KSEA LETTERS

Vol. 41
no. 3

Scientists and Engineers Early Career Development Workshop in Atlanta and San Francisco

Chapter, APS, and HQ News
Korea-US Science Cooperation Center

Established as a non-profit in 1997 for fostering science & technology cooperation between the U.S. and Korea through a variety of programs

S&T Program

Supporting S&T meetings
KUSCO scholarship for Science-majored graduate students
KUSCO-NRF-NSF Summer Institute Program
National Math and Science Competition

WEST Program

What is WEST program?

The WEST program is an exchange program created between the governments of the U.S. and Republic of Korea. The program will allow qualified university students from Korea to enter the United States for a period up to 18 months as Exchange Visitors on the J-1 visa.

<table>
<thead>
<tr>
<th>Parties</th>
<th>Names and type</th>
<th>Major responsibilities</th>
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</thead>
<tbody>
<tr>
<td>Host</td>
<td>The US organizations</td>
<td>Provide work experience</td>
</tr>
<tr>
<td>Sponsor</td>
<td>KUSCO</td>
<td>Visa, Insurance, and administration</td>
</tr>
<tr>
<td>Participants</td>
<td>University students from Korea</td>
<td>Travel, housing and living expense</td>
</tr>
</tbody>
</table>

Benefit Comparison between WEST and other J-1 program

<table>
<thead>
<tr>
<th>Items</th>
<th>WEST Program</th>
<th>Generic J-1 program</th>
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<tr>
<td>Visa</td>
<td>KUSCO applies</td>
<td>Host applies through sponsors</td>
</tr>
<tr>
<td>Program</td>
<td>KUSCO provides ESL and placement works</td>
<td>Host is responsible for the training program</td>
</tr>
<tr>
<td>Cost</td>
<td>KUSCO and Participants pay for travel, visa and ESL. No cost to the host.</td>
<td>Host may be responsible for the travel and visa application.</td>
</tr>
</tbody>
</table>

The Current Participating US host institutions

For further information as to WEST program at west@kusco.org
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDITORIAL NOTE</td>
<td>02</td>
</tr>
<tr>
<td>MESSAGE FROM THE 41st PRESIDENT</td>
<td>03</td>
</tr>
<tr>
<td>Scientists and Engineers Early Career Development (SEECD) Workshop</td>
<td></td>
</tr>
<tr>
<td>Overview</td>
<td>04</td>
</tr>
<tr>
<td>Summary of Presentations</td>
<td>08</td>
</tr>
<tr>
<td>Participant Post-Workshop Essays</td>
<td>12</td>
</tr>
<tr>
<td>Participant Testimonials</td>
<td>24</td>
</tr>
<tr>
<td>TECHNICAL ARTICLES</td>
<td></td>
</tr>
<tr>
<td>Flame-assisted Fuel Cells for the Power Generation Systems</td>
<td>25</td>
</tr>
<tr>
<td>Waste-Lithium-Liquid (WLL) Flow Battery for Stationary Energy Storage</td>
<td>27</td>
</tr>
<tr>
<td>FEATURED ARTICLES</td>
<td></td>
</tr>
<tr>
<td>New Technologies in Clean and Efficient Combustion Engines</td>
<td>29</td>
</tr>
<tr>
<td>End-of-Life Management of crystalline silicon (C-si)Photovoltaic Module</td>
<td>31</td>
</tr>
<tr>
<td>APS NEWS</td>
<td>33</td>
</tr>
<tr>
<td>KSEA HQ NEWS</td>
<td>37</td>
</tr>
<tr>
<td>KSEA HQ ANNOUNCEMENT</td>
<td>39</td>
</tr>
<tr>
<td>CHAPTER NEWS</td>
<td>40</td>
</tr>
<tr>
<td>KSEA PROJECT NEWS</td>
<td>45</td>
</tr>
<tr>
<td>KSEA SPONSOR LOGOS</td>
<td>48</td>
</tr>
<tr>
<td>KSEA SPONSOR ADVERTISEMENTS</td>
<td>49</td>
</tr>
<tr>
<td>KSEA ORGANIZATION</td>
<td>63</td>
</tr>
</tbody>
</table>
Finally, it is spring. The 41st KSEA publication team wishes you all the best in your research, development, work, and life.

The May issue of KSEA Letters of the 41st term highlights the KSEA’s first-of-a-kind effort dedicating to assistant professors and junior researchers, “The Scientists and Engineers Early Career Development (SEECD) Workshop.” We are presenting the summary of presentations made by guest speakers and the testimonials from inspired participants.

We are honored to deliver to you two featured articles from world-renowned scholars, Dr. Hong Im and Dr. Jun-Ki Choi, and two selected technical articles from distinguished scholars, Dr. Jeongmin Ahn and Dr. Youngsik Kim, introducing their frontier research projects in “Energy and Environment,” one of the four main themes of the UKC 2012.

In this issue, we proudly present the KSEA’s first effort to develop “the KSEA Chapter & Branch President Manual.” The Manual is the result of collective efforts by the 41st term chapter presidents and will be the first reference document for next chapter presidents.

We are pleased to share the news about events held by many affiliated professional societies of KSEA: Association of Korean Physicists in America (AKPA), The Korean Pathologists Association of North America (KOPANA), and Korean-American Construction, Engineering & Project Management Association (KACEPM). We are also excited to deliver successful stories of great chapters, including regional conferences hosted by these chapters: St. Louis, Seattle Washington, New England, San Diego, Southern California, and Georgia. In addition, Drs. Jonghwan Lee, Dong Sam Ha, and Gang-Ryung Uh shared their exemplary projects with us.

Lastly, please welcome our new Creative Director, Prof. Jun Bum Shin. Prof. Shin contributed to the new design of KSEA Letters and worked hard with Ms. Yoon Hee Chang and Ms. Anne Suh at the KSEA headquarter to make our May Issue look modern and professional. We hope this change of KSEA Letter brings inspiration to you. The 41st KSEA publication team will continue to make the Letter better for all the KSEA members. If you have good ideas, news, events, or articles to share, please simply e-mail them to sejong@ksea.org.

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EDITORIAL NOTE FOR KSEA LETTERS
Journal of the Korean-American Scientists & Engineers Association

41st KSEA publication team
Fellow members of KSEA,

It’s good to have over 200 selected KSEA members at two KSEA Scientists and Engineers Early Career Development (SEECD) Workshops in Atlanta, Georgia and San Francisco, California this spring.

The SEECD Workshop is a new initiative to support the professional advancement of young scientists and engineers. It is invigorating to work with assistant professors, post docs, and staff researchers to help realize and challenge their goals.

In the two workshops held in Atlanta in February 2013 and in San Francisco in April 2013, the programs focused on the topics of research and life, strategically ‘climbing the career ladder,’ finding funding resources and advice, capitalizing on opportunities, and effective writing and presentation skills, among others.

Throughout the workshops, I requested participants to i) communicate with other participants, especially those from different background and disciplines, ii) find opportunities to collaborate with other researchers, iii) discover new ways to observe and interpret theories and data, and iv) excel in your area of specialization and serve the community to which you belong.

The overwhelming number of applicants and feedback from the speakers and participants touched me. The passion and dedication of all those involved were unprecedented; many formed long queues to ask questions after workshop sessions, which led to long hours of inspired late night discussions. There were sleepless nights in both the east and west coasts.

Our organization is one that thrives on the unique expertise of each of our members. I saw the future of KSEA and our early career professionals through SEECD, in their thirst and passion for advice and information.

As we uphold the themes of innovation, creativity, and integration, I invite all of you to join, across generations and areas of specializations, to further communicate, collaborate, discover, learn, and finally excel in professional fields and organizations we work in.

Thank you very much.

Hyungmin Michael Chung
President, KSEA
The Scientists and Engineers Early Career Development (SEECD) Workshop was successfully held from February 23 to 24, 2013 in Atlanta, GA. Dr. Hyungmin Chung served as a general chair, and Drs. Seong Gon Kong and Jongdae Lee served as program co-chairs. The target audience was young Korean-American scientists and engineers in their early career paths, including junior faculty in academia, postdoctoral research fellow, graduate students, and researchers in government laboratories and industry. This two-day program presented essential topics such as strategies to win research grants, survive politics, publish research results in well-established peer-review journals, and to achieve career advancement in academia and industry. This event was promoted that attendees can

1) Learn how to obtain research grants from funding agencies such as NSF and NIH
2) Get information on job openings in academia, research institutions, and industry
3) Understand how to prepare for tenure/performance evaluation
4) Learn how to give an effective presentation
5) Build an information network with fellow scientists and engineers in the US

The speakers include program directors from NSF and NIH, experts in grant and paper writing as well as distinguished faculty with administrative experiences who can provide guidance for early career development in competitive environment. First plenary speaker, Prof. Dewey Ryu from Univ. of California, Davis, talked about his own experiences in many decision making occasions. Second plenary speaker, Prof. K. Wayne Lee, also provided insightful advice for the audience.

In Workshop 1, Prof. Jaehoon Yu offered to share lots of practical help on how to succeed in academia. The first session of Workshop 2, led by Dr. Clive Woods from NSF, was dedicated to the topic of how to get NSF funding. He presented detailed guidelines to apply for research funding to NSF. Dr. Priti Mehrotra from NIH covered the second session of Workshop 2 on how to get NIF funding. At dinner, workshop participants and KSEA officers had a chance to build a network. Followed by the dinner was Workshop 3, which covered job opportunities from industry. In particular, Lawyer S. J. Han presented the solutions to deal with various legal and immigration issues to work in the United States. This session concluded the first day of the workshop and the participants had a chance to get to know with each other.

The second day of the workshop began with a mock session of NSF and NIH proposal review panel. Participants were able to experience how their proposals are evaluated from this study session. A few attendees participated in the study session as volunteers. As the final program, Workshop 5 covered writing skills and presentation slide preparation. Dr. Lisa Rosenstein from Georgia Tech presented a broad spectrum of the topics with real examples.

Despite a relatively short notice to the potential participants, approximately 200 applications were received and only 110 applications were accepted to attend due to the limited budget for travel reimbursement and lodging. KSEA subsidizes the transportation, meals and lodging expenses to promote participation. All accepted participants were advised to share rooms with other participants to reduce the lodging expenses. Table 1 shows the break-down of those applied and accepted for participation in terms of their job positions. Numbers of applications from each local chapter are shown in Table 2.
### Table 1. Numbers of participants

<table>
<thead>
<tr>
<th>Position</th>
<th>Applied</th>
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<td>Assist. Prof.</td>
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<td>Graduate Student</td>
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<td>Research Scientist</td>
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<td>Others</td>
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<tr>
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<tr>
<td>Visiting Scholar</td>
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<tr>
<td>Engineer</td>
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<tr>
<td>Visiting Assist. Prof.</td>
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<tr>
<td>Assoc. Prof.</td>
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</tr>
<tr>
<td>Technician</td>
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<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>173</strong></td>
<td><strong>100</strong></td>
</tr>
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### Table 2. Numbers of applications from local chapters

<table>
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<th>Chapter</th>
<th>Applied</th>
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<td>New Jersey</td>
<td>3</td>
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<tr>
<td>Baltimore</td>
<td>2</td>
<td>North TX</td>
<td>8</td>
</tr>
<tr>
<td>Canada</td>
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<td>Northern Cal</td>
<td>1</td>
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<tr>
<td>Central IL</td>
<td>3</td>
<td>NY Metro</td>
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<tr>
<td>Central Iowa</td>
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<td>Nebraska</td>
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<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>173</strong></td>
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NEW SCIENTISTS AND ENGINEERS EARLY CAREER DEVELOPMENT WORKSHOP

Chair Report in San Francisco

The 2nd Scientists and Engineers Early Career (SEECD) Workshop was successfully held from April 27 to 28, 2013 in San Francisco, CA. Dr. Hyungmin Chung served as a general chair, and Drs. Chan Seung Park and Sung Yi served as program co-chairs. KSEA is devoted to developing young Korean-American scientists and engineers in their early career paths through this two-day workshop. The purpose of the workshop was to provide the information on how to apply for NSF, NIH and DOE research grants, how to write proposals, how to prepare oral presentation and technical writing skills to young Korean-American scientists and engineers in their early career paths. Moreover, it also provided an excellent opportunity for young Korean-American scientists and engineers to gather to discuss their careers plans and research.

The two-day program consisted of seven sessions including plenary talks, how to get NSF funding, how to get NIH funding, Networking, how to get DOE funding, proposal writing skills, and presentation skills. It included a total of eight presentations.

The first plenary speech was given by Dr. Nam Pyo Suh from MIT. His title of the talk was “On Developing a World-Class Research University”. He presented research spectrum versus impact and discussed about what kind of research we have to do. He also talked about how the advice of Professor Frank A. McClintock of MIT influenced his research and academic career. Briefly he presented the achievement he made during his tenure in KAIST. He spent much time on talking about various lessons he learnt through his careers and giving much advice to the young generation.

The second plenary presentation was given by Dr. Dewey D. Y. Ryu from UC, Davis. He gave a speech on career planning and development. He said that career planning and preparation is the most important and difficult project of your own during your life time and is a continuing life time task. He also talked about leadership quality, communication skills, team work, learning experiences with open mind, professional networking, etc. He also provided much advice to the audience.

There then follows a presentation by Dr. R. Clive Woods from NSF. He gave the introduction to NSF and talked about NSF Review Criteria such as intellectual merit broader impact, how to work with NSF and International Science and Engineering Program. He also provided keys to success with NSF.

The fourth presentation was provided by Dr. Priti Mehrotra from NIH. Her title of the talk was “Fundamentals of the NIH Grants Process”. She presented detailed guidelines to apply for research funding to NIH.

The fifth presentation was given by Mr. David Koh from KITECH, USA. He talked about various funding opportunities from KITECH.

During the dinner, Dr. Minyoung Lim provided a mini talk on business dining manners and organized networking session. All participants were divided by ten groups based on their expertise. Appreciation certificates were also presented to all speakers during the dinner.

On the 2nd day, the first presentation was started by Ms. Corinne Valkenburg from Pacific Northwest National Laboratory. She talked about how to respond to DOE funding opportunity announcements. She presented some proposal examples and provided essential tips to be successful.

The next presentation was followed by Mr. Mitch Boretz who is a technical communication specialist from UC, Riverside. He discussed strategies for finding suitable funding opportunities and how to prepare successful proposals. He also provided tips on how to use free, public funding search engines effectively.

The last presentation was given by Ms. Diana Lizarraga from UC, Berkeley. She covered the preparation of presentation slides and optimizing oral presentation. She provided many good examples.
Total 149 applications were received and only 101 applications were accepted to attend due to the limited budget for travel reimbursement and lodging. Tables 1 and 2 show the list of those applied and accepted for participation in terms of their job positions and the list of applications from each local chapter, respectively.

It is our earnest hope that this workshop will help young Korean-American scientists and engineers in their early career paths.

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### Table 1 Numbers of participants

<table>
<thead>
<tr>
<th>Position</th>
<th>Applied</th>
<th>Accepted</th>
</tr>
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<tbody>
<tr>
<td>Post-doc</td>
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<tr>
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<tr>
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<tr>
<td><strong>Sum</strong></td>
<td><strong>149</strong></td>
<td><strong>101</strong></td>
</tr>
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</table>

### Table 2 Numbers of applications from local chapters

<table>
<thead>
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<th>Applied</th>
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</thead>
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<td>Boise Idaho</td>
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<td>NE New York</td>
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<td>New York Metropolitan</td>
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<tr>
<td>North Carolina</td>
<td>5</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td><strong>149</strong></td>
</tr>
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</table>
Dr. R.C. Woods of the Office of International and Integrative Activities at the National Science Foundation (NSF) delivered two presentations: the first on “Winning awards from NSF” and the second, shorter, presentation on the differences between NIH and NSF panel reviews. Dr. Woods is a “rotator” Program Officer responsible for Japan, Korea, New Zealand, Australia, Mongolia, and the CNIC program at NSF, on temporary assignment away from his usual position of full professor of Electrical Engineering.

His first presentation on “Winning awards from NSF” summarized the basic information that a new researcher needs to know when submitting proposals to NSF, the major US Government supporter of basic research in US universities. This presentation began by describing the NSF: its internal organization into Directorates and Offices, its position within the US Government, and its current size and budget. Although submitting proposals for specific research projects is the only way to obtain research funding from NSF, it may be beneficial for researchers in their early careers (as well as “old hands”!) to offer to contribute to NSF as a mail reviewer or a panel reviewer. In this way, they can get to know program officers better, which will help later in obtaining potential research support.

Dr. Woods spent some time discussing the review criteria used at NSF for research proposals. The Intellectual Merit and Broader Impact of a proposal are evaluated separately in the context of five review elements, of which the last four are the same for both. Some examples of good Broader Impact were also discussed. Common pitfalls in preparing proposals for NSF include using fonts or margins too small (always interpreted as an attempt to circumvent the strict page limits in force), failing to have the summary cover both Intellectual Merit and Broader Impact of a proposal, exceeding the page limit, failing to write biosketches in the correct format, and failing to include a Data Management plan. Once the pitfalls are avoided, proposers need to manage their submissions to NSF to maximize chances of support, and effective strategies for achieving this were discussed.

Dr. Woods also covered the organization of International issues at NSF, his own specialty while working at NSF. The mission of the International section at NSF is to catalyze international collaboration where little or none exists at the moment, and this section typically does not get involved much in mature collaborations (for example, the extensive international collaborations required in high-energy physics facilities). International programs at NSF of particular interest to early-career researchers include CNIC for planning visits overseas where the researchers have little or no prior history of collaboration, IRES for sending students (UG or graduate) overseas for short research projects, and the GROW extension to the NSF GRF program for sending GRFs overseas for extended research collaborations.

A separate, shorter, presentation covered the major differences between review panels operated by NIH and review panels operated by NSF. As far as proposers are concerned, the most significant difference is that at NSF every proposal is considered de novo, i.e. there is no formal identification of a proposal as a resubmitted version of a previous proposal. With a small number of exceptions such as CAREER where PIs are allowed only a small maximum number of submissions, there is no limit to how many times a proposal based on the same idea can be submitted to NSF. The only general limitation is that an identical proposal cannot be resubmitted if it has previously been declined. If an honest and professional attempt is made to take account of the comments of the reviewers, it is likely to be reconsidered anew at NSF.
SUMMARY OF PRESENTATIONS II

The National Institutes of Health (NIH) is the world’s leading supporter for biomedical research. The NIH supports extramural biomedical research by funding grants to the investigators in the United States and other foreign countries. NIH-supported research has a major positive impact on nearly all of our lives by improving human health. The NIH invests over $30.9 billion annually in medical research. More than 80% of the NIH’s funding is awarded through almost 50,000 competitive grants to more than 300,000 researchers at more than 2,500 universities, medical schools, and other research institutions in every state and around the world. About 10% of the NIH’s budget supports projects conducted by nearly 6,000 scientists in their own laboratories. The NIH is made up of 27 different components called Institutes and Centers (ICs) and each of them has its own specific research agenda.

There are different funding mechanisms, e.g. career development (Ks), fellowship (Fs), investigator-initiated (unsolicited) research projects grants (Rs; R03, R21, and R01) or IC-specific initiative that solicits research in a predefined high-priority area (solicited; Rs and Us), small business awards (SBIR/STTR), and contracts (RFPs and BAAs). Before contemplating for NIH funding, see if and how you may fit in at NIH. First, assess whether your area of science falls within NIH’s mission. If it does, determine what type of support you may qualify for since NIH has many types of awards for scientists at different career levels with different research needs. Choosing an appropriate grant type may have major repercussions on your research and career. Writing a successful grant application requires careful planning, selection of a project, informed discussion with an NIH Program Officer (PO), and assembling a well-organized, visually appealing application that avoids common mistakes (typographical error). While writing the application, it is important to know the audience and target the research accordingly. Understand how the application will be assessed, and write the title, Specific Aims, and the various sections of the Research Strategy emphasizing significance, innovation, experimental design, and impact of the research on human health. Read about NIH peer review process and when feasible and take advantage of new and early-stage investigators when applying for your first independent NIH research grant. NIH sets target numbers for funding new and early-stage R01 investigators and they get some breaks of higher paylines.

After successful submission of the application, stay in-contact with the Scientific Review Officer (SRO; Designated Federal Official) assigned to the application. The SRO is responsible for assembling a panel of scientific experts, managing conflicts, assigning reviewers to the application, explaining peer review process, conducting the review meeting, and guiding the panel to get fair and objective review of the applications by providing NIH peer review policies. The reviewers provide written critiques and score applications using NIH 1–9 peer review scale based on the Scientific and Technical Merit of the application. The SRO writes resume of the discussion at the meeting and assembles summary statement of reviewer’s critiques including comments for other review criteria or considerations, e.g. human subjects and/or Vertebrate Animal. After peer review of the application and receiving Overall Impact Score of the application, do not forget to contact the PO. S/he would provide feedback about review of the application. Finally, Grants Management Staff (GMS) would work with the PO and the applicant institution to release money if the grant is to be funded. However, if the application is not funded after first submission, stay calm and don’t worry! Wait till you get SS. Read reviewers critique with positive mind, response to their comments, and prepare a re-submission application with all sections included according to the NIH application submission policy and re-submit on time. Start early in the process, never give up, and do not work in vacuum! Establish good collaborations, networks, mentors, and keep communication open with all parties involved for a successful NIH funding.

The key word for applicants is persistence.
SUMMARY OF PRESENTATIONS III

Professor Jaehoon Yu gave a talk titled “Things that might be helpful for an academic career” which focuses on survival skills in academia. As a recently promoted full professor at the University of Texas at Arlington, he perhaps was one of the best candidates to talk about this topic. His current administrative position as the associate chair of the physics department has added a different aspect of the entire tenure and promotion process in academia.

Following the previous talk of professor Wayne Lee, Dr. Yu opened the talk with describing his dream of solving the world energy problem but approaching it from looking for the fundamental building blocks of matter in the universe and understanding the forces between these basic particle. This dream-in-the-process-of-accomplishing led to a description of his discipline whose historic discovery of a new particle that behaves like the Higgs particle, sometimes dubbed as the “God” particle.

Since the 120 or so audiences were primary in early stage of their academic career, including many postdoctoral fellows and tenure track assistant professors, Dr. Yu’s talk on the survival skill began from the postdoctoral fellow searching for a faculty position. He emphasized that the time period as a postdoctoral fellow is a period of solidifying the fundamentals that would catapult one to the future and that one will continue cherish throughout the career. He, like the previous two speakers, emphasized good communication skills, pointing out that it is one of the greatest weaknesses of Koreans. He gave several examples of why good communication skills are necessary. He also emphasized of open mindedness at any stage of a career and the importance of building a good network. He described in detail what a normal tenure and promotion process is, emphasizing the importance of fully understanding what is needed for tenure. Early understanding of the process and the necessary ingredients of the tenure process will allow young postdocs and assistant professors to prepare their minds well ahead of the time before the actual process sets in, giving them a head start. He emphasized the essentiality of successful research over and over and on leveraging collaboration within the department, across the university and throughout the world. He also discussed the importance of teaching, providing what teaching entails to, and the services that not only within the university but also within one’s own field.

Finally, he emphasized that crises always bring opportunities and told audience that they have to keep their head held up high and pursue their dreams. In answering a question on regrets in his life, he said that he had a lot of occasions to regret but he advise everyone to use mistakes as opportunities to learn and continue head toward accomplishing one’s own dream. He finished his talk with three proverbs he has learned in his middle school Chinese class that rings truth to this day – “Take care of your health, both body and mind,” “Take care of your family,” and “Go and save the world”!

On Sunday, February 24, Dr. Lisa Rosenstein, who directs the Engineering Communications Programs for the School of Civil and Environmental Engineering and the School of Materials Science and Engineering at the Georgia Institute of Technology spoke to the SEECD workshop participants. She addressed two topics: “Standard Headings in Scientific Papers” and “Effective Slide Design.”

In her first talk, Dr. Rosenstein outlined the standard practices and standards of excellence in writing scientific papers. Most notably, Dr. Rosenstein stressed the importance of knowing what types of information goes in what section and making sure contents do not overlap from one section to another. For example, she gave useful advice on what information to include in an Introduction—motivation, relevant background information, and research objective—and explained how to keep the Results and Discussion sections entirely separate.

In her second talk, Dr. Rosenstein outlined the standard practices and standards of excellence in slide design. She reminded her audience that a successful oral presentation has three components: strong and well-organized content, a confident, professional delivery, and clearly designed slides. If any one of these components is missing, the quality of the presentation will be compromised. Dr. Rosenstein addressed such issues as choosing font style and size, designing backgrounds, and integrating graphical elements. She also showed example slides for all of the fundamental principles she addressed.
SUMMARY OF WORKSHOP

RESPONDING TO DEPARTMENT OF ENERGY (DOE) FUNDING OPPORTUNITIES

Ms. Valkenburg walked through the steps necessary to developing a proposal from the perspective of a potential reviewer. She deconstructed a recent funding announcement to reveal the critical elements being requested, discuss how to organize a response, realize the power of professional appearances and figures, and provide relevant context for a proposed effort. Participants learned that how to force one’s primary expertise to fit the objectives of a posted funding opportunity.

PROFESSIONAL PREPARATION I: FINDING AND WINNING RESEARCH FUNDING

Mr. Mitch’s presentation introduced young investigators to best practices for finding and winning grant and contract funding for science and engineering research. Participants learned about strategies for finding suitable funding opportunities and how to prepare successful proposals. Participants also learned how to use free, public funding search engines effectively, and understood the steps and approaches necessary for developing successful proposals.

PROFESSIONAL PREPARATION II: EFFECTIVE PRESENTATION SKILL

Ms. Lizarraga introduced up-to-date presentation resources and technique that improves presentation skill of participants. Participants totally agreed that the effectiveness is one of the most important key elements in presenting results. The tips and the good & bad examples presented by her brought many insights to the participants.
I would like to thank the organizers of Korean-American Scientists and Engineers Association (KSEA) for facilitating the Scientist and Engineers Early Career Development (SEECD) workshop this year. I felt fortunate to have a chance to be a part of the SEECD workshop. I am into second year of my postdoctoral training at the Rockefeller University after completing my PhD at Stanford University, and have been actively seeking opportunities to network professionally with fellow scientists. This workshop not only met, but also exceeded all of my expectations. It was well organized, combining informative introductory sessions on funding agencies like NSF and NIH, and personal experiences in achieving career success from renowned Korean-American professors, as well as networking opportunities with fellow Koreans from all different disciplines with a wide range of expertise.

During this workshop, I have learned a great deal of what it takes to achieve professional goals. In particular, Dr. Dewey Ryu gave me inspiration to dream big and passionately pursue it with all my heart and strength. Also he greatly emphasized how important it is to cherish personal relationships with our family, friends, and colleagues as we move forward in our professional career. Moreover, I met so many female scientists who are at the top of their fields. It was absolutely inspiring for me to know their career pathways, which will guide me through career and life planning. On top of that, I met incredible individuals in diverse fields at various stages of their career and I would love to stay in touch with them. If I may suggest my two cents, it felt as though the allocated time for networking was a bit limited. It would have been even better if we had slightly longer breaks between talks or had a reception after dinner, thus promoting our professional networking. Nonetheless, I can certainly tell you that this workshop was well suited to my needs. I hope there will be another SEECD workshop next year and it will continue to prosper for many years to come. I would highly recommend attending this workshop to anyone in any stages of their career.
Here is my recommendation. If you see the next SEECD Workshop announcement, Just do it (sign up took me about 5 minutes). Why? Here are my reasons:

**Great speakers.** We had Drs. Dewey Ryu, K. Wayne Lee, and Jaehoon Yu, who shed a light on the big picture of how an academic / non-academic career generally pans out. Their success stories are too great (even somewhat intimidating), but the lesson I got was “An academic career is more than just doing research and teaching. I should be more creative and open to lots of possibilities and seize them by being excellent.” We also had Drs. R. Clive Woods and Priti Mehrotra, who helped me understand the operation of NSF and NIH. Dr. Lisa G. Rosenstein also shared very practical tips on how to write better scientific papers. As you may guess, this one-day event may seem quite intense, but it was like an one-stop shopping mall. You can get many things in a single day.

**Great friends.** On top of excellent speakers, I enjoyed meeting old friends and making new friends. Though I wish that we had a dedicated event for networking, I still had chance to talk to people during meals and breaks. I even went out for beer with my roommate, who was randomly assigned to me. Yeah, he became a good friend of mine. By the way, I think that there is something unique about SEECD as a networking opportunity. Unlike other academic conferences / workshops, it consists of people with extremely diverse background. I met people in electrical engineering, physics, horticulture, and epidemiology at the same time. In spite of such diverse academic background, we still share the same cultural background, which seemed to help us bond quickly and easily. It was fun.

**Great potentials.** Still, I believe that the true potentials of a SEECD workshop are largely untapped. A group of 100+ young talents in diverse disciplines get together for one day. If they just listen to talks and go home right away, what a big waste it is. We could do better than that. We can be good friends; we can even have quick brainstorming sessions about research projects over beer; we can sustain friendship over a social network [https://www.facebook.com/groups/KSEA.SEECD/](https://www.facebook.com/groups/KSEA.SEECD/); and we can evolve the network by sharing information and helping each other. Something great will come from this network.

I hope that future SEECD workshop attendees will be excited about this opportunity and be ready to proactively participate. We should thank the workshop organizers, Drs. Hyungmin Chung, Jongdae Lee, and Seong G. Kong, for their tremendous time and effort to make this happen, but I believe that the best thing hasn’t happen, yet.

Oh, I forgot to introduce myself. I am Ji Soo Yi, an assistant professor in the School of Industrial Engineering at Purdue University. I just attended the first SEECD Workshop in Atlanta, GA.
Participation in the first SEECD workshop has reminded me how I was introduced to KSEA. It was the math competition events organized by KSEA New England (NE) Chapter and supported by MIT KGSA (Korean Graduate Students Association). Those events that I volunteered to support as a graduate student were very meaningful to me because I could meet KSEA members who were sincere and serious in fostering the young generation of the Korean-American community in the area. Later, I had more chances to work with KSEA NE Chapter more interactively as the president of MIT KGSA. Through all those events, I witnessed how beneficial and grateful it is to have the well-established Korean role models in the US who overcame and cared about difficulties that young Korean students and researchers had.

With such previous experiences with KSEA, I found that the SEECD workshop embodied the spirit of KSEA successfully, and believe that the workshop must be continued for the growing community of Korean scientists and engineers who have just started their career in the US. As such a junior faculty starting my own research program, I had been desperately looking for practical tips and advices from Korean faculties who have survived in academia. Upon receiving an announcement email about the SEECD workshop, I realized that the workshop was exactly what I wanted. Since then, I frequently visited the KSEA website to check when the application for the workshop would be open, and my application was submitted on the very first day of the application. Luckily I was selected among about 200 applicants as the only participant from Nebraska, and I appreciate KSEA for its thoughtful selection decision considering the demography of Korean scientists and engineers across the nation. The SEECD workshop provided useful information and unique advices based on Koreans' perspectives and experiences. Especially, the clarification of and tips about politics in academia were such unique and exceptional information that I had not been able to find elsewhere. I am sure that all the information from the SEECD workshop will be firm foundations for me to survive and hopefully to succeed as a Korean faculty in the US.

The SEECD workshop was also a valuable chance for me to network among KSEA members because I could see some of my acquaintances and introduce myself to those who can be my future colleagues. Because the importance of network cannot be overemphasized, I would like to suggest having speed dating among the participants for the next SEECD workshop to maximize its network capability. It would go like this: Before the workshop, every participant prepares and submits one-page summary of her or his research, and these summaries are open to all participants for browsing. Then each participant selects and contacts other participants who have common research interests, and they have speed dating during the workshop to seek for possibilities of collaboration. I had a similar event between University of Nebraska-Lincoln and University of Nebraska Medical School, and the event was very helpful for me to know research and expertise of other faculty members and to find collaboration chances. Therefore, I believe that it will reinforce the network medium role of the SEECD workshop to help participants find possible collaborators in KSEA.
The KSEA SEECD (Scientists and Engineers Early Career Development) Workshop, which took place on February 23 through 24, 2013, in Atlanta, Georgia, was a truly great experience for me. This is my fifth year teaching at East Carolina University, Greenville, North Carolina; as a junior professor, there were still many unanswered questions about my career path and research process. While listening to the presenters from various fields and with different kinds of expertise and backgrounds, I was able to greatly expand my understanding of possibilities, opportunities, and challenges particularly for professionals in their early stage of academia in the US. As an art educator who is interested in the intersection of digital technology, visual art, and cultural identity development and its implication for education, I was very curious about what this workshop would offer me, and how it would influence my scholarly and career development. Finally, finishing up the last session of the two-day long workshop, I felt very happy and fully satisfied about what I had learned and how much I had reflected on my past, present, and future.

Through the first three presentations on the first day of the workshop, the senior Korean-American scholars, Dr. Dewey Ryu, Dr. K. Wayne Lee, and Dr. Jaehoon Yu, inspired me to a great extent. I was impressed not only by their incredible expertise and achievements, but also by their passion and enthusiasm to share what they had earned with junior colleagues. Behind great success stories of each presenter, there were always hard work, challenges, patience, positive attitude, humility, and great hope to help others. Most importantly, all the three presenters, who gave their lectures on the first day, stayed in the conference room until the very last moment of the workshop next day, answering questions from the participants and giving important guidance and great tips for the better future of the younger scientists and engineers. This was a very powerful metaphor for their willingness to encourage younger generations with great enthusiasm, as I knew how busy they are. This experience also led me to think, “I want to be just like them when I get to that career stage in my field.”

While the three lectures were very inspirational, the other three presentations given by Dr. R. Clive Woods (NSF), Dr. Priti Mehrotra (NIH), and Dr. Lisa G. Rosenstein, were very practically helpful. Each session about insider views on grant writing, scientific paper writing, and professional presentations was clear and easy to understand. I will definitely use the information and knowledge I gained through these lectures in my future career.

I wrote a thank you note to all the presenters when I got home and, to my surprise, I received a reply from every one of them. How amazing! This demonstrates how enthusiastic they were for this workshop and how serious they are in trying to make a positive change in the lives of their junior colleagues. Finally, I want to give sincere thank you to President Hyungmin Michael Chung and the two perfect organizers, Drs. Jongdae Lee and Seong G. Kong, for their hard work and passion for this meaningful event, which surely will constantly influence the upcoming steps in the participants’ career paths.
Imagine if you had a manual that you could conveniently look up solutions when you ran into a problem. It would be even better if you could personally summon people for guidance. That is exactly what happened to me last February. Into my second year as an assistant professor, I was desperately looking for funding and searching for a way to navigate through new people that I had to get to know in the littlest time possible. So far, everyone around me offered me advice, but somehow failed to guide me on how exactly to do them. Then, I had chance to participate in the KSEA SEECD workshop in last February. Applying for this event was absolutely a no-brainer and I am still grateful that I was given the chance to participate in this event.

The workshop started with talks by two former presidents, Drs. Dewey Ryu and Wayne Lee from UC Davis and U of Rhode Island, respectively. I was initially quite unsure how to relate myself to these well-established people as they were listing their achievements that seemed highly unrelated to what I am. One question popped up during the section: can this part of the workshop be related to my quest to survive in the US? Well, of course. The workshop was about becoming successful. The answers were given later. One of my elementary school teachers once told me to read the whole question before answering. My teacher still has his point.

Dr. Jaehoon Yu from UT Arlington presented a guideline on how to deal with tenure and promotion processes. He essentially shed a light on how to survive in the US College as a foreigner by detailing the process from a bachelor degree to a position as a full professor that approximately takes more than a quarter century. One take-home message: be a great communicator! Frankly, you would learn how to communicate with audience by simply watching his way of presenting his talk, although his slides are full of detailed guidance. You can sometimes learn more from seeing than from reading. Dr. Yu was a great communicator in any standard.

Drs. Clive Woods and Priti Mehrotra from NSF and NIH, respectively, provided insightful presentation on how federal funding processes work. I have to note that this sort of opportunity rarely comes without a hefty remigration fee. Dr. Woods highlighted the funding area in which NFS is interested. He also emphasized that NSF staffs are eager to talk to the grant proposers. Of course, he took a great deal of time to list what to do and what not to do. By the way, do you know what you have in common with Nobel Prize winners? SEVERAL REJECTIONS from these funding agencies. I am now one step closer to this elusive Nobel Prize. The simple message was that we need to try the grant application more resiliently. Dr. Mehrotra also went great lengths to explain the NIH review process including scoring, reviewing and recommendation. She also emphasized trying without any reservation even after continuous rejection and communicating with program directors. I guess we may have been just too shy!

Next morning, I participated in the mock NIH study section as a moderator. I have to note that Dr. Mehrotra made detailed scripts well before the mock section. I would sincerely like to take this opportunity to thank her for her effort to organize the event. Many thanks also go to all the participants that made the event successful. Multiple hats that Dr. Woods brought to the event definitely made this rather serious event cheerful – a genius idea! I am sure that all of the audience was able to see what really goes on in the reviewers’ room after this mock study section. Last section, but not the least; Dr. Lisa Rosenstein from Georgia Tech gave a seminar that everybody can relate to: how to write good papers and to make good slides. She gave such an organized and to-the–point presentation that I didn’t need to look up at her slides to remind myself what was important: be effective! Just knowing what is important in this process seems to be already half way to successful presentation and publication.

The two-day workshop flew by quicker than anybody imagined. Can I see myself standing with successful people like our former presidents? I now know what takes to get there. Can I get there? Only time will tell. Once again, I would like to thank the organizers for this truly enlightening event for people like me.
When the KSEA announced holding the SEECD workshop on February in Atlanta, GA, I applied it and got an invitation email with notice of travel expense reimbursement. I was so excited to travel with most financial support and to attend the workshop with listening valuable talks from guest speakers and networking with other KSEA members. However, I could not find an air ticket less than $350 (Airfare reimbursement was up to $350 over 1,000 miles, and a distance from Boise, ID to Atlanta, GA is more than 2,100 miles) and I was coincidentally scheduled for a couple of job interviews the following day, I had to decide to cancel attending the workshop. I was very disappointed to give up this great opportunity, and I sent email to Dr. Jongdae Lee, program co-chair with a notice of my cancellation. He replied and mentioned “We are planning one for the west coast region but the date has not been set yet. Stay tuned”. I was glad to hear that and I had waited their announcement. At the end of March, the KSEA announced holding another SEECD workshop on April in San Francisco, CA so I applied it and got an invitation again.

I arrived at the hotel at 12:35 pm on Saturday. I was little tired after I drove 670 miles (11 hours driving) from Boise, ID. To make matters worse, luncheon was just finished so I could have only bitter coffee in front of registration desk. After a while, there were two plenary talks by Dr. Nam-Pyo Suh and Dr. Dewey Ryu that were very didactic and influential so I could almost forget my hunger. Both of them are well known and have been studying engineering for half a century and happened to graduate from MIT a long time ago. I knew that Dr. Suh is the former president of KAIST and he contributed his efforts so much for developing programs and reputation of KAIST, but I was surprised to hear that Dr. Ryu was one of KAIST founders. It was fascinating and admiring stories to hear how they came to USA, started their education and career, and kept their goals with various experiences. Dr. Suh mentioned that our education is not a part of governmental business so it should not be controlled by any political issue and a high-ranking governmental official. Most of all, I was struck with Dr. Ryu’s advice “Do not follow successful man’s way, but develop your own way”. Sometimes, people believe that it would be easy to learn a lesson from someone who already had his/her success in their field and to follow his/her ways to minimize their failure. I totally agreed with his advice and it helped me believe in myself, explore with an entirely new field, and enjoy my adventurous life. It was very valuable plenary talks that I wanted to spend more time listening and communicating with them later.

While we had a couple of very short breaks due to delayed schedule, I met few people studying different fields and came from different locations. We shared with stories about not only professional major but also living circumstances including monthly rent, children’s education, and local amenities. We sat next to each other for listening next plenary talks. Dr. R. Clive Woods who is a FIET Program Director and Dr. Priti Mehrotra who is a chief of the immunology review branch, scientific review program, gave us how to get National Science Foundation (NSF) and National Institutes of Health (NIH) funding. Most of scientists and engineers were interested in getting some tips in order to improve quality of their proposal. Especially, Dr. Woods encouraged us not to give up when we apply our proposal for NSF funding and receive any negative comment or rejecting response from a committee. He mentioned it is not easy to get funded, but it would be eventually granted if we carefully prepare our proposal and take enough time to read and understand all indications and recommendation.

After a few recruiter presentations followed by taking group photos, we moved to the opposite room for dinner. There was an abbreviation tag on each table, and I sat with few people I already knew in the ENE-tagged table. It was thoughtful consideration by organizers wanted us gathered with similar major. Therefore, it was relatively easy to talk to each other for networking. While we were served with very delicious food, Minyoung Anna Lim led a networking session with a table manner. She taught us very simple ways to remember so we followed by what she mentioned in that dinner. In addition, Dr. Priti Mehrotra gave us a brief speech how she came to USA and how she was able to get the important position in the NIH. It reminded me giving up a well-known position in Korea Water Resources Corporation two years ago and challenging with full of my ambition and passion in entirely new world. It was very memorable night with good food, people, and networking.
The following morning, we had a few more talks on DOE funding opportunity and professional preparation. Especially, Ms. Diana Lizarraga delivered us a presentation skill with various techniques of MS Office Power Point, and most of people seemed to pay attention much. It was very useful to learn not only how to bring audience interest with design, pattern, and techniques but also what to avoid on making slides. After she finished her talk, Dr. Chan Seung Park announced the workshop was finally finished, then people said goodbye to each other and left the room with a sorrow of parting. Thereafter, I left the hotel at noon and drove my car for 12 hours, and I finally arrived at home 2 am. It was very long distance with exhaustion, but very valuable and unforgettable memory.

Finally, I would like to thank all of organizers preparing the workshop and giving me the great opportunity participating in the workshop. Especially, I would like to thank Dr. Chan Seung Park who took so much effort with taking many photos for our memory and moderating program in the 2nd day workshop. I wish we have more chance to have something like it in future.

As a local chapter president, I attended 2013 KSEA mid-term council meeting being held in Atlanta, February 23-24, 2013. The meeting was focusing on issues and challenges we, KSEA, are currently facing, which are budget, activities, staffing, and general operations. During the meeting, two other events, including “Scientists and Engineers Early Career Development Workshop (SEECD)” and “KSEA Southeastern Regional Conference (SERC)” were held concurrently. SEECD, in particular, caught my attention not only because I am familiar with those meetings often organized by universities and/or federal agencies, such as the National Science Foundation (NSF) and the National Institutes of Health (NIH), but also I wonder how KSEA can come up with this brilliant idea. These days, many postdoctoral research associates, early career faculty, and Ph.D. students are struggling with finding permanent jobs and/or high-paying jobs, but getting such jobs is always challenging and competitive during the long-lasting economic downturn. As such, many young scholars and career-ready students are looking for outlets, where they learn job-seeking strategies and career building techniques, which are critical assets in their career portfolio.

During my visits in Atlanta, I simply recognized that opportunity but I haven’t committed to participate in SEECD due to the previous task engagement. But, I also recognized that another SEECD event tailored to young scientists in the western US was proposed by President Hyungmin Chung and scheduled to be held in San Francisco, California coming soon. A couple of months later, working with local organizing committee members, including Chan Seung Park from UC Riverside and Sung Yi at Portland State University, President Chung successfully made it happen. For the 2-day workshop, April 27-28, 2013, many young scientists from various fields including biomedicine, environment, water, energy, public affairs, and so on and from academia, industry, and other NGO groups participated in this meeting and promoted broad social and professional networking. Especially, graduate students took an advantage of job-seeking opportunities through cohesive KSEA networking and they shared lots of information for their career path.

During the workshop, outstanding guest speakers were invited and they made powerful presentation and enlightened young KSEA members to compete history rather than contemporary so that they can achieve goals they dream on. Dr. Suh Nam-Pyo, the former President at the Korea Advanced Institute of Science and Technology (KAIST), gave an excellent icebreaker speech. His speech was very impressive, persuasive, and informative in the sense he shared his personal story ranging from graduate life at MIT to administration challenges when he was incumbent at KAIST as President. I believe that his selflessness and spirit of forgiveness will help young scientists promote moral standard and career success in their field.

Another fascinating speech was made by Dr. Dewey Ryu from UC Davis. His research credential is well recognized nationally and internationally. One of the striking moments during his talk, in my opinion, was when he was elaborating the early history of KAIST. He was a member of “the gang of six”, who has involved in establishing KAIST back in the early 1970s.
What a scene. I thought to myself sitting in the corner of the Hilton Bay Front Hotel’s conference room on the Saturday afternoon of April 27. Dozens of cell phones were waving through the room, eager to take a picture of Dr. Nam Pyo Suh as he began his plenary talk at the SEECD (Scientists and Engineers Early Career Development) workshop. Young professionals in the room were paparazzi as if he is a celebrity. Perhaps all not surprising given the stature of Dr. Suh as a household name in Science, Engineering and Education. Throughout his career he brought various technological innovations at MIT and steered NSF (National Science Foundation) as a leading administrator during his tenure. More recently, he has been in the center of media focus as he assumed the reins to head KAIST as the 13th president.

We kicked off with Dr. Suh’s life story. I was particularly intrigued by how others have influenced his career path in the way unexpected. Often we believe, or at least try to believe, that we are the master of our lives and everything is under our control. Nonetheless, it becomes obvious, though often in only in hindsight, that meeting the right person at the right time marks major inflections in our career trajectory. Please think of those who shaped you as a person- parents, teachers and mentors, spouse and children, coworkers and friends- and recall how they walked into your life. The same applies for a professional life, at least for me. I once met a fellow woman scientist by total chance at a local symposium which eventually landed me my first job. The job turned out not to be the greatest but the person I met at the symposium led me to KWiSE (Korean-American Women in Science and Engineering), a sister organization under the umbrella of KSEA, and eventually to KSEA.

Next in the impressive line-up of speakers was Dr. Dewey Ryu, a professor and director of the Biochemical Engineering Program at the University of California Davis, who then brought his personal and professional journey to the podium. He shared his personal experience going back to the ‘gang of six’ whose visions were to establish a university with a focused mission: A university that leads the nation’s Science and Technology Education at the front line. Their vision and persistence was did not pass without reward as KAIST was established in 1971. Dr. Ryu emphasized that it was possible only by the strong leadership of former president Park Chung-Hee and his commitment to Science Policies. Thereafter, came the era of the big leap, the period of magical changes, and the time of great scientists and engineers; The belief of these pioneers that elite scientists and engineers will lead the country’s economic development held true. So I ask myself, what about now? Can we, the young professionals that gathered from all around the US for this workshop, partake in a similar course of history as their predecessors did?

It was an open question and young professionals in Science and Engineering were eager to converse with their seniors. Many attendees wanted to discuss about the disparity they are facing. Ideal or reality? Should we all pursue great science by challenging ourselves with the most difficult questions? How should the next generation of scientists and engineers be trained? Clearly, Dr. Suh’s educational experiment at KAIST has far from seen a conclusion, as proven by heated debates by the attendees about the future of Science and Technology in Korea following the end of the schedule. While I held my breath on any definitive answer to the overarching questions in the future of Science and Technology, the workshop program offered an opportunity to help prepare myself in the immediate real world as well. Three major funding agencies for scientific and technological research presented their mission, how to identify funding opportunities and apply for them, and explained the useful tips may aid in successful funding, and other training opportunities at the institutes etc.

The workshop attendees had a vast spread of research interests and career plans, and, to the attendee’s delight, the diverse funding mechanisms offered by NSF, NIH, and DOE was able to match much of the needs and interests of this diverse audience. The sessions on transferable skills such as business dining manners, manuscript and grant writing, and presentation skills were also well received and successful. Scientists and engineers are being asked to be all-round players- to be productive and excellent with their job and at the same time to become a great communicator with good interpersonal skills. Despite the time constraints, the workshop covered an impressive range of topics regarding career development.
I can say with great confidence that I have overachieved my goal at the workshop. I believe most of attendees will agree with me since the question I heard the most from other attendees were whether this will become an annual event of KSEA. At the conclusion, farewells were exchanged and we all looked forward to meet again at future KSEA events, hopefully soon. I would like to close with my sincere appreciation to the organizers, Drs. Hyungmin Michael Chung, Sung Yi, and Chan Seung Park and other volunteers who made this wonderful workshop happen.

One day, I was unexpectedly given a link to the Scientists and Engineers Early Career Development (SEECD) Workshop. After a few minutes of thoughts, I decided to apply for a registration not only because I thought it would give me some useful information, but also because it’s held in San Francisco where many of my friends live. It turns out that although I did have good time with my friends there, the things I learned from the workshop is more valuable than I expected.

First of all, the programs were well tailored for post-docs and young researcher and focused on how they can climb the career ladder successfully. Particularly, as a postdoc in the field of biological sciences, I am so thankful for Dr. Mehrotra’s talk on how to get NIH funding. Although it is common sense that writing a grant is a great training by itself and of course, getting one is a crucial key to being a successful PI, I and perhaps other post-docs as well are heavily engaged in doing experiments for publication and don’t get to work on writing grants readily. Dr. Mehrotra’s talk not only reminded me of the importance of NIH funding, but also gave very detailed information, together providing a good starting point to pursuing NIH funding.

Secondly, networking after dinner was very enjoyable. Thoughtfully, KSEA set up tables such that people who have similar interest can mingle easily and share current issues. Also, discussion with people on the subjects covered at the workshop helped me grasp in more detailed and practical ways. I hope to continue to keep in touch with all the good people I met at the workshop.

Finally, I’d like to thank all the KSEA staff for organizing such a great workshop. There is no doubt that young scientists and engineers who attended the workshop thrive in their careers and come back in the near future to give a talk on career development for KSEA members.
PARTICIPANT POST-WORKSHOP ESSAYS

The 2013 SEECD workshop not only satisfied my needs for seeking opportunities for network with other professionals, but also helped much to improve skills for preparing future career path. In a modern society, the prosperity of each is interconnected with the prosperity of others. In such world, it is extremely important that young academic researchers and industry professionals not only improve intellectual and practical skills for career development, but also have opportunities to network professionally with others. In this sense, it was my great fortune that I could join the 2013 Scientist and Engineers Early Career Development (SEECD) workshop hosted by the Korean-American Scientists and Engineers Association (KSEA). The workshop provided benefits to: (1) learn how to obtain research grants from national funding resources such as the NSF and NIH; (2) get useful information on job openings in academia, research institutions, and industry; (3) learn how to give an effective presentation; and most importantly, (4) build a valuable network with fellow scientists and engineers in a diverse research field.

I have just started to work as a postdoctoral researcher at University of Central Florida from February, this year after completing my PhD degree at University of Texas at Austin. As a postdoctoral researcher I encounter a great deal of questions how to achieve professional goals for my future career. The first two presenter of the workshop, Dr. Shu Nam-pyo and Dr. Dewey Ryu not only gave me an inspiration to a great extent, but I was also impressed by the way they view the world. In addition, their enthusiasm and passion for research and education continued throughout their life encouraged me in my choice of career. Presentations given by Dr. R. Clive Woods, Dr. Priti Mehrotra, Ms. Corrine Valkenburg, Mr. Mitch Boretz, and Mrs. Diana Lizarraga were very helpful to improve intellectual and practical skills for preparing my future career. Nonetheless, the greatest advantage of the SEECD workshop, I think, is the fact that a group of approximately 100 professionals in diverse disciplines get together. I could easily meet people with the same interests who are at the top of their area and share ideas and thoughts.

I strongly believe that the SEECD workshop was very helpful for career development and was beyond my expectation. I sincerely hope that KSEA continues to host the SEECD workshop every year to provide such valuable opportunities to young professionals. I highly recommend that postdocs, junior faculty members, and young industry researchers attend the SEECD workshop hosted by KSEA, next year. I thank the organizers of KSEA for hosting the 2013 SEECD workshop!
I just had a two-day trip to San Francisco for the SEECD workshop. Without hesitation, I would like to recommend this workshop to all of my Korean-American colleagues who are pursuing their academic career. Here I list three valuable lessons that one can take from this particular workshop.

How Senior Korean American Researchers Took Their Career Path.

As a Korean researcher in the United States, I often wondered how I could build my own career by making decisions in my early career. In that regard, plenary talks from Dr. Nam-pyo Suh and Dr. Dewey Ryu fully satisfied my needs. They literally revealed the low-level decision making processes they took while pursuing their academic career in their early age. The special talks from renowned researchers were inspiring especially because I could relate more to those who have similar cultural backgrounds (e.g., Korean heritage). I hope KSEA continues to introduce many of such successful researchers to junior researchers in upcoming seminars as well.

What I need to prepare to win funding from national agencies.

I really appreciate that the SEECD workshop provided seminars from the three major funding agencies: NSF, NIH, and DOE at the same time. As well as guidelines, all the speakers provided personal insights on individual funding tracks. As a novice, junior researcher who doesn’t have much experience in grant proposal, I could create a nice list of funding tracks that I can pursue in my early career. Also, I really appreciate many details on funding (e.g., how funding can be used) because such knowledge can be very important when I actually get to win and use funding for my research in the future.

What other Korean researchers are doing in the United States.

The networking event was really great. I really like the fact that KSEA divided the group into interest groups where participants can have more in-depth discussion about research. Through this opportunity, I could meet many researchers who work in my field. In a short period of time, we could make nice friendship across the United States. I hope we continue this kind of networking events in the future.

Overall, only the worst part of this workshop is that it was too short. I appreciate the time that I can meet so many researchers in different fields. I hope that many of my colleagues will also have a chance to learn about funding and to make friends that can help them continue their successful career in academia.
When I first received the official announcement of this workshop, I just realized that the second day of the workshop is the day I was supposed to run the 32nd La Jolla Half Marathon with my friend. I have practiced for this marathon for the last 3 months very hard. My immediate response to the email was not to attend the workshop this time and wait for another one next year. However, after thinking of it for a couple more days, I ended up changing my mind after skimming through the program. I was very excited that Dr. Nam-Pyo Suh and Dr. Dewey Ryu would be there to give plenary talks to young scientists and engineers. In addition, Program Officers from NSF and NIH would be giving us quite interesting talks on how to get funding from both agencies. I thought this would be much more important in my professional career than running the half marathon, so I cancelled the marathon to attend the SEECD workshop.

The plenary talks by Dr. Suh and Dr. Ryu were very inspiring to me. I wish I had a chance to listen to their talks before I graduated. They shared all the lessons they had learned throughout their professional careers in both academia and industry. They both emphasized the importance of early career plan preparation to become successful. They asked us to develop the capabilities to see a big picture and have the ownership wherever we are, and told us we should work on ‘important’ problems that will allow us to compete against the history of science and engineering. Their talks were truly eye-opening ones for me. I am working for a start up company and most times non-important things obsess me. Sometimes I ask myself, what am I doing, is this really important because I often feel like being lost in my career. Now I know why. I did not set up the higher goal of my career, and I was not well prepared to become a successful entrepreneur. Dr. Suh and Dr. Ryu certainly made me realize the important of think carefully about my career goal. After dinner, I was fortunate to sit with the two great speakers and had wine together. They listened to our concerns as a young professional, and gave us great advice. Until we went to our rooms around 2am, we talked about science, engineering and our country’s future.

Two workshops by the program officers from NSF and NIH were also very helpful to me. My company received multiple research funding from NIH through SBIR (small business innovative research) programs, and it was great to learn how NSF and NIH evaluate research proposals. Sometimes, I feel shy to contact the program officers as many Asians do, but both of them told me that I should contact the program officers before and after submitting grant proposals. They even gave us tips how to meet with the program officers, and I will definitely follow their advice.

The second day’s program was also great. I learned about DOE funding opportunities. The last two talks taught me how to prepare myself professionally by writing professionally and presenting professionally. Mr. Boretz and Ms. Lizarraga both gave great talks and advice and recommended great books and websites for us. I bought a book named ‘the Language of Success’ recommended by Mr. Boretz and have read it over the past few days, realizing how great this book is.

I very much appreciate the organizers of the great workshop for early career scientists and engineers. They did this just to help out young professionals like me. Even though I had to cancel my original plan of running the half marathon, I do not regret at all. This workshop taught me a lot of things and gave me some answers that I have been looking for. I hope KSEA continues to hold this great event annually, and I will definitely recommend my friends to attend this workshop.
PARTICIPANT TESTIMONIALS

“It was wonderful two days listening to the leaders and mentors in the field of science and engineering among Korean-American society. All sessions were helpful in anticipating what I will face in the next phase of my career, and I got well motivated. I sincerely appreciate KSEA for granting this chance to me.”
Chung Hyuk Park (Postdoctoral Fellow, Georgia Institute of Technology, chungpark@gatech.edu)

“Amazing speakers! As a young professional, I learned so much during the two days. Very well organized, great participants, and amazing officers/staffs.”
Phillip Han (Application Engineer, Easton Corp., philliphann@gmail.com)

“The SEECD was helpful for me providing practical advices and giving opportunities to meet new people at a similar career stage. I also appreciate that the organizers provided slides prior to the meeting. Thank you very much for the great event.”
Sung Hoon Kang (Postdoctoral Fellow, Harvard University, sikang@seas.harvard.edu)

“First of all, this workshop is very helpful. As a Korean professor in the US, I felt lack of chances where I can build the academic network as much as American professors. In this workshop, I could meet many Korean researchers and professors in the US with various research backgrounds. I found potential collaborations which was the most important and biggest achievement of mine in this workshop. I hope this workshop takes place annually in the future.”
Wooram Park (Assistant Professor, University of Texas at Dallas, wwooram.park@utdallas.edu)

“Thank all organizers for the great workshop for early-career professionals. The lessons and tips from successful senior KSEA members answered my own questions which I have been struggling. It was great to meet KSEA friends and seniors as well as new members. I am sure the resource I got from this workshop is very meaningful piece of my professional career.”
Ka Yeon Jeong (Senior Scientist, The Scotts Miracle-Gro Company, jeongkay@gmail.com)

“This was a great opportunity for me as a scientist working in the US to get together and know each other. The atmosphere of SEECD was very friendly and I felt very comfortable during all time I was staying at the workshop. The story (= real experiences) from the speakers was helpful but could be more practical if they showed their own good or bad experiences. Food was descent and hotel was clean. Overall, I was very satisfied and I want to come back for next SEECD workshop. Thank you so much.”
Jihoon Chang (Instructor, MGH/HMS, rdn202@yahoo.com)

“It was a great chance to meet people and learn a lot about survival skills in academia. However, it would have been even greater if we (the participants) could have had a chance to talk to each other. It was really tight schedule to communicate among us. Thanks!”
Joung Hyun Lee (Postdoctoral Fellow, Columbia University, jhelenlee@gmail.com)
In recent years, the demand for electricity has continued to increase in many applications such as portable electronics and transportation. Unlike in stationary power generation, however, renewable energies such as solar, wind, geothermal, and hydropower cannot be easily adopted in portable power generation due to the intermittency in their availability and difficulties in storage. Batteries have seen significant advances in recent years, but their power density is still far inferior to combustion devices [1]. Therefore, conversion of electricity from chemical energy available in various hydrocarbon fuels remains a versatile and cost-effective approach in a wide variety of applications [2].

Among the many techniques for chemical-to-electrical conversion, fuel cells are considered a viable means in favor of higher efficiency and lower emissions [3]. In particular, solid-oxide fuel cells (SOFCs) have received considerable attention due to their fuel flexibility and use of inexpensive catalytic materials [4]. In general, the solid oxide fuel cell consists of three components: (1) cathode for oxygen reduction; (2) anode for fuel oxidation; (3) electrolyte for oxide ions transportation. The function of the fuel cell with oxides is based on the activity of oxide ions passing from the cathode region to the anode region, where they combine with hydrogen or hydrocarbons; the free electrons flow through the external circuit. Conventional SOFCs are operated with a split cell, dual-chamber configuration: the anode chamber supplied with fuel and the cathode chamber with air (Fig. 1 a). The dual-chamber SOFC (DC-SOFC) does not require catalytically selective electrodes since the electrodes are exposed to separate gas streams, and is generally considered to be the technology of choice for large-scale stationary power generation. Despite these advantages, however, DC-SOFCs are not widely applied due to the high cost and difficulties in sealing [5]. In addition, it is not considered suitable for the applications in which frequent and rapid start-up and shut-down are necessary. Subsequently, the single-chamber SOFC (SC-SOFC) concept was proposed to address these issues (Fig. 1 b) [6]. It is a sealant-free configuration with both electrodes exposed to the same premixed fuel–air mixture in one chamber. The performance of the SC-SOFC depends on different catalytic selectivity of the anode and the cathode towards the reactant mixture. However, the use of premixed reactants brings safety concerns because of its susceptibility to explosion, suggesting that the SC-SOFC can only be suitable for small-scale systems. In addition, it is limited in fuel flexibility. Both DC- and SC-SOFCs need an external heating system to maintain optimal operating temperatures.

New developments in SOFC, notably the so-called Flame-assisted Fuel Cell (FFC) design have the potential to overcome these issues and enable SOFC technologies for a wide variety of commercial applications (Fig. 1 c) [7]. The operation principle of the FFC is based on the combination of a flame with a SOFC in a simple, “no-chamber” or “unsealed” chamber setup. The flame serves as fuel-flexible partial oxidation reformer, while simultaneously providing the heat required for SOFC operation. In the combined system, flame and fuel cell are inherently coupled. There are a number of advantages in FFC: (1) Simple setup: there is no sealant needed; (2) Rapid start-up: the flame heat release brings the fuel cell rapidly to its operation temperature. Since no sealant is needed for FFC, the mismatch of thermal expansion between sealant and fuel cell can be neglected; (3) Fuel versatility: since the intermediate species produced by the flame are similar for a wide variety of hydrocarbon fuels, FFC is highly flexible in fuel selection. Due to above advantages, the FFC system showed great promises as a compact, portable, and fuel-flexible power generation device.

Thus far, most results of the FFC concept were achieved by employing an electrolyte-supported SOFC (ES-SOFC), which has a thick electrolyte to supply the mechanical strength for the fuel cell [8]. However, there are
several disadvantages in the current FFC system by using ES-SOFC. One is that the power density is still relatively low compared to those of DC-SOFC and SC-SOFC. A thick electrolyte causes high ohmic resistance and it can greatly increase the ohmic loss of fuel cell, therefore depress the fuel cell power density and efficiency. Another is that the thermal shock resistance of ES-SOFC is low. It is well known that a thick dense layer is easy to crack when it experiences a high heating or cooling rate. During the operation of FFC, rapid start-up and uneven temperature distribution of fuel cell generated by flame can bring the variation of fuel cell temperature, therefore increase the risk of thermal shock, especially for ES-SOFC with a thick dense electrolyte layer. This may lead to a rapid degradation of fuel cell performance or fractures of the material.

We have developed the anode-supported SOFC (AS-SOFC) to perform FFC test. Here, the porous anode supplies the mechanical strength for the fuel cell. It is well known that the thin dense layer or porous material has a better thermal shock resistance due to the decrease of the elastic modulus of the material. Also, AS-SOFC has a better performance due to its thin electrolyte and thick porous anode which can decrease ohmic resistance and expand the three boundary phase.

Anode-supported complete cells were prepared using a tape casting with wet spraying technique. SDC (Sm$_{0.2}$Ce$_{0.8}$O$_{1.9}$), NiO + SDC (60:40 w/w) and BSCF (Ba$_{0.5}$Sr$_{0.5}$Co$_{0.8}$Fe$_{0.2}$O$_{3-\delta}$) + SDC (70:30 w/w) were used as the electrolyte, anode and cathode materials, respectively. NiO + SDC anode-supported substrates with SDC thin film electrolyte were fabricated by a tape-casting and lamination process. The green tape was cut into discs, sintered at 1400 °C for 5 h. The sintered substrate (15 mm in diameter) consisted of two layers: anode and electrolyte. Then, the substrate with SDC layer was sintered at different temperatures for 4 h. Following the deposition of cathode (0.7 cm$^2$) on the top of SDC layer, the complete cells were sintered at 1000 °C for 5 h. A quartz tube with 4 mm in diameter was used as a burner, which was placed under the fuel cell anode with a distance of 1 cm. Two mass flow controllers were used to regulate the flow rate of methane and air through the burner. The cathode breathes oxygen in ambient air directly.

The Fig. 2 (a) shows a SEM image of the cross section of the AS-SOFC. The highly porous anode structure allows enhanced gas diffusion and also ensures higher thermal resistance. The thin and compact electrolyte layer (~ 10 µm) shows no sign of pinholes or cracks which would short-circuit the fuel cell. Based on the prepared AS-SOFC, the FFC test was performed at an equivalent ratio of 6 with the methane flow rate of 400 mL/min. As shown in the Fig. 2 (b), the fuel cell achieved a power density of ~ 791 mW/cm$^2$ and a maximum current density of ~ 2300 mA/cm$^2$. It was noted that the power density and current density are the highest reported to date in the literature for flame fuel cell and are comparable to the performances of direct methane fueled DC-SOFC and SC-SOFC.

In this study, the AS-SOFC based FFC shows a high power output with high thermal shock resistance. Even with a low efficiency, considering that hydrocarbon fuels contain nearly 100 times more energy per unit mass than lithium-ion batteries, thus devices converting of fuel to electricity at better than 1 % efficiency represent improvements in portable electronic devices and other battery-powered equipment. Thus, even with the disadvantage of being a low efficiency method, FFC is considered a viable alternative for creating a power source.

References

The increased interest in using renewable energy such as solar and wind has prompted the need to find energy storage systems, to make such energy sources reliable. Many types of energy storage systems [1–3] have been considered such as pumped hydroelectric storage, compressed air energy storage (CAES), flywheels, and electrochemical storage. Depending on the application of the system, each storage design is more suitable either in efficiency, lifetime, discharge time, or in weight or mobility of the system. Among these various energy storage systems, electrochemical storage such as batteries has the advantage of being more efficient compared to pumped hydroelectric and CAES storage [3]. A battery works by directly converting chemical energy to electrical energy by employing different chemistries. A varied combination of anode, cathode and electrolyte materials produces numerous types of batteries such as the Li-ion, Lead-acid, Na-S, and vanadium redox batteries.

Presently, the lithium (Li)-ion rechargeable battery is the most common type of battery used in consumer portable electronics due to its high energy density per weight or volume and its good recharge efficiency. However, the Li-ion battery for use in stationary energy storage applications is limited by cost and safety concerns. The Na(sodium)-S battery has been considered to be economical and efficient for large installations because it has a high energy density and efficiency around 76% [3,4]. Another type of rechargeable battery for stationary energy storage applications is the flow battery. It stores electrolytes in tanks, therefore having a flexible energy capacity depending on how many electrolyte tanks one connects to the power input/output unit. The best known and widely applied flow battery is the vanadium redox battery (VRB) [5]. Even though the efficiency of the battery is relatively better than other types of energy storage devices, current battery technology is still considered too expensive for stationary storage. For renewable energy to be stored without government subsidy, the storage process must be kept below $200 per kilowatt [6]. Thus, to meet the increasing demand to store large amounts of electric energy for stationary applications, one must develop a viable battery technology that, as the battery increases in size, it decreases in cost per unit energy and amount of power stored.

We proposed the use of waste Li-ion batteries and water for both electrodes in a Li-Liquid battery system where the Li metal can be harvested from the waste Li-ion batteries, and the harvested Li metal can be discharged with the use of water as the cathode to produce electric energy. This concept can be extended to a Waste-Li-Liquid (WLL) flow battery for a large energy storage system (see Fig. 1) where the discharge and charge parts are separated (via multi-layer electrolyte strategy) to allow for more choices of materials to efficiently store and produce the energy at a low cost. In the charging system, the Li metal is harvested by charging the cell and drawing from one of the following three sources: (a) using waste Li-ion battery materials containing Li ions such as the graphite anode Li \(_2\)C\(_6\), cathodes made of LiFePO\(_4\) or LiCoO\(_2\), or the organic liquid electrolyte, 1M LiPF\(_6\) in mixture of ethylene carbonate and diethyl carbonate (EC:DEC), (b) using the discharged products such as LiOH (aq) created by discharging the battery, or (c) collecting Li from both sources simultaneously. Charging the cell using renewable energy sources such as wind and solar power, the renewable energies are stored by the formation of the Li metal. As for the discharging system, water and other liquid solutions containing aqueous or non-aqueous solvents can be used as cathodes with the harvested lithium metal as the anode. The key strategy in this research lies in the use of a multi-layer electrolyte strategy consists of one non-aqueous liquid electrolyte and one solid electrolyte. The organic liquid electrolyte is used because, as a liquid, it creates close physical contact with the solid lithium anode. Although the lithium metal reduces the 1M LiPF\(_6\) in EC:DEC liquid electrolyte by the direct contact, the formation of a solid electrolyte interface (SEI) layer on the surface of the Li metal allows Li to be used as the anode with the organic liquid electrolyte. The solid electrolyte is an inorganic solid that separates the two liquids (liquid elec-
trolyte and liquid cathode), and prevents mixing of the liquids while also making it possible to use a cathode in all three phases (solid, liquid, and gas). The solid electrolyte, Li$_{1+y+x}$Ti$_{2-x}$Al$_x$P$_x$Si$_y$O$_{12}$ (from OHARA), is commercially available with an area of 1 inch × 1 inch, 150 μm thickness, and $\sigma_\text{Li} \approx 10^{-4}$ S/cm at room temperature.

To prove the proposed idea, the following experiments have been performed in our lab recently [7]. The waste Li-ion battery was disassembled (Fig. 2(a)), and then the anode (Li$_x$C$_6$) and cathode (Li$_x$FePO$_4$) electrodes, separator, and organic liquid electrolytes (1M LiPF$_6$ in EC:DEC) were inserted in water and stirred to correct electrode powders and electrolytes containing Li-ions. After removing the current collector and separator, only the liquid solution containing the electrode powders and the liquid electrolyte were collected as shown in Fig. 2(b). The liquid solution was placed on in the charge cathode part (see Fig. 1) and charged with a bare stainless steel electrode (instead of using a Li metal electrode). Figure 2(c) shows the charge voltage curves of the liquid solution containing all of Li$_x$C$_6$, Li$_x$FePO$_4$, and organic liquid electrolyte at once. Figure 2(d) shows the Li metal collected on the surface of the stainless steel (SS) electrode after charging the battery. The formation of Li metal was confirmed by the observation of the aggressive reaction with water. This result shows that the Li metal can be recycled from waste Li-ion battery materials that include both solid and liquid materials. Also confirming the formation of Li metal on the SS electrode, the charged cell (which collected Li metal from waste battery materials) was discharged when pure deionized (DI) water was used as the cathode. Figure 2(e) shows the discharge voltage curve of the pure DI water versus Li metal harvested from the waste batteries. The mean discharge voltage appears to be about 2.7 V vs. Li+/Li0 at 0.1 mA/cm$^2$, which is similar to the voltage reported in the literature.

This study was to demonstrate the feasibility of developing a Waste-Li-Liquid (WLL) battery system that uses waste Li-ion batteries as a source of Li metal and that discharges with water, producing electricity.

Although this study is in its early stages, the concept of using waste Li-ion batteries and water for the electrodes in a battery system is attractive for a large size energy storage application because it dramatically decreases the cost of electrode materials. With further development of the other parts of the system including the solid electrolyte, current collector, and overall system design, the Li-liquid flow battery system is a promising strategy for stationary energy storage of renewable energy sources.

References

Increasing concerns in the availability of fossil fuel reserves and anthropogenic climate change have led to strong demands in long term energy environmental sustainability. Despite these concerns, however, recent reports [1] show some solemn trends: carbon emissions rebounded to a record high, global primary energy demand is projected to grow by 40% through 2035, and combustion remains a major fraction (over 80%) of energy sources in all sectors. These data indicate that, while many researchers have been pursuing a variety of alternative energy sources, such as hydrogen, fusion, or solar energy, fossil fuels will more than likely dominate as a primary energy source in the foreseeable future.

Despite the many ideas of alternative energy sources, combustion remains the most effective way to utilize the chemical energy of fossil fuels. This process, however, inevitably creates serious environmental impact through the greenhouse gases and other atmospheric pollutants such as NOx and soot. The level of carbon dioxide in the atmosphere have shown a steady rise from approximately 300 ppm to more than 370 ppm today, and its adverse effects on climate changes have been widely documented [2]. Therefore, development of more efficient and clean energy utilization has become a global interest and is enforced as mandatory regulations in many countries, in order to respond to the increasing energy demand with minimal environmental impact.

In the transportation sector, the drive to improve fuel economy has led to a variety of new design components, such as turbochargers, variable valve time systems, and higher compression ratios, as well as new load management strategies such as downsizing and hybridization. A common strategy of all these efforts, known as advanced combustion, features engine operation in dilute and high pressure conditions. Though the efficiency benefits of utilizing these parameters are well known, the new combustion regimes pose numerous technical challenges that require enhanced fundamental understanding of combustion and pollutant formation processes.

The low temperature combustion (LTC) engines refer to a general class of modern engines that utilize combustion at substantially lower temperatures compared to conventional gasoline or diesel engines. This strategy allows combustion of lean and dilute mixtures at peak temperatures typically below 1900K, thereby providing the potential for high efficiencies (improvement by 15–20%) and lower engine-out emissions. One of the most actively investigated LTC strategies is the homogeneous charge compression ignition (HCCI) engines [3]. In an HCCI engine, fuel and air are well mixed and induced into the engine cylinder, which is subsequently compressed to high pressure and temperature such that the mixture autoignites without any external ignition system. While showing great promises as an alternative to diesel engines, however, development of commercial HCCI engines faces many technical challenges, which primarily lie in the control of the ignition and combustion phasing, and smooth heat release to prevent excessive knocking [4]. For gasoline engines, one way to successfully achieve advanced combustion is to use spark-assisted compression ignition (SACI), in which a spark initiates a slow heat release by flame propagation, triggering the subsequent autoignition. The University of Michigan (UM) combustion research group has been leading the efforts in fundamental investigation of combustion characteristics of SACI in extending the load limits [5].
Figure 2 illustrates chemiluminescence images taken from a single cylinder optical engine developed at UM. These experiments unraveled detailed ignition and combustion characteristics encountered in SACL engines, thus demonstrated the mechanism to control combustion phasing and improve engine stability by the adjustment of the spark timing.

Other variants of the LTC concepts are actively investigated in the major automotive companies and universities worldwide. As a new development, the Clean Combustion Research Center at King Abdullah University of Science and Technology (KAUST) in Saudi Arabia established a state-of-the-art engine experiment facilities, such as the variable compression ratio engine shown in Figure 3. These new research efforts will utilize a large number of cutting-edge equipment and laser diagnostic techniques, thereby accelerating breakthroughs in the development of next generation engines. Simultaneously, the role of predictive computational models are becoming more important as the advanced supercomputers enable the massive amount of floating point operations required to resolve all the details of the combustion events to be completed in a reasonable time. Figure 4 shows an example of high fidelity numerical simulations used in improved understanding of ignition characteristics for mixture conditions encountered in LTC engines.

References

PV manufacturing has been growing over the past 10 years and further annual growth of 15% is expected until 2020 [1]. A study on positioning a grand plan for solar power shows how vast PV arrays and other renewable energies can provide significant amount of electricity and total energy needs by 2050 [2]. Various new PV technologies have been introduced in the market and existing technologies have undergone further development. How all these developments will affect the fate of the end-of-life PV modules is uncertain. In addition, the market price of some rare earth materials utilized in the manufacturing of the various PV technologies has exponentially increased in the past five years [3]. Therefore, it is necessary to set a proactive strategic recycling plan for the treatment of the disposed PV wastes.

There are three different types of PV waste; end-of-life modules, manufacturing scraps, and defect form packaging and transportation. Among these, end-of-life PV modules (Figure 1-a) are the major source for the recycling process and a prospective waste prognosis showed that the future amount of PV waste will grow exponentially. Figure 1-b illustrates the schematic of crystalline silicon (c-Si) recycling processes. This process consists of five major steps. First the unloaded modules transported from the collection sites will be loaded to the automatic conveyor system to enter into the recycling process. Then the junction boxes are removed manually. Thermal treatment burns off the laminates to facilitate the separation processes. From the separation steps, copper wire, aluminum frame, glass, and waste are separated. During the next step the solar cells are treated chemically. Surface and diffusion layers are removed subsequently by cleaning steps. Cells and wafer breakage are cleaned by etching techniques. Regarding to the reclaimed materials and waste, the following outlet parameters are considered. Junction box is processed by an electronic scrap waste treatment company (collection cost paid by photovoltaic take-back center, PVTBC). Plastic is burned off after the thermal treatment (i.e. incineration cost paid by PVTBC). Waste goes to landfill and PVTBC pays landfill tipping fees. Aluminum can be reused while glass, copper, and silicon can be sold to recycling companies. The thermal process could be improved with regards to its throughput, cycle time and yield. The yield of recovered cells depends largely on type, design and state of the modules to be processed. Design dependent factors that affect results of the thermal process are the type of laminate and crystal, the dimensions of the embedded cells, and the material and dimensions of bonds and soldering.

There are various issues involved in the economics of PV recycling in the macro and micro level. In the macro-level, strategies are needed for allocating the centralized/decentralized collection and recycling facilities in the optimal locations to minimize the total recycling system costs. This includes issues such as the optimal level of marginal capital costs to open up PVTBC, costs associated with the reverse logistics services for the collection of PV modules and transporting them to the recycling facilities. Various stakeholders (e.g., dismantlers, recyclers, smelters) must be taken into account in the recycling infrastructure. In the micro-level, optimized process planning is required to ensure the profitability of the PVTBC. Potential PVTBC will face some challenging decisions in the following issues; material separation, revenue structures of current and future recycling processes with regard to the volatility of the market price of materials/components, cost associated with processing, reverse logistics costs, and external social costs, such as landfill-tipping fees.

Therefore, this study developed a generic mathematical modeling framework to evaluate the economic feasibility of the macro-level reverse logistics planning and the micro-level recycling process of the PV waste by considering the complex issues of the PV recycling planning listed above. A mixed integer programming and a linear programming are applied to the macro logistics and micro process planning models respectively. A case study of the crystalline silicon PV waste recycling in Germany is presented to illustrate the applicability of the models.
First, the macro-level reverse logistics model is designed to allocate the optimized locations of PVTBC by considering the amount of PV wastes to be collected, distance traveled (routing schemes) to PVTBC, and capital cost of opening the facility. The base model solves the optimization problem of the location of the capacitated facility by minimizing the objective function subject to the various constraints. The objective function is the sum of the transportation costs (i.e., fuel price, fuel-efficiency of lorry, and distance traveled), and the costs of logistics services provided by the registered logistics company. Figure 2 illustrates one of the examples of the results after running the model. With the variation of the marginal capital cost for opening up a PVTBC, the model suggests the best candidate locations to open up PVTBCs by considering the amount of waste from each collection locations and the cost associated with the reverse logistics to transport the waste from each locations to the designated PVTBCs.

In the micro-level recycling process level, the main objective of each PVTBC is to maximize the revenues from selling the materials recovered from the collected PV modules to the price varying markets for reclaimed materials while minimizing the cost associated with processes, transportation, capital, and inventories. The base optimization model decision set determines how much material to process by which equipment, in what period to process it, and if applicable, how much inventory should be held each period. Various experimental designs provide sensitivity analysis on key parameters. Figure 3 illustrates the sensitivity of the economics of recycling facilities when there is a 10% hike of each parameter in the recycling process. Exogenous parameters include cost of incoming modules (e.g., freight, packaging, logistics), and shipping cost to landfill or secondary material processing companies. Endogenous parameters include capacity level of the each equipment, processing time, processing costs, capital investment and labor costs.

Based on the current study, following general conclusions can be claimed from German case study. In order to ensure the economics of the PV end-of-life management systems, PVTBC should be constructed in an optimally decentralized location to minimize the total reverse logistics cost to transport PV wastes from various collection facilities to the PVTBC. In the recycling process level, advanced and automated energy efficient recycling processes should be integrated to handle the large amount of growing PV wastes economically. Market price of the reclaimed materials is important factor for deciding the profitability of the recycling process. Therefore, it is important to recycle thin-film PV modules (i.e., CdTe, CIGS) where some rare earth materials can be reclaimed. This study focused on the short term planning which currently accounts for the available PV waste. However, further study will adopt strategies to consider the complex waste flows generated from different spatial (i.e., US), temporal (i.e., future), and technical (i.e., various technologies) aspects. Lastly, further study will experiment the life cycle environmental implication of the PV recycling along with the economic feasibility.

References
THE AKPA (ASSOCIATION OF KOREAN PHYSICISTS IN AMERICA) ANNUAL &
THE KOREAN SYMPOSIUM AT THE APS (AMERICAN PHYSICAL SOCIETY)
March Meeting

AKPA’s annual meeting was held in conjunction with the Forum of International Physics (FIP) Reception at the Pickersgill room, Hilton Hotel in Baltimore, MD, on Tuesday, March 19, 2013, during the American Physical Society Annual Meeting. Most of AKPA officials, including the current president Prof. Seo, Eun-Suk, University of Maryland, and the next president Prof. Yu, Jaehoon, University of Texas, Arlington, attended the meeting. Prof. Seo introduced AKPA, and presented this year’s Outstanding Young Researcher Award (OYRA) to Drs. Chung, Sukbum of University of California, Los Angeles, and Jo, Gyu-Boong of University of California, Berkeley. AKPA was established in 1979 to promote physics and related fields and to facilitate close networking of Korean physicists. AKPA recognizes outstanding young researchers early on in their careers through the OYRA, which is awarded every year to one or two outstanding young (< 5 yr after Ph.D.) Korean physicists in North America since 1994. Many past OYRA awardees play important roles in Korea and the United States. Notable examples include Prof. Philip Kim, Columbia University and Prof. Taekjip Ha, University of Illinois, Urbana-Champaign. Since year 2012, one of the two OYRA awards is sponsored by the Korean Physical Society. The transition of the AKPA leadership to the next president, Prof. Yu, occurred at the Executive Members’ meeting that followed, over dinner.

The second Korean Physics Symposium at the APS March meeting was held at the Calloway room, Hilton Hotel on the following day. This annual symposium is intended to serve as a forum during the APS March meeting, where Korean physicists in US and Korea exchange information on their research activities over fruitful discussions in an open environment, which would lead to potential collaboration in future. This year, the symposium had four distinguished speakers and was chaired by Prof. Kim, Philip, Columbia University. The session started with an opening remark by Prof. Seo, Eun-Suk, University of Maryland, who, as the current AKPA president, introduced AKPA/KSEA. The first speaker, Prof. Cheong, Sang-Wook from Rutgers University, gave a historical overview in the Field Effect Transistor with an emphasis on Korean heritage Dr. Kahng, Dawon who first successfully demonstrated the operation of the transistors. Prof. Jeong, Yoon Hee from POSTECH discussed high-orbital compounds based on iron in the metal-insulator transition. Dr. Matthew Stone introduced the facilities and capabilities of the Oak Ridge National Laboratory (ORNL), promoting various neutron scattering techniques to explore condensed matter materials and encouraging people to submit to ORNL viable proposals for their future exploration. Lastly, Dr. Chung, Sukbum, one of the two OYRA 2013 recipients, presented Majorana fermions in solid-state systems as an emerging field for a feasible detection method in superconducting materials.

The AKPA APS Korean Physics Symposium was a great success with over 80 participants from US and Korea attending the symposium. After the symposium, the participants joined for the traditional Korean Physicists’ Wednesday Banquet at a nearby Chinese restaurant, in which further discussions of collaborations and networking took place in a courteous atmosphere.
KOPANA (The Korean Pathologists Association of North America)  
12th Spring Seminar

The Korean Pathologists Association of North America (KOPANA) was founded in 1992 and has a membership of more than 200 Korean pathologists in North America who are practicing pathology in a variety of venues such as universities, community hospitals, private laboratories, or research institutes. Currently more than 30 American pathologists of Korean heritage (Korean-American pathologists) have membership and their number is growing. Now is an important transition time for the KOPANA as most of our elder members have retired or approaching retirement and the younger members are assuming more active roles.

Twelve years ago KOPANA started the Spring Seminar in conjunction with the Annual Meeting of United States Academy of Pathology (USCAP) to provide networking, educational, and recreational opportunities for our members. Our Spring Seminar has been an excellent educational event with speakers selected from among Korean-American pathologists and pathologists practicing in Korea. This has become an ideal venue for professional networking between Korean-American Pathologists and pathologists in Korea, particularly for pathologists-in-training (members for Korean Society of Pathologists).

The 12th Spring Seminar was held at the Hampton Inn & Suites Baltimore Inner Harbor, Baltimore, Maryland in conjunction with the Annual Meeting of USCAP in February 28-March 2, 2013. This year’s meeting was another very successful one and 35 people attended. We had seven lectures in gynecological (GYN) pathology which emphasized practical diagnostic utility as well as the latest advances and controversies in research. The topics and speakers for the 12th Spring Seminar were as follows:

1. “Practical Issues in Ovarian Pathology”  
   George G. Ahn, MD, PhD, University of California San Francisco, California
2. “Ovarian Cancer Pathogenesis: Insights from Morphology, Molecules, and Mice”  
   Kathleen R. Cho, MD, University of Michigan, Michigan
3. “Practical Issues in Endometrial Pathology”  
   Sung Ran Hong, MD, PhD, Cheil General Hospital & Women’s Health Care Center, Seoul, Korea
4. “Diary of Intrauterine Life”  
   Grace Kim, MD, University of California San Francisco, California
5. “Endometriosis-related Disorders”  
   Insun Kim, MD, PhD, Korea University, Seoul, Korea
6. “Gestational Trophoblastic Diseases”  
   Kyu-Rae Kim, MD, PhD, Asan Medical Center, Seoul, Korea
7. “Cervical Adenocarcinoma, a Heterogenous Entity”  
   Kay J. Park, MD, Memorial Sloan Kettering Cancer Center, New York

Last 21 years we have made a lot of effort to help pathologists in Korea to come to USA for proper additional training and academic participation at the USCAP meeting. In every year (since 1998) we provided “Resident Awards (a certificate and $100 for each person)” to all residents and fellows (trainees) who had either platform or poster presentation as the first author at the USCAP meeting. Last year we began to use membership subsidy from KSEA and named the award to “KOPANA/KSEA Resident Awards”. This year nine trainees (1 from USA and 8 from Korea) received the awards. Eight years ago we also started “Eu-ham Academic Award ($1,000 for one trainee from Korea who has excellent presentation and financial need for traveling)” and this year’s recipient was Dr. Hyung Chan Shin (Yeung Nam University).
The community of Koreans working in the construction, engineering and project management field in the United States has grown quite significantly in the past ten years. It is estimated that more than 30 Korean American faculty members are teaching at universities in the US, and approximately 30 Koreans are pursuing higher degrees (Master’s and PhD) in this field. A significant number of Koreans who were not identified yet are also working in the US construction industry.

There have been some sporadic discussions at various conferences in the past years that there is a need to officially develop our home base in the US to promote fellowship among Korean Professionals in the Construction, Engineering and Project Management (CEPM) field, to strengthen the relationship of Korean CEPM professionals between the US and Korea, and to contribute to the advancement of CEPM research and education as well as industrial growth in Korea and the US. With some financial support from the Korean-American Scientists and Engineers Association (KSEA), a group of Korean professionals in this field was able to hold a preparation meeting in May 21, 2012 at Purdue University, West Lafayette, Indiana. The meeting was held in conjunction with the Construction Research Congress (CRC) of the American Society of Civil Engineers (ASCE) to maximize the number of participants. Approximately 30 people attended this meeting as shown in the picture.

The meeting was a success. General consensus was drawn that an official association needs to be developed and the inaugural meeting can be held in January, 2013 in conjunction with the 5th international conference on construction engineering and project management (ICCEPM), Garden Grove, California. This venue was chosen because many construction engineering and project management professionals in Korea were expected to attend the conference and it could be used as an excellent opportunity to let them know the establishment of the association.

At this meeting, six Post-Docs and PhD students were awarded travel grant of $200 each to encourage their contribution to this community in the future. Also, three committees were formed to move forward on initial activities that Korean professionals in this field can immediately benefit and use as a means to interact and communicate each other. These committees are the education committee (chaired by Dr. Joohyoung Lee at Purdue University at Calumet), the research committee (chaired by Dr. Yong Kwon Cho at University of Nebraska), and the website development committee (chaired by Dr. Yong Kwon Cho at University of Nebraska). The inaugural meeting was held in January 10, 2013 at the Hyatt Regency Orange County Hotel, Garden Grove, California in conjunction with the 5th international conference on construction engineering and project management (ICCEPM). The meeting was a huge success. In total, more than 60 construction engineering and project management professionals including the professionals working in Korea attended the inaugural meeting and supported the establishment of the new association. Picture in the next page shows the meeting attendees.

Dr. Hyun Joo Kim (University of North Carolina – Charlotte) as the chair of the 5th ICCEPM conference started the meeting with welcoming remarks and mentioning the significance of the meeting to the Korean Americans in the field of construction, engineering and project management. Dr. Young Hoon Kwak (George Washington University) spoke about the history of Korean Americans in this field and efforts made until this historical inaugural meeting came to realization. After the brief introduction of the first two speakers, every meeting attendee was given an opportunity to introduce themselves. Even though this self-introduction of attendees took a lot longer than expected, it was a valuable time to get to know each other and feel as a member of one community.
Dr. Yesang Kim as the president of Korean Institute of Construction Engineering and Management (KICEM) talked about the excitement that this new association is creating for the CEPM professionals working in the US and Korea. He praised the efforts of the founding members and envisioned that this new association would be able to work as an excellent bridge to connect the CEPM professionals in both countries for mutual benefits and the professional advancements. He also gladly donated $1,000 in a form of scholarship to KICEPMA as the president of KICEM. Two doctoral students, Mr. Sanghyung Ahn (Purdue University) and Mr. Haegon Kim (University of Texas, Austin) were awarded the KACEPMA-KICEM scholarship for their voluntary work in developing the KACEPMA website (www.kacepma.org). They have been working with Dr. Yong Kwon Cho since May 2012 and will continue to work as the website development committee members.

The activities of the three committees and their progresses were reported at the meeting. Dr. Joohyoung Lee asked for more active participation in sharing CEPM course materials. He handed out a note of encouraging the members to participate in the development of the course material database. Dr. Yong Kwon Cho reported on initial activities of his research committee and the website development committee. The committee members were introduced. He asked the members to register at the KICEPMA website. He demonstrated the registration process and in the registration process, the research interest areas of a member can be filled out, and later on, this information will be shared among members for finding potential research collaborators. This registration process is also linked with the KSEA membership registration process. Dr. HyungSeok Jeong explained that the KSEA membership is important for the KACEPMA to stay and be connected to KSEA as an Associated Professional Society (APS) and to obtain financial support from KSEA.

A short video clip highlighting 2011 UKC (http://www.youtube.com/watch?v=GR_qNBO4OB0) was also shown. Dr. HyungSeok Jeong encouraged the meeting attendees to participate in various activities sponsored by KSEA including the UKC 2013 conference, Sheraton Meadowland, NJ August 7-10, 2013.

Two researchers from the Korean Institute of Construction Technologies (KICT), Dr. Heisook Nah and Mr. KiBeom Ju gave an invited presentation on “The State of the Art of Road BIM development in Korea.” The KICT is the largest government sponsored research institute in the area of construction engineering and management and it has huge potential for KACEPMA members to collaborate in various aspects in the future. This presentation gave an opportunity for the meeting attendees to think about collaboration potentials with the KICT.

Finally, the KACEPMA was inaugurated and officially launched with the three leadership positions elected. Dr. Younghoon Kwak was floor-nominated as the first President of the Association and was unanimously approved. Dr. Kwak selected Dr. Yong Kwon Cho as vice president and Dr. HyungSeok Jeong as secretary in his leadership team of the association. According to the bylaws, the president’s term is one year and the vice president and the secretary will be automatically promoted to the upper position in the following year. A new secretary will be elected at every annual meeting. The meeting was adjourned by Dr. Young Hoon Kwak.
INTRODUCTION OF KSEA CHAPTER & BRANCH PRESIDENT MANUAL

This article intends to help chapter/branch presidents to understand the operation of KSEA and roles of chapter/branch presidents. We will briefly cover function and roles of council, HQ’s financial support, national math and science competition (NMSC), and relevant issues, such as bank account, chapter bylaws and chapter web pages.

1. Council
The role of council is to deliberate and make decisions on; (1) approval of budget, business plan and amended policies, (2) selection of multiple candidates for executive members, President (P), President-Elect, (PE) First Vice President (VP1), Second Vice President (VP2), Auditors, Elected-Councilors, and the committee members, (3) recommendation to general assembly to enact a new Bylaw or to amend a Bylaw, and (4) confirmation of Executive Director (ED) and Finance Director (FD).

The KSEA council consists of P, PE, VP1, VP2, ED, FD, three former Presidents including the immediate past President, all elected-councilors of technical groups, and each president of local chapters with at least 30 voting members. Councilor meetings are held twice in a fiscal year. Annual and mid-term councilor meetings are typically held during the United Korea Conference (UKC) in August and Leadership Conference in January, respectively. Travel expenses for attending the Councilor meeting are reimbursed by KSEA.

2. HQ’s financial support
The KSEA HQ can provide financial assistance for various local chapter activities, which are related to (1) support the progress of science and technology, (2) support academic and extracurricular academic activity of the members, (3) promote fellowship among the members, and (4) promote activities of the student members. To receive financial assistance from the HQ, the representative of a local chapter/branch needs to submit (1) application letter describing the objectives and description of the project, (2) project plan and milestones, and (3) itemized budget summary.

KSEA HQ requests proposals by 4 weeks prior to the event date. For support decisions, ED or executive committee (EC) decide the final support amount. Final support amount may vary from 20 to 90% relative to the requested amount. Therefore, proposal submitters need to keep in mind planning a few budget scenarios. The Council shall decide the total amount of assistance for proposed projects and 75% of the approved amount of assistance for a project shall be paid within 2 weeks after the approval, and the 25% of the approved amount shall be paid within 2 weeks after the HQ receives the mid-term progress report. The local chapter/branch, which received financial support for a project, shall submit a final report to the EC within one month after the completion of the project. The final report shall describe the progress and results of the project in detail. Evaluation of the final report shall be made by the EC. In addition, the final report for a project shall require the approval by the Council.

3. National Math and Science Competition (NMSC)
NMSC event annually which is dedicated to foster the mathematical capabilities of 4th to 11th grade students. HQ decided to open NMSC to all students attending American schools regardless their ethnic background. As one of main national KSEA events, NMSC requires the chapters’ volunteering participation with close cooperation of the NMSC committee. NMSC committee will inform the annual NMSC event to appointed KSEA chapter president and NMSC chair. The NMSC test and answer keys will be sent to the NMSC chair from KSEA HQ before the test date. The participants may register by either on-line or on-site. HQ supports on-line enrollment service. The score of all participants will be sent to the HQ after the test, as a part of final NMSC report and for selecting national awards.

4. Bank account for chapters and branches
Employer Identification Numbers (EIN) for your chapter/branch is required not only for opening bank accounts but also for creation of non-profit organization. According to IRS, EINs are issued for the purpose of tax administration and are not intended for participation in any other activities (e.g., tax lien auction or sales, lotteries, etc.)

To get EIN, you need to file the form SS-4 and apply to IRS by 1) online; 2) toll-free telephone service; 3) fax; and 4) mail (see IRS website: http://www.irs.gov/Businesses/Small-Businesses-&-Self-Employed/How-to-Apply-for-an-EIN).

To manage the account, you will need to designate two signers of the account. Typically the president and secretary serve as the signers. The two signers will have the right to use the account including the bank debit card. Transferring the ownership to the next president is basically to change the signers. You need to submit
to your bank the “Incoming & outgoing officer form” or something equivalent. The bank will close the outgoing signer's account and open the new signer's account. The outgoing signer's debit card will be closed and a new debit card will be sent to the new incoming signer.

5. Chapter bylaws and policies
KSEA policy requires a local chapter to have bylaws. It is a good idea for each chapter adopts bylaws, which governs the operation of the chapter. A simple approach is to acquire a bylaw adopted by another chapter and revise it as each chapter needs. The following minimal information needs to be included for bylaws of a chapter. They are name of the chapter, membership (regular, graduate and undergraduate, admission and membership due), officers (P, VP, General Secretary, and Auditor, Duties of the officers), and election (voting members, election of officers and their terms)

According to KSEA bylaws and polices, president of a local chapter/branch shall be elected by voting members of the local chapter/branch. The term of all local chapter/branch presidents is one year. Local chapters/branches shall be established regionally in order to promote professional activities and fellowships among local members as stated in the KSEA bylaws. Local chapters/branches shall be established regionally according to the following procedure: when there are more than 30 voting members in a local community and they wish to establish their local chapter, they shall submit the three documents to the President of KSEA. These documents are (1) Letter application for a local chapter establishment, (2) list and signatures of the founding members, and (3) draft of the Bylaws of the local chapter.

The President shall review the application with the supporting documents at the (EC meeting. When the EC approves the application after careful consideration of the demographic distribution and density of the members as well as particular circumstances in the region, the President shall present the EC’s recommendation to the Council for approval to establish the proposed local chapter. When the number of voting members is less than 30, a local branch can be established following the same procedure as local chapter. Local chapters/branches shall hold at least one general meeting of all members annually.

The KSEA HQ may assist local chapters/branches financially by returning part or all of the membership dues paid by the local members. In addition, the HQ may assist a local chapter/branch financially upon request for a special project that promotes the objectives of the local chapter/branch depending on the EC’s decision. The Presidents of local chapters/branches shall report their fiscal year budget, final balance sheet, membership list, and all activities to the President by May 31, that is, one month before the end of the fiscal year of KSEA. If a local chapter cannot sustain at least 30 voting members who reside in the specific local area, it shall become a local Branch in the following fiscal year.

6. Chapter web pages
A chapter website is becoming an increasingly important component of an effective member relations program and is a critical tool for keeping member informed and connected. A good site should have fresh content, plenty of community news, a secure online member directory, and a photo archive. The KSEA HQ recommends that chapters host their websites on the KSEA HQ server (www.ksea.org). All domain registration, hosting, and site building assistance are provided free of charge by the KSEA HQ IT team. The KSEA HQ has developed a standard chapter website template for use by all chapters to produce modular functionality that can be easily added to chapter sites hosted on the KSEA’s architecture. You may use your university web server or a private host if we desire, but in that case HQ IT team will not provide any supports and you will need to develop and maintain all by yourself.

The template architecture provides an easy to use interface that allows even the novice website owner to add sophisticated site functionality and make chapter website development and maintenance as easy as possible for those without specific web design experience. This will provide immediate recognition on the internet that the chapter is a part of KSEA and is a first step towards assuring that chapter websites are developed in a manner that is consistent with the policies of KSEA. KSEA HQ encourages chapters to develop and maintain websites to disseminate helpful information to members. It is extremely important that chapter pages be readily identified as affiliates of KSEA and that the KSEA logo, which is trademarked, is displayed in an appropriate manner. When someone browse the web and visits a chapter page, it must be immediately identifiable as a chapter of KSEA.

7. Acknowledgement
The purpose of this article is to introduce the Chapter/Branch presidents' manual, which will be available in August 2013. We hope the CP presidents' manuals will assist you understanding roles and duty in council and your chapter. Finally, this article was based upon the manual, contributed by Drs. Taeok Bae, (Chicagoland), Dong Sam Ha (Southern Virginia), Jun Y. Huh (Silicon Valley), Byeong-Uk Kim (Georgia), Sung-Taeg Kang (Texas Austin), Kyung S. Lee (Washington Metro), Byungkyu Park (KSEA VP).
2013 KSEA ELECTION RESULTS
KSEA Election Committee

The 2013 General Election results of Korean-American Scientists and Engineers Association (KSEA) results are as follows:

The Election Committee conducted the ballot counting at KSEA HQ on April 20, 2013. The Committee reported that all ballots have been accounted for according to the rules established by the Election Committee.

No election-related irregularity was found.

- Total Eligible Voters: 5015
- Total Ballots Received: 978 (19.50% of Eligible Voters)

The newly elected officers and councilors are:

**PRESIDENT-ELECT (43rd President)**
Kookjoon Ahn
California State Department of Transportation

**42ND VICE PRESIDENT 1**
Gyewon Han
The Scripps Research Institute

**42ND VICE PRESIDENT 2**
Youngsoo Richard Kim
NCSU

**AUDITOR**
Kyungjae Myung
National Institutes of Health

**COUNCILOR GROUP “H”**
Byoung Do Kim
Virginia Tech University

**COUNCILOR GROUP “K”**
Bong-Kyun (Bo) Ryu
EpiSys Science, Inc.

**COUNCILOR GROUP “K”**
Tae (Tom) Oh
Rochester Institute of Technology

**COUNCILOR GROUP “M”**
Young B. Choi
Regent University
ST. LOUIS CHAPTER

2013 Mini Conference

Saint Louis chapter hosted 2013 mini-conference on March 16 at McDonnell Science Building in Washington University. The conference was organized in 2012 and continued this year as an annual event. The main goal of the conference is providing an opportunity for undergraduate students to experience a scientific conference and develop their presentation skills.

Dr. Soojin Jang, a Saint Louis chapter president began the conference introducing KSEA and the chapter prior to presentations of undergraduate students. The oral presentations were composed of 20 min talk and 5 min question time. This year, a broad range of topics from medical science to cutting edge techniques made the conference more interesting and informative. In addition, the speakers showed a lot improved presentations compared to the last year achieving the purpose of the event. Each presentation was evaluated in six criteria including organization, topic knowledge, visual aids, and stage presence. The conference was separated into two sessions with a coffee break. The main event was closed with a special presentation by Hyung Joo Lee, the representative of graduate students. After the presentations, 5 speakers were awarded as a best presenter: Seong Ho Pahng “Perfluorinated Near IR Fluorescent Micelle for Imaging fo Tumor Hypoxia”, Junsoo Park “Present Tense Climate Change”, Hyang Ki Cho “Mellitin Nanoparticles Decrease HIV-1 Infectivity”, Ki Baek Park “3D Printer and Its Limitless Applications”, and Jiyoon Choi “Glioblastoma.” The event was finished with a social networking time between speakers and attendees having dinner.

The conference was successful achieving the original goal of the event. KSEA headquarter and KUSCO provided pivotal financial aids for the event. Since the speakers and attendees were satisfied with the event, mini-conference is expected to be bigger next year with more participants.

SEATTLE, WA CHAPTER

Mr. Sun Min Jung

Mr. Sun Min Jung from the KSEA Seattle WA Chapter has been recognized for the 2013 Asian American Most Promising Engineer of the Year Award (AAEOY) on March 2, 2013 in Dallas, Texas in front of 600 distinguished guests, fellow awardees, and various sponsoring corporations (http://www.aaeoy.org). Mr. Jung is a design engineer at Boeing, where he recently developed secondary support structures for the 787 program.

He said, “I want to thank AAEOY for this honor and also want to thank all individuals and organizations serving in the fields of science, technology, engineering, and mathematics (STEM). This award reinforces the importance of the work we are doing together to promote STEM.” KSEA Seattle chapter has been busy preparing for the 2013 National Math & Science Competition. They have been investing significant time and effort to create informative and challenging science questions for stimulating scientific interest in students. It is noticed that Seattle chapter has well prepared the science questions and will share them with other chapters for the competition.
New England chapter (Chapter president: Jun Young Choi) held annual technical symposium on March 2nd, 2013. This event was co-organized by KSEA-NE and the Korean Graduate Students Association of MIT and was sponsored by KUSCO (Korea-US Science Cooperation Center). Mr. Kangho Park (Consul General of Boston), Mr. Sun Woo Han (President of Korean Society of New England), and Prof. Sung Woo Kim (Executive director of KSEA head quarter) gave welcome messages. Prof. Yoo Taek Lee (Senior Lecturer, Boston University), Dr. Sokwoo Rhee (Co-founder & CTO, Millennial Net), Mr. Taewon Jin (President, Phoenix Business Computing), and Dr. Jong Sung Koh (CTO, Genosco) were invited to give talks under a theme of “Theory to Practice, from Scientist/Engineers to Successful Entrepreneurs”. Starting with Prof. Lee’s in-depth review of various aspects of entrepreneurship, Dr. Rhee’s experience of starting a company with details, President Jin’s wisdom learned from 20 years of successful management of a startup and Dr. Koh’s road to successful drug discovery and endless challenges captivated the audience of more than 60.

In this year, students and postdocs who were presenting posters had also chances giving 3-5 minute oral presentation of their research field and posters to the audience. Executive director Dr. Yoojin Chung, who helped organizing the symposium and led the poster session, said that “It was a great opportunity for the young investigator who are accustomed to discuss their work to those in similar field, to think about how to present their work to an audience with diverse scientific background. For the members who are not in academia, it was an unusual chance to learn about cutting-edge research performed by the next generation of KSEA-NE.” There was a raffle for a Galaxy Tab sponsored by Samsung after the poster presentation. Most attendees moved to the poster session venue where they shared light refreshments and enjoyed a time of networking.

41st admin of NE chapter held total 9 events including membership drive golf outing on Sep 1, 2012, YG meeting on Nov 17, 2012, regular seminar on Nov 29, 2012, and year-end party on Dec 15, 2012.
GEORGIA CHAPTER
Southeastern Regional Conference (SERC)

With the main theme, “Science and Technology for Better life”, KSEA Georgia Chapter (KSEA-GA) hosted the third Southeastern Regional Conference at Melia hotel (Atlanta, GA) on February 23, 2013. Approximately, more than 100 people participated in this conference. It was composed of three technical sessions, “Physical Science and Biology for Better Life”, “Geospatial Technology for the Betterment of Our Vulnerable Society”, and “Applied Science and Engineering for Better Life”, as well as a YG program. In addition to them, a plenary session was added to the conference in order to introduce the KSEA vision and UKC 2013. It began with welcoming speech by the Chapter President, Dr. Byeong-Uk Kim, and followed by congratulatory speech by Dr. Hyungmin Michael Chung.

Following the speeches, ten speakers from universities, private sectors, and government spoke their specialty in two concurrent technical sessions. In the physical science and biology session, speakers introduced a variety of interesting topics such as liver failure and diabetes mellitus, Parkinson’s disease, genome methylation maps, DNA bend, and Down syndrome, whereas multi-hazard mitigation, web-based GIS, hurricane impacts on crime events, sea-port outage, and the relationship between road traffic noise and human health were addressed in the geospatial technologies session. In the plenary session, the KSEA President-Elect Candidates for KSEA 42nd term, Dr. Kook Joon Ahn and Dr. Dong Sam Ha spoke their vision and plan, and Dr. Myung Jong Lee (KSEA President-Elect 41st term) focused on UKC 2013 that will take place at New Jersey in August 7 ~ 11. After this, four speakers talked about quality assurance in asphalt pavement, mechanical empirical pavement design, 3D MAPS processor design, and game development in STEM field in the applied science and engineering session. The technical sessions of the conference were closed by Dr. Sang Hyuck (GA chapter president-elect), but most organizers continuously worked on for KSEA-GA Young Generation program until late night. Through the conference, we confirmed that GA chapter had been steadily growing and getting strong network connection among professors, researchers, and engineers as years go by.

The 2013 KSEA-GA Young Generation Program is to offer a great opportunity for the undergraduate students in Georgia not only to meet people from industry and academia but also to establish a strong network with them. The title of this year was “Co-op, Intern and Grad school Workshop” focusing on how to get an internship and whether to go to graduate school. Approximately, seven regular members and more than 60 undergraduate students participated in this program. It began with welcoming speech by Dr. Seung Soon Jang (KSEA-GA YG Advisor) at 7:00 PM after a network dinner. The program was divided into two sessions, Co-op/Internship Session and Graduate School Session. In the co-op/internship session, three speakers addressed how to apply an internship position, and prepare for the internship interview. They also emphasized on important tips for turning an internship position to a full time job. They noted that don’t be disappointed even after a series of failures because it is rarely fatal and unimportant, and keep applying for an internship. Two out of three speakers had the previous membership of KSEA-GAYG program and also shared their activities as well.

In the grad school workshop session, students had a chance to listen why speakers had chosen to go to graduate school because most of the student said they had started to think whether they have to get an advanced degree. During the session, speakers exemplified good and bad reasons based on their experience as well as well-known factors. One of the common factors they agreed is that don’t go to graduate school to avoid the difficulty in the job hunt or to delay it. Instead, they recommended that students have to figure out what they want to do with their life and ask assistance from career development counselors. After all the presentation, students were split up to six small groups and had a Q&A session. In the session, the speakers switched around the groups and answered a lot of students’ questions. Finally, the program was ended by 9:30 PM, and most students said they were very satisfied with the program because it covered what they wanted to listen.
The 23rd South Western Regional Conference was held on February 16th (Saturday) of 2013 at the beautiful Carlsbad Sheraton hotel. The event was a very meaningful because the event was the first joint conference between the San Diego chapter and the Southern California chapter. Many important figures of Korean community came to congratulate the event including Consul General Yeon-Sung Shin, KSEA president Hyungmin Michael Chung, Mayor of Gumi City, Yoo Chin Nam, and KITECH USA president Choon Keun Park. The theme of SWRC was “Living with Science, Technology, and Entrepreneurship” and plenary speakers delivered the importance of the theme to the young generation scientists and engineers for their future career. The first plenary speaker was Dr. Wayne Miller, Associate Director of Center for Environmental Research and Technology at the University of California, Riverside. He is the expert in the fields of fuel efficiency and impact on environment. He shared the lifelong lessons, “the importance of identifying partners and being persistent” from his career with young generation audience. The second plenary speaker, Dr. Jae Hoon Kim spoke about innovative current and futuristic technologies.

“Promise of Stem Cells” was a topic of Session I Bio track organized by Dr. Jung Joo Hwang at UCSD & Jae Myoung Suh at Salk Institute. Professor Jeannie Loring from the Scripps Research Institute was a keynote speaker. Dr. Loring gave a general overview of the state of stem cell research and how her group has contributed to establish critical molecular standards to understand and define exactly what a pluripotent stem cell is. Dr. Chang-Sung Kim from Sanford-Burnham Medical Research Institute challenged us with newly admired technology called induced pluripotent stem cell generation. He walked through how we can envision the future human health care and disease treatment with stem cell technology. Although he mainly focused on ARVD cardiac diseases modeling, we are quite sure that his findings and contribution in science community will harness the cure of other fatal disease in human. Dr. Yongsung Hwang from UCSD introduced how to engineer hydrogel-based artificial extracellular matrix to create synthetic matrix with potential to regulate matrix rigidity. Dr. Yoonsung Lee from UCSD showed very beautiful picture and movie regarding how blood cell origins form and function using animal model system. Final speaker of the Session I was Eric Furman from Knobbe Martens. Dr. Furman provided an excellent historical overview of intellectual property law and how it co-evolves with the advances in science and technology and how scientists can protect discoveries made at the bench.

Session II Bio track, titled “Horizon of Molecular and Cell Biology,” was organized by Dr. Jung Joo Hwang at UCSD and Dr. Chungsung Kim at Sanford-Burnham Medical Research Institute. Professor Ohyun Kwon from UCLA was a keynote speaker of the session. Dr. Ohyun Kwon showed excellent works done in her own lab during last decade regarding novel approaches to find better synthesis platform for biologically functional chemical drug repertoire. Professor William Song at UCSD introduced next-generation Dynamic Modulated Brachytherapy (DMBT) for Cancer Treatment. Using a robotic applicator, he emphasized possible treatment option with limited side-effect to treat various cancers. Professor Young Jun Kang from the Scripps Research Institute gave a lecture on body’s immune response upon inflammation followed by anti-inflammatory drugs introduction. Final speaker was Dr. Jae Myoung Suh from Salk Institute. Dr. Suh presented his recent discovery of a novel and unexpected link between the adipocyte master regulator PPARgamma (PPARG) and fibroblast growth factor 1(FGF1) in regulating adipose tissue homeostasis.

The computer science session was organized by Dr. Suejung Huh with the theme of “Computer aided society.” The keynote speaker, Professor Chang-Hyun Jo, presented “Can Agile Processes Make Your Life Agile?” The Software Process of Rigid and Agile was presented to discuss which is better process and how the process can be improved. The second speaker, Professor Arthur H. Lee talked about a DBMS perspective of Data Life Cycle and compared Oracle and Teradata approach. A talk titled “3D Face from Images” was presented by Dr. Jongmoo Choi. In his presentation, 3D Face reconstruction from 2D images using morphing techniques was discussed. Dr. Sun Hyoung Han presented “Discriminant Saliency Network for Object Recognition.”
Han discussed hierarchical Discriminant Saliency Network. The final speaker Dr. John Lee presented machine learning and data mining that were used in auditing. The forum “From R&D to Entrepreneurship” was chaired by Dr. Sung Hwan Cho from NanoCellect Biomedical. Brian Chung, CEO of Interactive Display Solutions gave an introduction of INKE (International Korean Entrepreneurs) and other local association such as KASE or K-group in northern California area. Dr. Inseop Jeong introduced his own consulting company, NBIT Research, that provides consulting services in the field of Nano, Bio, Information Technologies for start-up companies in Korea. Dr. Jeong showed several useful market analysis tools and explained how it can lead to a useful report that a company can refer to when making an important decision such as expanding the company’s business to a new area. Dr. Sung Hwan Cho gave a talk about his start-up company; how it was founded, how the company has raised multi million dollars by Small Business Innovative Research (SBIR) program from the US government. Yougmin Lee introduced a new exciting event that YG and Dr. Bo Ryu are trying to hold at UKC2013 this August.

The Electrical Engineering session was chaired Dr. Youngin Oh. The keynote speaker, Professor Sang Hee Kim from Kumoh National Institute of Technology, introduced the new project of Biomedical & IT convergence that will be carried on next five years. The second speaker, Han Seung Kim from Qualcomm, discussed how CAD tools can play a role in mitigating from challenges of various aspects of semiconductor manufacturing process. The third speaker, Dong Hyup Shin, discussed his PhD thesis work, phased array receiver for use of portable device to minimize the power consumption without significantly sacrificing performance. The technique of his research is used to turn the switch on/off to minimize the power consumption with an optimized channel to be considered to substantiate array performance. The last speaker, Dr. Jong Wook Woo from California State University at Los Angeles, addressed the importance of dealing with big data. Because the amount of data in our world is exploding and analyzing large data sets (larger than terabytes) is increasingly fluid, the traditional database like relational database is not useable. Therefore Big Data is quickly becoming a key foundation of productivity, growth, and innovation.

Track C covered diverse issues related to environmental clean-up, emerging contaminants, drinking water treatment in southern California. One of the presentations was a case study, “removal of naturally occurring uranium for the Campo Hills water system.” Campo is a small community located in southeast San Diego County, 1 mile from US-Mexico border. To provide potable water to the community, County of San Diego installed three groundwater wells. Groundwater in the area is under the influence of naturally occurring uranium that is to be removed before delivery. The presentation included the site information, water quality, water treatment processes, and distribution. Another presentation was about national mussel watch monitoring of the California Coast. In 2009, a pilot project initiated within NOAA’s Mussel Watch Program monitored contaminants of emerging concern (CECs) in California coastal waters. The CECs were: pharmaceuticals and personal care products (PPCP), polybrominated diphenyl ethers (PBDE), current use pesticides (CUP), perfluorinated compounds (PFC) hexabromocyclododecane (HBCD) and alternate flame retardants, and alkylphenols (AP). Results from this project will be used to suggest analysts and station locations in future Mussel Watch surveys and California-specific monitoring projects. In addition, sustainability in development was introduced as a separate presentation. Examples of how to imply sustainability in urban development management were introduced. Current perspectives on environmental site clean-up in California were introduced. Strategies to enter US civil engineering market for Korean companies were introduced and discussed in the session.

The YG session invited John Lee, YG director, and Dr. Kookjoon An to hear why building leadership is important. They discussed two different aspects of how to build a good leadership in an organization. The session provided free discussion on the future career selection. This year organizing two chapters made an MOU with Gumi city and promised to build a productive relationship. The successful event was closed at the dinner for session chairs, speakers and volunteers. We all were looking forward to having a more meaningful SWRC next year in the Los Angeles area.
DEVELOPMENT OF KEY TECHNOLOGIES FOR BIG DATA ANALYSIS & MANAGEMENT SOFTWARE BASED ON NEXT GENERATION MEMORY

It seems like the word ‘big data’ itself is becoming big data in Google, hitting 21M results. But what do we refer to ‘big data’ as? According to Wikipedia, ‘big data’ is a collection of data sets impossible to process using traditional methods. The processing includes capture, management, storage, search, sharing, analysis, and visualization. It was observed in 2012 that the average everyday creation of data was $2.5 \times 10^{18}$ bytes. This number is expected to grow exponentially spanning various sectors. Unfortunately, however, technologies have been growing at almost linear scales. Without new breakthroughs, ‘big data’ will become a critical bottleneck to progress. The future IT winner will be one who can process big data in real time at an affordable cost.

To cope with this potential bottleneck, ETRI, KTH, ECMinor, DataStreams, Realtime Tech, KAIST, and IUPUI teamed up and proposed a 5-year project with an overarching twofold goal: 1) to develop a new data processing system that can process big data in real time with newer technologies and 2) to provide this new system to commercial sectors. I got involved in this project by showing an interest in the global survey jointly initiated by KEIT/KSEA in early 2012. In March, I was contacted by ETRI with a collaboration offer, which I gladly accepted. My team’s role at IUPUI is to develop and consult on hardware-based approaches to accelerating data stream processing, management, and analysis. I proposed to develop two new technologies (see Figure 1): FPGA-accelerated (field programmable gate array) and GPU-accelerated (graphics processing unit) high-speed data stream processing engines.

The first year’s task (currently being performed) is to develop an FPGA-accelerated high-speed data stream processing engine. The proposed engine has a newly structured coprocessor, combining the concepts of single instruction multiple data (SIMD) and very large instruction word (VLIW) architectures. The engine includes nine arithmetic logic units (ALUs) (each is also a vector functional unit) designed and tuned specifically for parallel processing of data streams. The architecture enables the system to dynamically adapt to the varying number of streams by using a compilation method that quickly translates the operators of data query trees into instructions for VLIW processing ALUs. Novel structures of data buffers and stream paths are being devised to deliver many instructions and large amounts of data in real time to the many vector processing ALUs.

The second year’s task will be to develop a GPU-accelerated data stream processing engine. GPUs have shown extreme speedups thanks to their innovative parallel architecture and full-blown parallel programing and debugging environment. In my other studies, we have achieved speedups of more than 500X over CPU-only versions with a recent Nvidia Tesla GPU having 2496 computation cores. The approach is similar to the FPGA-based engine, but unlike the FPGA, the internal structure of the GPU cannot be modified. Thus, in this approach, the features and benefits of a target GPU should be well studied and exploited to implement a desirable high-speed stream processing engine. Our approach is to, first, thoroughly study the unique architecture, features, pros and cons, and application development environment of a new target GPU and design the engine. Second, it will be critical to consider and optimize the various GPU parameters and basic GPU programming for best performance. Third, two types of data storage structures currently exist: row-oriented and column-oriented storage models. As performance can also depend greatly upon structure, according to our past experience, the storage model that better fits the GPU-accelerated engine should be selected through experiments and their results.

Currently, we are making good progress towards achieving the goals, but several difficulties exist due to being a foreign research entity; hopefully, these will be mitigated as more international collaborations occur that offer great benefits. Nonetheless, I greatly appreciate those who enabled this collaboration to be possible.

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COLLABORATIVE RESEARCH WITH ETRI, KOREA

Development of Key Building Blocks for High Speed Fiber-optic Communications

The advent of Internet technologies has revolutionized everyday life; people can watch streaming videos and internet TV at home these days. Although today’s Internet speed is unparalleled compared to a decade ago, the demand for even faster Internet connections never diminishes and pushes to expand its technology envelope. Fiber-optic communications is the backbone of virtually all high-speed communications such as Internet, cable TV broadcasting, and transoceanic communications. Fiber-optic communications sends pulses of light through an optical fiber instead of an electrical signal through a copper wire and offers several advantages over traditional electrical communications including higher speed, lighter weight, no electromagnetic interference, and higher resistance to corrosion.

IEEE (Institute of Electrical and Electronics Engineers) has developed a standard to cover both 40 Gigabit and 100 Gigabit Ethernet, which intends to support local server applications and internet backbones. The standard was rectified in 2010, and a standardization effort for 400 Gbits/s (400G) may start this year. ETRI (Electronics and Telecommunications Research Institute) in Korea proposed to develop a 400G fiber-optic communication system in five years. Designing such a high speed system is technically challenging and requires novel design approaches. KEIT (Korea Evaluation Institute of Industrial Technology), the sponsor of the proposed ETRI project, solicited collaborators for the project along with about 100 other projects through KSEA in January 2012. I was fortunate to be selected as the oversea collaborator of the ETRI project. The entire project team has made good progress over the past year, and renewal of the project was approved in January 2013. The project team, including ours, is in the process of renewal.

The focus of our research for this project is to develop low-power integrated circuits (ICs) for key building blocks of a 400G system, and the major building blocks for a receiver are shown in the figure. The system consists of four channels, in which each channel achieves a speed of 100 Gbits/s. A fiber optical signal is applied to the receiver through a single-mode fiber (SMF) in the figure. The TIA (Transimpedance Amplifier) for each channel amplifies the signal for further processing. TIAs are the most critical block of a receiver, as they dictate the overall receiver performance such as speed, sensitivity, and signal-to-noise ratio.

Existing TIAs for low power dissipation are in CMOS technology, whose main benefits are low cost and low power. All existing TIAs in CMOS technology target 40 Gbits/s, as CMOS technology is inherently slow. The current objective of our research is to design a TIA in CMOS, which can achieve a speed of 100 Gbits/s, or increase the speed by a factor of 2.5 compared with existing CMOS TIAs. The design objective is highly challenging due to the inherent low speed of CMOS technology. We investigated a new TIA design in CMOS 65 nm in the first year. The simulation results at the circuit level show that it is feasible for our TIA to achieve the target speed of 100 Gbits/s. We plan to refine the proposed TIA to improve its performance including group delay variation, bandwidth, and the number of inductors used this year. We will layout the circuit for the post-layout simulation and fabrication of test chips.

Finally, I appreciate KSEA for informing its members of the collaborative research opportunity with Korea, which is a showcase for tangible benefits of being a KSEA member.
Personalized Smart device services are around the corner for millions of subscribers. For this to occur, smart devices must seamlessly leverage real-time sensor data. However, this is impractical with current technologies and infrastructures. We aim to overcome this technical hurdle.

**Rapid Rise of Services.** The emergence of consumer expectation for and technology to support such services has come rapidly, beginning with the game-changing 2007 Apple iPhone release. Apple’s 2008 App Store launch was perhaps an even bigger surprise as it created a totally new consumer software market. Shortly thereafter, Google followed suit with its Android smartphone and App store, and the combined efforts of these and other players resulted in a rapid paradigm shift from mobile industry “voice-centric” to “data-centric” services. Gartner Research forecasts that by 2015, smart devices will begin integrating “Sensor Data Services” (SDSs) that will offer subscribers real-time environmental sensor data from a multitude of locations. Software developers will be able to create personalized and life-centric applications for smart devices that will become more relevant (and critical) to our daily lives. However, developers must address a major technical hurdle given that current smart devices typically lack both physical sensors and the ability to share sensor data.

**Overcoming Technical Challenges.** To overcome this challenge, we began the ELFWAND project to develop a software and hardware infrastructure that can offer environmental real-time sensor data to smart device subscribers. It is a collaborative project between Moneual, KT, ETRI, Teleworks, Chung Ang University and Boise State University. Our objective is to create a “Sensor Data Service” provider. We also aim to initiate a new business market for software companies to develop various personalized and customized life-centric mobile services for each subscriber. The ELFWAND project seeks to provide a solution by developing:

1. Low-cost and low-power wireless/wired sensor networks that can serve as a platform for Ubiquitous Sensor Networks (USNs). As an illustration, in order to reduce the cost and power budget of wireless sensor networks, we are testing and benchmarking RFM12B (433Mhz) radio modules to tether multiple sensor devices together.
2. Low-cost and zero-configuration system architectures that enable smart devices to seamlessly access sensor networks with zero overhead. In particular, we are currently resolving widely known sensor network coordination issues, such as insecure device authentication and registration as well as unreliable dynamic device network join and departure.
3. Lightweight real-time virtual machine and runtime environment for accessing sensor data on smart phones to greatly simplify the software development process for creating a life-centric service. This includes implementing a software abstraction layer for an Android-based device that hides the complex details required to map each sensor data request to either an actual sensor on a device or a virtual sensor by marshalling and unmarshalling each request with a sequence of remote procedure calls.
4. A sensor-oriented cloud infrastructure, as well as sensor service application program interfaces (APIs) that will provide Sensor Data Services as new mobile business products. These offerings will allow new mash-up services to meet individual requests for ubiquitous personalized services.

This project is partially supported by the Korea Evaluation Institute of Technology (Grant No. 10041725) and a 2012 Google Faculty Research Award.
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KOFST is firmly committed to enriching and supporting science and technology societies; encouraging scientists to engage with society; protecting the rights and interests of scientists; and increasing public understanding of scientific discoveries and theories to reap even greater benefits for Korea.

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