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The Energy, Information, Robotics, and Industrial Revolution

While the IEEE Industrial Electronics Society (IES) is celebrating its 70th anniversary, the energy, information, robotics, and industrial revolution is speeding up. It seems that soon everyone in the world will have access to electricity. The electric power supply is a common factor for electrical and electronics devices. It does not matter if we are considering electrifying a Honduran primary school or automating a Japanese robotic factory—without a reliable, flexible, environmentally friendly energy source, modern education and industrialization is not possible. Therefore, one role of the IES is to attract as many new engineers as possible. We need to show girls that engineering is as attractive as other study fields. We must propose a discussion platform for undergraduates, postgraduates, and young professionals from industry. This kind of platform was presented at the IES 70th Anniversary Joint Forum of Women in Engineering (WiE) and Students & Young Professionals (S&YP) at the 2021 International Symposium on Industrial Electronics (ISIE2021)-Kyoto online conference by IES Vice President for Planning and Development, Prof. Makoto Iwasaki, Nagoya Institute of Technology, Japan.

As almost all IES members know that 2021 is a special year, with it being the 70th anniversary of IES. The Society prepared a variety of anniversary events this year, including a special anniversary issue of *IEEE Industrial Electronics Magazine*

(March 2021), anniversary congratulatory addresses in IES e-newsletters and webpages, anniversary gifts to IES members, and special events (e.g., lectures, forums) at the IES flagship conferences, the IECON and the ISIE. Unfortunately, due to COVID-19 issues, many events might have to be carried out online, just as the 70th Anniversary Joint Forum of WiE and S&YP was successfully held at the ISIE2021-Kyoto online, 20–23 June 2021.

The joint forum of the IES WiE and S&YP was specially organized in conjunction with a variety of 70th Anniversary events this year to strongly foster young engineers in this area and support the Women in IES Initiative under the support of the IES Planning and Development Committee as well as the WiE and S&YP Committees. In this three-hour forum on 22 June, as shown in Figure 1(a)–(c), after the welcome greetings by the IES officers, five talks (three keynote and two invited talks) were presented by senior and young women engineers from industry and academia, as the “forum talk session.” Then, breakout room discussions were held in three rooms to foster closer relationships with all virtual participants, making full use of the online conference functions. Finally, the session chairs, Prof. Lo Bello (WiE Committee) and Prof. Jasinski (S&YP Committee) closed the forum with conclusions of the discussions of the talk session and breakout rooms.

At the forum talk session, three keynote talks were presented by senior woman engineers. The first keynote speaker, Ms. Chieko Umeno, Toshiba Mitsubishi-Electric Industrial Systems

Corporation, Japan, gave a talk on the “Development and Certification of PV Inverter” [Figure 1(a)]. She introduced her R&D activities on photovoltaic inverters and discussed her hard experiences during her stay abroad after university graduation, leading to helpful advice to the young participants for their future activities.

The second keynote speaker, Dr. Keiko Shimizu, Toshiba Energy Systems and Solutions Corporation, Japan, presented her talk on “Women Engineers in the Technical and Industrial Field in Japan” [Figure 1(b)]. Because she does a lot of work to spread women engineers’ activities through various organizations, she made some very persuasive arguments during her talk.

Prof. Morgan Kiani, Texas Christian University, presented “Sustainability and Humanitarian Engineering Education” [Figure 1(b)] as the third keynote speaker. In her talk, her fundamental educational activities, especially in Latin American countries, were attractively introduced to describe how to practically achieve sustainable and humanitarian engineering educations for children.

After the three keynote talks, two young women engineers gave their invited talks. Dr. Yukiko Osawa, National Institute of Advanced Industrial Science and Technology, Japan, presented valuable messages to young students and professionals in “Important things in a human–machine relationship—What I learned from my experience in Japan and France” [Figure 1(c)]. She also described her daily research activities and her



WiE and S&YP Forum

**IES 70th Anniversary Joint Forum
Women in Engineering/Students and Young Professionals Forum**

Date: June 22 (Tue), 18:30-21:30 (JST)
Chairs: Lucia Lo-Bello and Marek Jasinski

1. Welcome and Introduction to IES WiE and S&YP (18:30-18:40 JST)

Terry Martin (IES President), **Mariusz Malinowski** (IES President Elect), **Yousef Ibrahim** (IES VP Membership Activities), **Lucia Lo-Bello** (IES Secretary), and **Marek Jasinski** (Students and Young Professionals Activity Committee)

2. Forum talk session

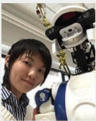
 Keynote talk-1 (18:40-19:10 JST)
Development and certification of PV inverter
Ms. Chieko Umeno
Toshiba Mitsubishi-Electric Industrial Systems Corporation, JAPAN
[Speakers' Bio](#)


(a)

 Keynote talk-2 (19:10-19:40 JST)
Women Engineers in the Technical and Industrial field in Japan
Dr. Keiko Shimizu
Toshiba Energy Systems & Solutions Corporation, JAPAN
[Speakers' Bio](#)

 Keynote talk-3 (19:40-20:10 JST)
Sustainability and Humanitarian Engineering Education
Prof. Mogan Kiani
Texas Christian University, USA
[Speakers' Bio](#)

(b)

 Invited talk-1 (20:10-20:30 JST)
Important things in a human-machine relationship -What I learned from my experiences in Japan and France-
Dr. Yukiko Osawa
National Institute of Advanced Industrial Science and Technology (AIST), JAPAN
[Speakers' Bio](#)

 Invited talk-2 (20:30-20:50 JST)
The relationship among research, education and human resource development from my point of view as an engineer
Prof. Tran Phuong Thao
Nagaoka University of Technology, JAPAN
[Speakers' Bio](#)

3. Breakout room discussions (20:50-21:15 JST)

Room-1 (topic: Women in Industrial Electronics Initiative)
Room-2 (topic: Strong Messages to Students and Young Professionals)
Room-3 (topic: Engineering Educations in Future Industrial Electronics)

4. Summary of Breakout room discussions (21:15-21:30 JST)

(c)

experiences during her study abroad at a laboratory in France.

The next invited speaker, Prof. Tran Phuong Thao, Nagaoka University of Technology, Japan, presented her point of view as a young woman engineer on “Relationship among research, education and human resource development” [Figure 1(c)]. She concluded her talk with a discussion of future education and research activities and collaboration among Asian countries.

After the forum talk session, the presenters and participants were divided into three rooms for breakout discussions, where the participants discussed the three topics: 1) the Women in IES Initiative, 2) strong messages to students and young professionals, and 3) engineering educations in future industrial electronics. Finally, the WiE and S&YP Committee chairs, Prof. Lo Bello and Prof. Jasinski, closed this joint forum with conclusions of all the keynote and invited presentations and the breakout discussions. This presentation scheme should be promising for the full use of the online conference/meeting functions in future online and/or hybrid events.

We would like to especially thank Prof. M. Niitsuma and Prof. T. Murakami for introducing the presenters and also the general chairs, the committee members, and all participants of ISIE2021 for effectively working on this forum (Figure 2). More information can be found at https://www.isie2021.org/wie_syp_forum.html.

All the presentations showed that technology is very useful for society. From renewable solar energy harvesting standardizations, sustainability, and education, human-machine relationships to the role of women in technical and industrial fields, we learned that relationships, friendships, and synergy between men and women are crucial to the successful growth of technical knowledge. Collecting technical skills is not easy but is possible when we prioritize other people in the first place.

Not only is high-tech promotion necessary today, but we also need

FIGURE 1 – Forum programming showing (a) Chieko Umeno’s keynote talk, (b) Dr. Keiko Shimizu’s and Prof. Morgan Kiani’s keynote talks, and (c) Dr. Yukiko Osawa’s and Prof. Tran Phuong Thao’s invited talks.



FIGURE 2 – The ISIE21 Japanese team. (From left) Makoto Iwasaki, Kiyoshi Ohishi, Hideki Hashimoto, Toshiyuki Murakami, and Mihoko Miitsuma.

to promote access to electricity for every single human in the world. Access to electricity should be a human right. Let us focus on this interesting IES project. The IES has joined the IEEE initiative to empower a billion lives through Prof. Morgan Kiani's project in Honduras:

Empowering Those Who Are Powerless Initiative by the IEEE IES

Purpose

The proposed pilot program of Empowering Those Who Are Powerless aims to improve health and education in Honduras by introducing off-grid solar-powered lighting, cooking fans, and charging stations. The proposed system is composed of two phases. Phase one was finished by the end of May 2021, and it was dedicated to providing lighting for Hogar CREA Madres, a campus located in Tegucigalpa, Honduras (Figures 3 and 4).

The second phase will be dedicated to introducing cooking fans in the kitchen and charging stations for portable electronics (e.g., computers, cellular phones) and other dc equipment in the same campus area. Appropriate safety precautions will be developed on-site and added for the safe operation of the system.

Objectives of the Project

The objectives are to improve quality of life by eliminating life hazards associated with cooking and by providing a clean source of energy for light and for charging portable electronics, as well as enhancing education. This pilot project will be a stepping stone toward understanding the local needs

of the community for electricity in the absence of a reliable power grid.

Sustainability

In addition to the technical goals of the program, the proposed project will include an educational component. There will be a close collaboration with local people, administrative personnel in the campus, local volunteers, and local IEEE members in Honduras. There are plans in work to start

a series of educational workshops for locals with a focus on the educational component to create an income for the campus and for its self-maintenance.

The goals of these workshops include the essentials of maintenance and operation for a renewable energy system as well as the fundamentals of a power system needed to pursue a career in renewable energy. This will lead to a sustainable income for the campus, better quality of life for



FIGURE 3 – Top: LED Lighting in the Hogar CREA. Bottom: Madres campus and classrooms.

the locals, and broad outreach to underprivileged communities. This plan calls for across-the-board collaboration among varied technical committees within the IES and, in particular, among young professionals

with diverse backgrounds and linguistic skills.

Background

In Honduras, approximately two million people are currently living in

energy poverty. People who live in the rural areas do not have access to electricity. This pervasive problem creates issues for education, health and safety, and family and women’s empowerment. Cooking using biofuels (e.g., wood) is a leading cause of respiratory diseases in Central America, particularly in Honduras. The use of biofuels is primarily driven by an unreliable electricity grid and the high cost of energy. In addition, the lack of access to a quality education has been a major block to obtaining high-paying jobs. This, in turn, diminishes further financial opportunities that would improve living conditions and health standards of the local communities.

Initial and Sustained Impacts

The proposed project is a first step toward addressing the health and educational needs of the local community by providing 1) an LED-based lighting system for an educational campus for the children’s education and for after-school or evening activities, such as parent workshops and family movie nights; 2) a solar-powered electric cooking fan system to alleviate the hazards caused by traditional cooking; and 3) charging stations for the local community and campus (Figure 5).

To conclude, on one side, we have the tools to implement access to electricity almost anywhere, even in the not-so-well-developed countries; on the other side, we could improve the ability of high-tech to reach less-well-developed countries. However, we must remember that even the most advanced robots should be designed in such a way as to enhance better understanding and provide a better “relationship between humans and machines.” Robots and automation are starting to be implemented in every aspect of our daily lives. When developed, the supporting role for humans will be at the first place. Two basic things that are crucial for sustainable growing are electricity access and the knowledge about how to use it for suppling education, industrialization, and the automation of our life.



FIGURE 4 – The Hogar CREA Madres campus building.



FIGURE 5 – Electricity for all should be a part of human rights.