

Event Report: 2nd IEEE Hack Challenge in Tokyo

IEEE Tokyo Section Young Professionals Affinity Group Chair

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August 5th, 2017

1. Event Overview

The 2nd IEEE Hack Challenge was held at Keio University on July 8-9, 2017. This event was organized by IEEE Tokyo Section Young Professionals Affinity Group, and co-organized by IEEE Japan Council Women in Engineering Affinity Group and IEEE Tokyo Section Keio University Student Branch. This event was also supported by CHIRIMEN Open Hardware Community.

The purpose of this event is to build up the skill to address problems of Japanese modern society by using a cutting-edge technology. In the first part of the event, participants learned CHIRIMEN Open Hardware, a development environment specialized to control physical devices only by Web browser technology. After the lecture on CHIRIMEN, they challenged to develop a web application that addresses the decline in the labor force population in Japan.

This event was finished successfully and the total attendees were 33 persons (including 20 IEEE members).

Date: July 8th and 9th, 2017

Place: Yagami Campus, Keio University, Yokohama, Japan

Speaker:

Akihiko Kigure (CHIRIMEN Open Hardware Community)

Osamu Toda (Meidensha Corporation / IEEE Nagoya Section Young Professionals Affinity Group)

Schedule:

[First day (July 8th)]

09:15am - 09:30am	Reception
09:30am - 10:00am	Opening ceremony
10:00am - 12:00noon	Lesson and exercise about CHIRIMEN (1)
12:00noon - 02:30pm	Lunch
02:30pm - 03:00pm	Lesson and exercise about CHIRIMEN (2)
03:00pm - 05:00pm	Lecture about social problem
05:00pm - 06:00pm	Ideation and teaming
07:00pm - 09:00pm	Networking party

[Second day (July 9th)]

10:00am - 03:00pm	Prototyping
03:00pm - 04:30pm	Presentations and voting
04:15pm - 06:00pm	Awarding and closing ceremony

2. Lesson and Exercise

Mr. Kigure (CHIRIMEN community) gave a lecture on CHIRIMEN. He showed a concrete example about “What is CHIRIMEN”, “What can it do in CHIRIMEN.” After the short lecture, we had some exercises with CHIRIMEN.

The lecturer explained a meaning and the editing method of the program source code. The participants tried to edit given examples for CHIRIMEN, which work with four sensors (accelerometer sensor, light sensor, touch sensor, temperature sensor).

The participants could readily see how different the CHIRIMEN works when they edited an example code, so that they had fun with the exercise.

Three assistants from CHIRIMEN community supported the participants who were struggling with editing the examples. Some participants who finished the basic exercises argued about the implementations and the applications using CHIRIMEN. Most participant enjoyed the exercises with CHIRIMEN.



3. Lecture about Social Problem

This lecture had aimed to show one of serious problems which Japan suffers, a declining workforce in Japan. The speaker, Dr. Toda, reported a few predicted trends of maintenance and repair costs of infrastructures in Japan. The cost in Japan has rapidly increased from 2000, because many infrastructures billed in Japan's economic growth between 1960 and 1980 have been damaged over the years. This report alludes to the fact that a demand of maintenance also increases in the years ahead. The declining workforce in Japan, on the other hand, progresses because of a declining birthrate in Japan from about 2000. From the facts on the maintenance and the workforce, a workload for individual worker will be too much to handle.

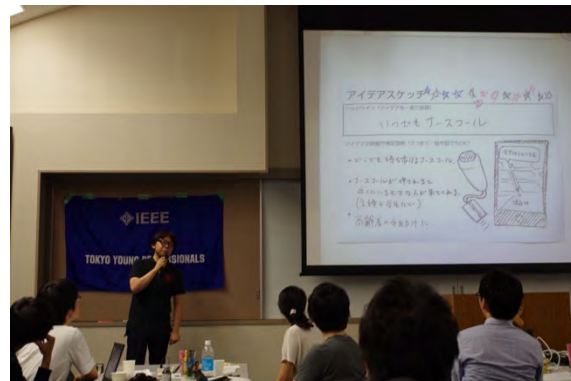
After the above report, he pointed out that young Japanese engineer and researcher can come up with effective solutions for the workload problem.

Especially, the lecturer stressed out that good technology used for decades, just like the infrastructure. By this lecture, the participants were given new insights about (i) why IoT technology is needed, and (ii) how they can support the Japanese society with engineering.



4. Ideation and Teaming

The attendees shared their ideas based on the theme with "Speed Storming" style. First of all, attendees got in two circles (inside and outside) and then the face-to-face people who are inside circle and outside circle talked each other in 3 minutes. After that they took a memo and the people outside circle make a clockwise turn for one person. Again, they shared the ideas with different person and the same task is continued at 5 times. The important things of this speed storming are to absorb the other people's idea and create more exciting ideas. After this session, we had 15 minutes for the "Idea Sketch". Then the idea sketches were lined up on the table and all attendees evaluated all idea sketch ("Highlight method"). Finally, 5 ideas which had higher score were selected and the people who wrote the ideas presented and appealed their ideas and the other attendees joined one idea and finally they separated into 5 teams.



5. Networking Party

30 people participated in the party, including students, social workers, researchers, university professors and others. They enjoyed talking about their research and work each other.

On the other hand, some people discuss how Japan will realize IoT in the future. An application engineer and an embedded engineer talked about communication methods of IoT, an application engineer thought TCP/IP is better, but an embedded engineer thought that we should use communication methods for different purposes in accordance

to the use. This discussion was interesting.

In the middle of the party Japanese Sake were hands out to them. It was made in Akita Prefecture and brought by Mr. Sato of Tokyo YP, and the participants were having a pleasant talk while drinking sake.

The networking party provided a good opportunity to students interact with engineers.

6. Prototyping

On the second day, participants broke into five teams and developed prototype applications based on the ideas put out at the ideation on the first day. A set of CHIRIMEN hardware board and four types of sensors that the participants had learnt were provided to each group. IEEE staffs and CHIRIMEN Open Hardware Community members supported the five teams technically. Each of teams decided the roles of members (Javascript coding, HTML coding, preparation for presentation, etc.) according to the skills of the members, and worked together for the prototyping. We prepared light meals for lunch so that the participants could continue coding and implementation. Finally, every teams implemented unique applications related to the decline in Japanese labor force population.



7. Presentations and Awarding

5 team presented their work within 15 min. including 5 min. for Q&A. Summary of each application is described later. After all the presentation and Q&A, we had a voting time to select the winner. The evaluation points are three, i.e. (1) Expectation for Social Contributions (if fully realized), (2) Idea to utilize CHIRIMEN effectively, (3) Programming and Implementation Skills. All attendees evaluated each team's application except for their own team's. Then, the winner team was team B: CHIRIMEN Dash. They achieved high degree for all three evaluation points. In the award ceremony, they commented that they are helped by each other and promise to continue learning, etc.

Summary of the application of each team

Team A: An attractive telework application for nonworkers

Team A is formed by 4 members who are all beginners of web programming languages. They projected and developed a teleworking web application for nonworkers (e.g., NEET, unemployed). The application proposes provide a job opportunity in home. The members divided the proposed application into 4 web pages: (1) a top page to attract attention, (2) managing pages for a working team, (3) a console page to check an entering and leaving at a remote place and (4) an evaluation page for a workload of teleworking. The page (1) and (2) are programed by html code installed on CHIRIMEN. In contrast, (3) and (4) are Java script included with sensors (e.g., a touch sensor and a light sensor). All members had a hard time to build the page with a minimum quality, however, they integrated all page within the given time. Student members of the team A got further curiosity for the development of the web application. Mentor of this team got an impression that this challenge was a good career- and technical-development for student members. In order to bring it closer to the ideal, it is difficult to formulate all the original ideas. However, I feel that “Team A” got obtain a more realistic and functional method than the original idea in the process.

Team B: CHIRIMEN DASH

They noted that as the working population decreases, old men would become lonely and not be able to get necessary helps and requirements including talking with anybody, buying something, and so on. Therefore, CHIRIMEN DASH aimed to construct a system in which a person who has time, such as a student, a housewife, a worker at a break time, responds by raising his / her name when an old man asks for help.

- (1) An elderly person sends his / her requirement to the server by using CHIRIMEN
- (2) Based on the sent position information, a person who can satisfy this requirement raises his / her name
- (3) A person who will dispatch is decided with consideration of rewards and arrival time.
- (4) The elderly person is informed through CHIRIMEN that someone is headed.

In the event, they constructed a server and implemented functions to CHIRIMEN that (1) sending help message from CHIRIMEN to the server and (4) notifying someone heading by flashing LED on CHIRIMEN. Furthermore, they also simulated the communication between the server and the person who helps elderly person by using Facebook Messenger and another constructed server.

Team C: Occupied!

They thought decreasing of working population can be supported by increasing the quality of working time. Hence, they tried to develop the restroom availability system named Occupied! because waiting for the toilet to be available is one of the most wasted moments in working time. Occupied! consists of the server and CHIRIMEN. The server holds each toilet’s equipment, space, user evaluation results, and so on. CHIRIMEN sends each toilet’s availability, used count, paper towels remaining amount, queuing time, evaluation, emergency message to cleaner. In the event, restroom availability visualization UI moving on browser were developed, and a system were implemented on CHIRIMEN which changes the availability of each toilet by touching the touch sensor instead of closing the key.

Team D: Office-work application through a short-game

A team D is formed by 5 members who are four students and one electrical engineer. The team E first discusses

technology trends of recent years. From the discussion, they focused on supervised learning of machine learning, and then, pointed out that how to make a training data set. It is generally known as making of the training set takes long-time because of hand working. The team D plans a game with CHIRIMEN to support the making of the training set.

The proposed game is "a true or false quiz" which is linked to machine learning. The quiz has four steps.

- (i) The quiz displays an image and a text.
- (ii) The player selects a answer (e.g., same or different) for the subject by a tach sensor of CHIRIMEN.
- (iii) The answer of the quiz reflects a training set of the machine learning.

The players support a part of office work through the proposed game.

The team E shows the concept of the game with CHIRIMEN. The student of this team E, after the event, reviews that the team E too use a time for the meeting to develop the web application.

Team E: E HOGE!

Team E proposed a web application which notices crowdedness of trains. Commuting by a crowded train can cause stress and decrease of efficiency in working. Team E thought that if one knows the crowdedness of the trains they would commute by, they can choose the most comfortable train.

People would get less stress in their commutation. Someone may take a seat and do an additional work. Such improvements might result increase of work-efficiency. Eventually, it can be one of the solutions for decreasing working population.

Team E employed touch sensors (below seats) and light sensors (both sides of doors) to evaluate the crowdedness of a train. They used CHIRIMEN to collect the information, and to upload it to a web server. They also made a web page displaying the information on the web server, so people can check the crowdedness.





8. Questionnaire

After this event, we conducted a survey questionnaire to participants.

8.1 Respondents

There were 27 respondents which consist of 18 students and 9 working adults. Figure 8.1 shows a breakdown of the respondents on the school year.

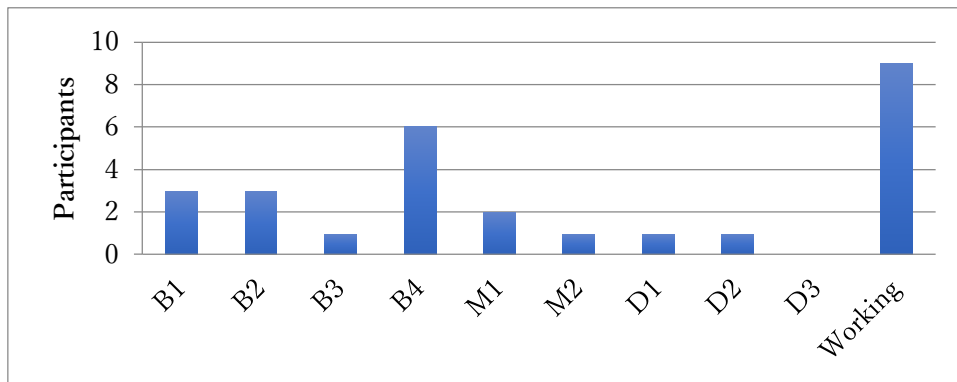


Figure 8.1 School year of the respondents

8.2 Evaluation of this event

We asked participants to evaluate this event's contents, useless, time length, venue, and event operations. Each question consists of five point rating scale, as follows:

- (a) Contents: *Very good, Good, Average, Poor, Very poor*
- (b) Usefulness: *Very useful, Useful, Average, Useless, Very useless*
- (c) Time length: *Long, Slightly long, Appropriate, Slightly short, Short*
- (d) Venue: *Very good, Good, Average, Bad, Terrible*
- (e) Event operations: *Very good, Good, Average, Bad, Terrible*

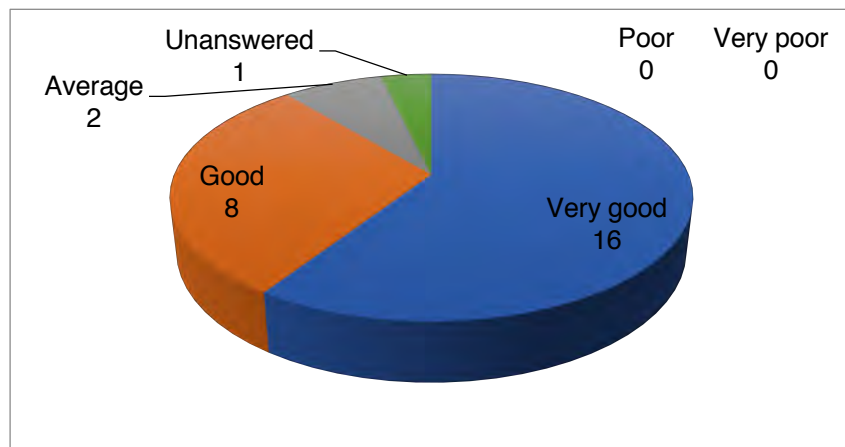
The answers to each question are shown in Figure 8.2(a) – (e).

We got rather favorable reviews, except for (c) time length. Some reason of such favorable reviews are as follows:

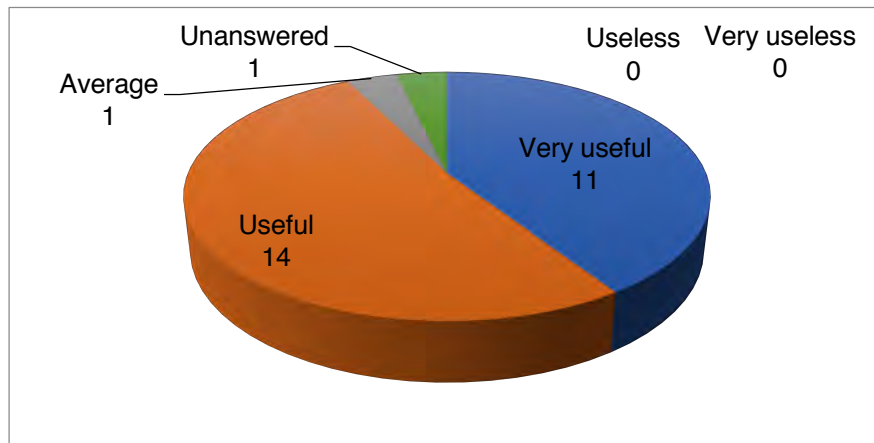
- Because I had a very good experience of making one product with my team members.
- I did not know CHIRIMEN until this event. This is my first time to use CHIRIMEN, and I thought it's very interesting. Moreover, I did not much know about HTML and Javascript, therefore I learned a lot from this event. It was very fun. The networking party is also my good experience.
- I was impressed outstanding support of the event staff. It was a successful event.

On the other hand, we have been pointed out that the event time length is not appropriate. As many opinions, the prototyping time is slightly short. Some comments are as follows:

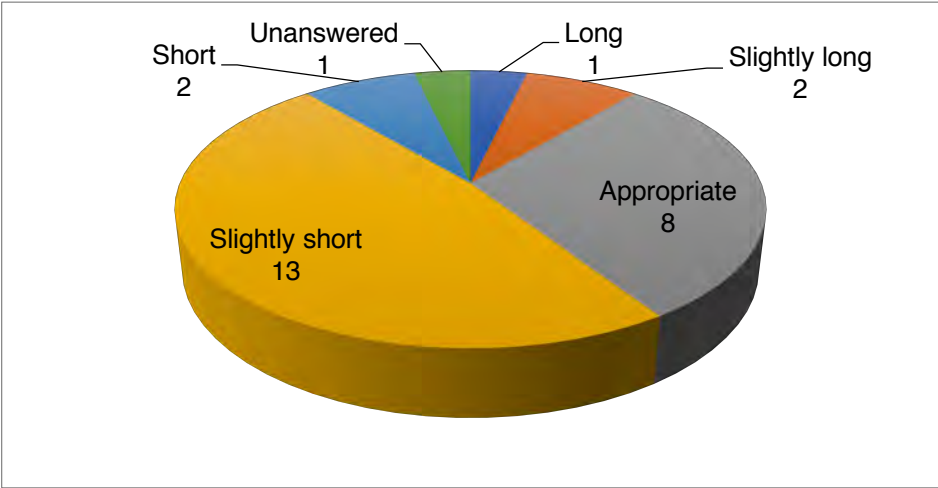
- The thinking time for a specification is appropriate, yet the implementation time is insufficient.
- The programming time is not enough for me to implement a prototype which I want to complete.



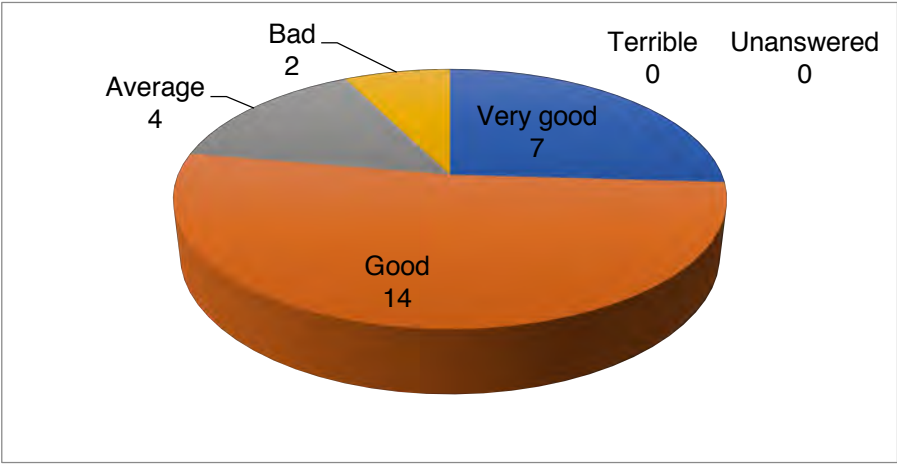
(a) Contents



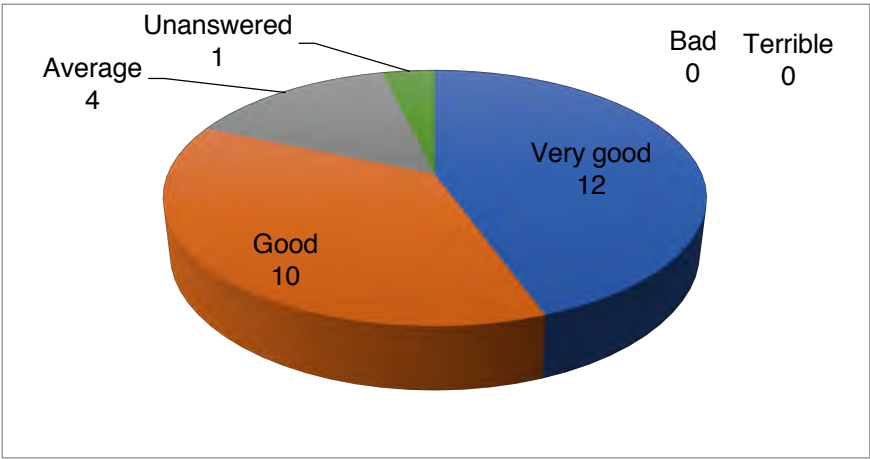
(b) Usefulness



(c) Time length



(d) Venue



(e) Event operations

Figure 8.2 Evaluation of this event

Considering above, we would like to make efforts to improve on future events.

8.3 Next workshop

We also asked the participants

- what kind of events they would like to attend in the future
- which academic fields they are interested in

with multi choices on the questionnaire. The choices are as follows:

(a) Events

- Lecture meeting
- Practical course
- Competition / Contest
- Company tour
- Informal party
- Other events (free writing)

(b) Academic fields

Electronic Engineering / Electrical Engineering / IT / System Engineering / Communications / Material / Physical properties / Physics / Chemistry / Mathematics / Education / Medical / Management / Economics / Politics / Social Science / Philosophy / Psychology / Arts / Others (free writing)

The total results for each question are shown in Figure 8.3 and 8.4.

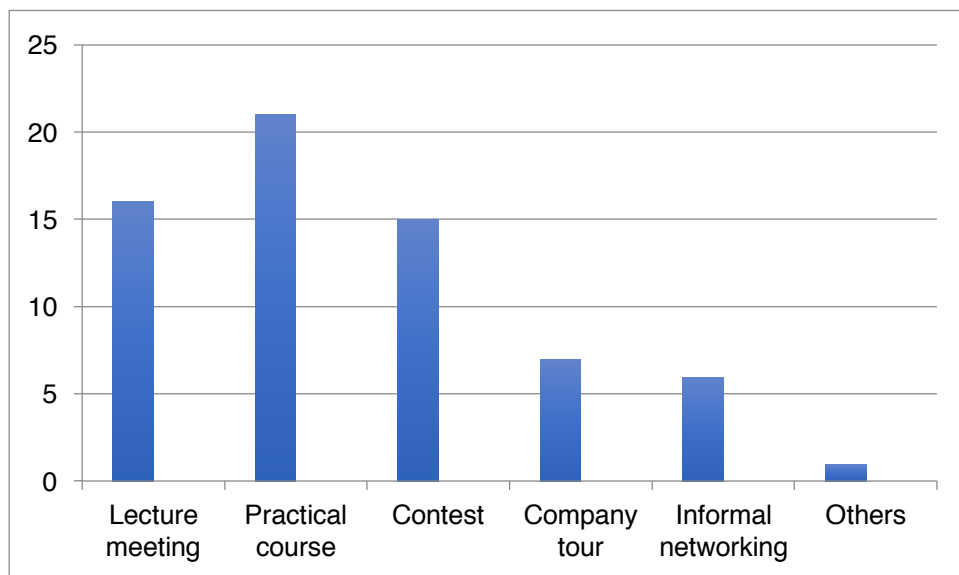


Figure 8.3 Events

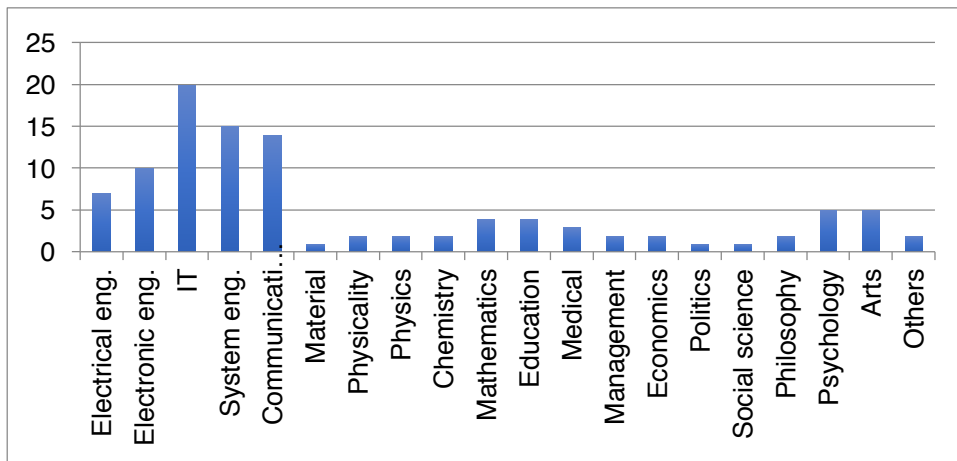


Figure 8.4 Academic Fields

About (a) events, many respondents want lecture meetings, practical courses, and competitions. About (b) academic fields, the fields related to information and communication technology (ICT) and electrical and electronic engineering are highly rated. These fields have a close relationship with IEEE. We would like to plan future events based on these useful opinions.

9. Summary

Tokyo YP held "the 2nd IEEE Hack Challenge" co-organized by IEEE JC WIE Affinity Group and IEEE Tokyo Section Keio University SB, and supported by CHIRIMEN Open Hardware Community. This year's hack challenge provided a chance to deal with both software and hardware as IoT developments, while the 1st hack challenge held in last year dealt with software only. The event was finished successfully. We are going to keep this event, "Hack Challenge" after this with higher effort.

10. Acknowledgement

This event was supported by CHIRIMEN Open Hardware Community. Especially, Mr. Akihiko Kigure, Mr. Ken-ichiro Kishida, Mr. Takayoshi Miyamoto, and Mr. Yusuke Kajii kindly helped us. Also IEEE Japan Council Women in Engineering Affinity Group and IEEE Tokyo Section Keio University Student Branch joined as co-organizers. Further, this event was funded by IEEE Region 10 Young Professionals. CHIRIMEN Open Hardware Community gave organizers an opportunity to learn and exercise CHIRIMEN programming during preparation for the event. Moreover, they lent CHIRIMEN hardware and sensors, and provided technical support for attendees. Finally, we could finish this event successfully thanks to all sponsors, CHIRIMEN Open Hardware Community members, organizer and co-organizer team members, and all attendees. We really appreciate all their helps.

