

Internet of Things for 4.0 Industry Revolution

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Abstract

In this training, participants were given an understanding of the IoT (Internet of Things) for the Industrial Revolution 4.0 and were accompanied by instructors to get to know the technology. The approach method is based on research results that have been published in electrical engineering. We CO (Collaborated Overseas) with UTHM (Universiti Tun Hussein Onn Malaysia) in the CS (Community Service) programme, with the aim of providing guest lectures on the advancement of IoT technology and IR (Industry Revolution) 4.0. Thus, the contribution to this CS activity is to support the improvement of the quality of skilled labor from partner participants to be in line with industry needs. Therefore, the leadership of the institution approved and held the IoT for 4.0 IR training. Universitas Mercu Buana through the Institute for Research and Community Service participated in the field of ICT (Information and Communication Technology) with the long-term target of developing wireless sensors and actuators, and computing methods in embedded systems and the cloud. The conclusion of this CS activity is that participants were very enthusiastic about this activity and and gained the benefits of science, as well as an understanding of telecommunications.

Keywords: *community service, electrical engineering, guest lectures, IoT, IR 4.0*

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Introduction

Rapid development of electric and electronic technology, information technology, and advanced manufacturing technology have made changes in companies towards the digital era to the intelligent era. A new era incorporating virtual reality technologies based on the CPS (Cyber-Physical System) is coming (Li et al., 2016; Okwu et al., 2022; Wan et al., 2013, 2014). These new challenges have resulted in manufacturing technology and the like, gradually becoming part of a highly regarded field of science for industrialized countries. The European strategy 2020 (United Nations, 2010; Łabędzka, 2021), the IR (Industry Revolution) 4.0 strategy (Fakhri et al., 2020) and China manufacturing 2025 (Zhou, 2015) have been proposed, as well as the United States is gradually accelerating the speed of reindustrialization and manufacturing reflow (Jamwal et al., 2021).

Due to the different characteristics of the information field, there are still many technical problems to be solved to accelerate the path of smart factory. The following are things that have been done in the Electrical Engineering Study Program of Universitas Mercu Buana:

1. In the physical resources layer, it is imperative for physical apparatuses to possess the capability to gather real-time data, while communication tools must offer swift and diverse information transfer. A designed prototype should ensure rapid reconfiguration and adaptability. Furthermore, it is essential to enhance the sophistication of the underlying equipment in order to fulfill the demands posed by IoT (Internet of Things) (Budiyanto, Medriavin Silalahi, et al., 2020; Budiyanto, Silalahi, et al., 2020; Budiyanto et al., 2022; Silalahi, Budiyanto, Silaban, Simanjuntak, et al., 2021; Silalahi, Ikhsan, et al., 2022).
2. In the network layer, the IoT needs to endorse novel protocols and fresh data formats, characterized by remarkable adaptability and scalability. This, in turn, introduces novel prospects for the advancement of industrial networks. Moreover, it is imperative to introduce other pertinent technologies to ensure the QoS (Quality of Service) within the network, and facilitate collaboration among equipment. (Budiyanto et al., 2021; Silalahi, Budiyanto, Silaban, & Hakim, 2021; Silalahi, Jatikusumo, et al., 2022).
3. In the data application layer, the cloud platform must be able to analyze the semantics of various data. Therefore, a data analysis can provide a scientific basis for decision making, while data mining can be used to ensure design optimization and active maintenance (Budiyanto et al., 2016, 2017).

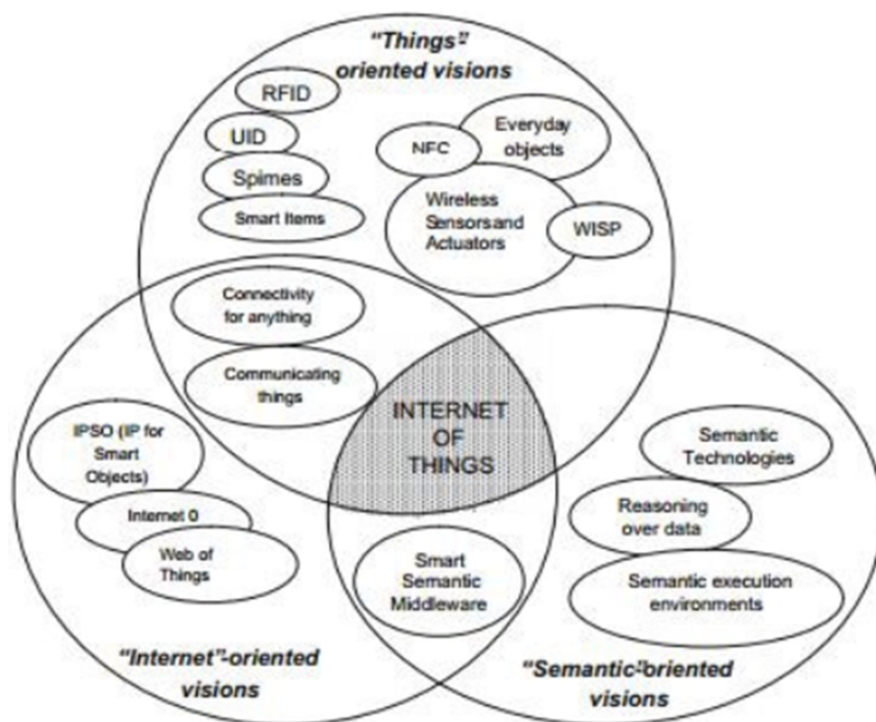


Fig. 1. Internet of Things (IoT) map

In general, we have developed and analyzed the hierarchical architecture of smart things with a focus on the key technologies of each layer. These research results and technology development trends are also presented based on publications and have been summarised into an illustration in figure 1.

In the face of increasingly rapid technological developments, Human Resources (HR) are needed to be able to compete and have competitive abilities and expertise. One of the efforts to improve the quality of Indonesian human resources is done by encouraging and fostering public interest in learning.

In general, IoT is defined as a set of electronic devices that connect components with each other to produce pre-processed information. Realising this, UMB (Universitas Mercu Buana) and UTHM (Universiti Tun Hussein Onn Malaysia) established a CS (Community Service) OC (Collaborated Overseas) to provide an understanding of IoT and the development of IR 4.0. Based on the results of the situation analysis above, IoT for IR 4.0 is needed for students in learning, introducing the concept of IoT, and adding to the treasury of lecture material properly.

The partners who will collaborate to carry out this CS are students located at UTHM. As a request from the partner in order to improve the knowledge and competence of knowledge about the Introduction of IoT for IR 4.0 as a provision in preparing student competencies to face the Industrialisation of Automation Era as well as provision in entering the world of work in electronics-related industries, especially in the field of Automation Systems. In accordance with requests from partners. The target participants or target audience as the target participants in this training are 5-10 people.

Based on the preceding situational analysis, it can be formulated that the issue discerned from the scenario pertains to comprehending the IoT within the context of the IR 4.0. Hence, to enhance participants' understanding and proficiency in IoT and IR 4.0, it is advisable to organize both theoretical and hands-on seminars. This approach considers the essential knowledge and skills required for comprehending IoT in the context of IR 4.0. Such competence is crucial for participants to effectively navigate competition in the era of industrialization and open markets. Additionally, these insights are anticipated to be valuable as individuals venture into employment opportunities associated with the field of IoT.

The goal/target of this CS is that participants can understand about IoT for IR 4.0 which is useful for the world of education and can be accepted by the industrial world including:

1. Introduction knowledge about the IoT and the development of the IR 4.0.
2. The importance knowledge about IoT in various fields.
3. Assisting partners in developing competence in accordance with the development of current IoT.
4. Describe the basics of Industrial Revolution 4.0

With this project, it is very beneficial for the participant, in this case, is the participant from UMB and UTHM, because they would get knowledge how to understand about IoT for IR 4.0 that is useful for the general public.

Methods

The proposed solution design is to provide education to students about IoT for IR 4.0 at UTHM, including:

1. Debriefing is needed in the form of positive and useful activities for students, especially those entering the final semester at UTHM.
2. It is necessary to provide knowledge about IoT for IR 4.0, namely simple project-based coding skills to foster the interest of CS participants to get to know IoT.
3. Stimulate students' interest in the field of electrical technology by presenting the research results of the head of the proposing lecturer, then continued with training and workshop methods.
4. Participants who carry out training and workshops get:
 - a. Understand and understand the theory and working principles of IoT
 - b. Understand and understand the coding script displayed
 - c. Perform a simple simulation of the displayed code

It is hoped that this training can provide benefits to Universiti Tun Hussein Onn Malaysia students to develop their abilities and skills related to IoT technology. In terms of quality of service or community life, of course this training supports a skilled community so that it is ready to face the AEC (ASEAN Economic Community) according to its talents and interests.

A. Place and Time

The place and time of this activity are at Universiti Tun Hussein Onn Malaysia, located at 86400 Parit Raja, Batu Pahat, Johor Darul Ta'zim, Malaysia, and Universitas Mercu Buana, Jalan Meruya Selatan No. 1, Kembangan, West Jakarta, Indonesia, 11650.

B. Target Audience

Participants are final-year students from Universiti Tun Hussein Onn Malaysia with the goal that students feel the impact of changes from the IoT learning system for the IR 4.0.

C. Type of Activity

The types of activities carried out are exposure to the concept of IoT for IR 4.0, carrying out practicum based on kits that have been designed and evaluation of this CS activity.

D. Activity Method

The method used is to combine research, then obtain solutions to partner problems about IoT for IR 4.0 so that student graduates are in accordance with their fields of knowledge and support graduate skills in the world of work in the IR 4.0 era.

E. Activity Technique

The technique of training activities for more detail is listed in Table 1.

Table 1. Community service programme activity techniques

No	Description
1	Cooperation between Universitas Mercu Buana's electrical team and partners in terms of files and others at Universiti Tun Hussein Onn Malaysia
2	Simple project-based coding training to foster participants' interest in IoT

F. Evaluation Design

The participants from this Project are from UMB and UTHM. Based on the description of the problem statement and the solutions, the community service project that suitable for the participants. This community service project is divided between each phase, which are:

1. Step 1: The participants are given explanations about IoT (Internet of Things) for 4.0 Industry Revolution.
2. Step 2: The next is a question-and-answer session.

The project method is an explanation of the material (tutorial) and a presentation or seminar on the introduction of IoT and Industry Revolution 4.0. The training participants were evaluated in the last session by the question and answer session.

Results and Discussions

Community service activities have been successfully in a hybrid manner at the Harun Zein Auditorium, Universitas Mercu Buana and online via the Zoom platform as shown at Figure 2.



Fig. 2. Participants of the event



Fig. 3. Speech from Head of Research & Community Service Centre

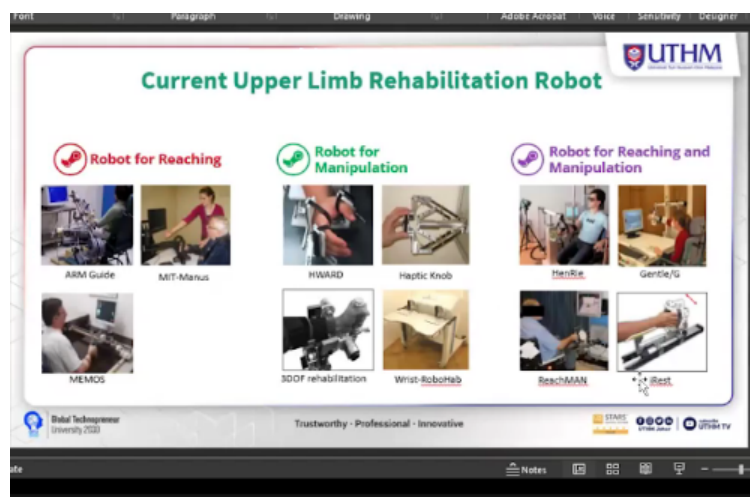


Fig. 4. Keynote speech presentation from UTHM

The event started with opening remarks from the Head of UMB Research & Community Service Centre, Dr. Erna Setiany (Figure 3). Speaker from university partner, Assoc.Prof. Ir. Dr. Dirman Hanafi Burhannuddin, gave explanation about ongoing research in UTHM (Figure 4). At the end of the event students from Universitas Mercu Buana presented Smart Robot Demonstration as shown in Figure 5.

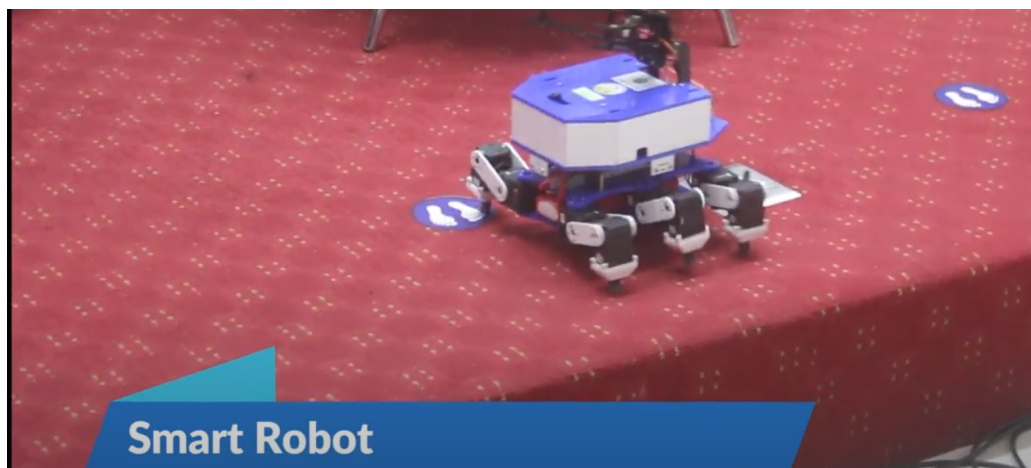


Fig. 5. Smart robot demonstration

A questionnaire was given to the participants to complete in order to get their opinions and suggestions. Most of the participants responded favorably to the instruction with great enthusiasm.

Conclusion

The participants were very enthusiastic about this activity and they really hope that this activity would continue. Participants are expected to benefit from the community service program. These benefits include knowledge and understanding of telecommunication, where this knowledge is very useful for them to know more about electrical engineering. This community service is very useful, especially to improve knowledge, insight and skills of the participants to use or apply the technological devices. Therefore, there are some records for this community service in the next project, such as conducting information dissemination and similar training for other students with the same material, as well as the continuity of the community service.

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