

Training on Arduino Uno-based Smart Home Installation at SMK Al Falah Dago

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ABSTRACT

Understanding smart home technology is increasingly important as automation and IoT become integral parts of modern living and industry. Arduino is a microcontroller that is widely used in practical technology applications, including smart home technology. Smart home systems are computer-based systems that provide comfort, safety, security, and energy savings automatically. They can be programmed via a computer connected to the internet and can manage electrical equipment that can be controlled, monitored, or accessed remotely. To connect Arduino to the internet, the ESP8266 is used. The ESP8266 is a low-cost Wi-Fi microchip with built-in TCP/IP networking software and microcontroller capability. The Arduino system for education and learning at SMK Al Falah Dago is based on an ESP8266 microcontroller embedded in the Arduino Uno Smart Home Installation for connecting to cellphones, relays, lights, and fans as controlled electronic devices. SMK AL Falah Dago is a vocational high school that offers a program in electrical engineering scope, so this training is crucial to equip students with the necessary expertise to design, install, and maintain smart home systems, preparing them to meet the demands of the evolving technological landscape.

Keywords: *Arduino Uno, microcontroller, smart home, SMK Al Falah Dago*

1. INTRODUCTION

Community service is one of the Tri-Dharma activities of higher education (**Riyanti et al, 2024**). By implementing the Dharma of community service, it is hoped that there will be a connection and togetherness between universities and the community. Based on this rationale, it is hoped that there will be no gap between universities and the surrounding community. Community service is one of the main tasks of higher education, so its implementation must be supported by community service guidelines to ensure that related elements do not make mistakes in implementing it. Referring to this, it is appropriate that community service programs carried out by educational institutions such as ITENAS can be implemented and developed. One implementation of community service is carrying out the development of educational and research results, which are utilized by the community, province, industry, or regional companies (BUMD or UMKM).

Technological developments in the field of electronics have progressed very rapidly over time (**Abd ELhamid et al, 2021**). This is supported by the emergence of new, increasingly sophisticated innovations with smaller sizes, such as microcontrollers. One widely used microcontroller is the Arduino Uno (**Deshmukh et al., 2018**). The use of Arduino Uno covers various fields; one of the technologies that is currently popular is smart home technology. Arduino usage requires the Arduino IDE. The Arduino IDE is software used to create programming sketches; in other words, the Arduino IDE is a medium for programming the board (**Erintafifa, 2021**). A smart home system is a computer-assisted system that provides comfort, safety, security, and energy savings (**Santoso et al., 2021**). It takes place automatically and is programmed via a computer in a residence, also called a home, that connects to a communication network with electrical equipment that can be controlled, monitored, or accessed remotely. Smart homes can also increase efficiency, comfort, and security by using technology automatically (**Mendes et al., 2015**).

Apart from the Arduino Uno, another device has also been developed that can connect to the internet, namely the ESP8266 (**Kurniawan, 2017**). Developed by Espressif Systems, the ESP8266 is not only a small device embedded in various electronic devices but also the brain behind the intelligence related to the internet (**Wicaksono, 2017**). With its small size, the ESP8266 turns a simple device into a gateway to the connected digital world (**Vispute et al., 2020**). As a microcontroller with low power consumption, it is able to work efficiently even in battery-powered devices (**Zuchriadi et al., 2024**). This is what makes it especially suitable for IoT applications, where devices communicate wirelessly to collect, send, or receive data (**Mesquita et al., 2018**). This system is designed using an ESP8266 microcontroller as the system control center, a Wi-Fi module to connect to a cellphone, relays, lights, and a fan as electronic devices that will be controlled (**Erintafifah, 2021**). Based on this background, our team carried out Arduino Uno training on smart home installation at SMK Al Falah Dago because this training is crucial to equip students with the necessary expertise to design, install, and maintain smart home systems, preparing them to meet the demands of the evolving technological landscape.

2. METHOD

Training activities for students of SMK were conducted at SMK Al Falah Dago with a total of 27 participants. These activities included material presentations, question-and-answer sessions, discussions, and demonstrations of experimental equipment related to the training. Afterwards, the participants filled out a training questionnaire.

3. RESULTS

The following are the details of the activities carried out in community service at SMK Al Falah Dago

Preparation for Implementing Activities

Initial coordination was carried out among the organizing team to finalize the schedule, materials, logistics, and technical requirements needed to support the success of the event.

Filling Out Attendance Forms for Training Participants

At the beginning of the event, each participant was asked to fill out an attendance list as part of the administrative documentation.

Opening of the Event

The event was officially opened with welcoming remarks from both the organizing team and school representatives to mark the commencement of the activity as shown in figure 1.



Figure 1. Opening remark from school representative

Introduction to Itenas and the Electrical Engineering Study Program

Participants were given an overview of Institut Teknologi Nasional (Itenas), including its vision, mission, and academic environment, particularly focusing on the Electrical Engineering Study Program.

Delivery of Materials

The main content of the training was delivered by the speakers, covering theoretical and practical aspects relevant to electrical engineering and vocational applications as shown in figure 2. Figure 3 shows the theme of the training.



Figure 2. Delivery of Materials

PENYULUHAN SMARTHOME MENGUNAKAN ESP 8266



Figure 3. Theme of Training Activities

Implementation of the Presented Material through Direct Practice

Students were guided through hands-on practice sessions to directly apply the concepts introduced, thereby enhancing their technical understanding and skills (figure 5). Before hands on practice, the facilitator give demonstration of the training (figure 4).



Figure 4. Demonstration Session



Figure 5. Hands on Session

Question-and-Answer Session and Discussion

An interactive session was conducted where students could ask questions and engage in discussions to deepen their understanding of the presented topics (figure 6).



Figure 6. Question and Answer Session

Quiz and Distribution of Souvenirs to Participants

A short quiz was conducted to assess participants' understanding of the material, followed by the distribution of souvenirs as a form of appreciation (figure 7).



Figure 7. Appreciation Session

Closing and Documentation

The event concluded with closing remarks and a documentation session, including group photos and feedback collection from the participants. The training participants can be seen in Figure 8.



Figure 8. Documentation of Training Participants

The following are the results of a questionnaire from "Arduino Uno Training on Smarthome Installation at SMK Al Falah Dago," with 27 participants. Figure 9-12 show details of the satisfaction results of training participants for each question point.

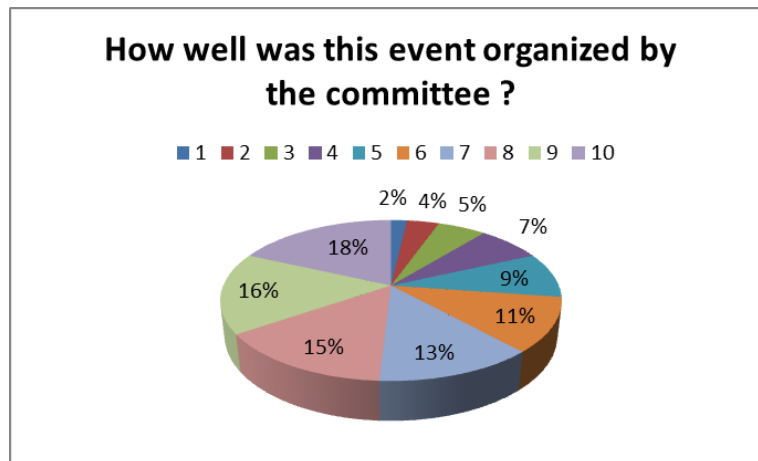


Figure 9. First-Point Question

From Figure 9, it can be seen that for the first-point question, on a scale of 1 to 10, 13% of respondents answered 7, 11% answered 8, 16% answered 9, and 5% answered 10, regarding how well this event was organized by the committee.

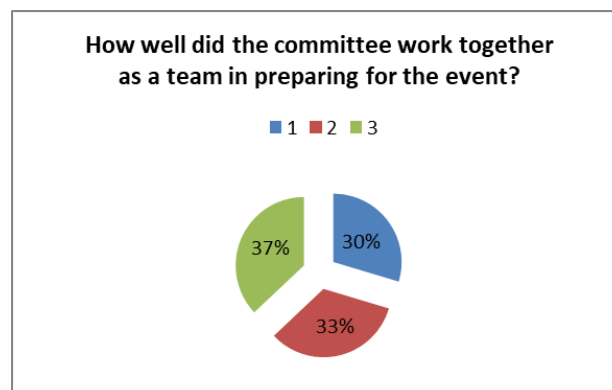


Figure 10. Second-Point Question

From Figure 10, it can be seen that for the second point question, on a scale of 1 to 10, 30% of respondents answered 8, 33% answered 9, and 37% answered 10 to the question of how well the committee worked together as a team in preparation for the event.

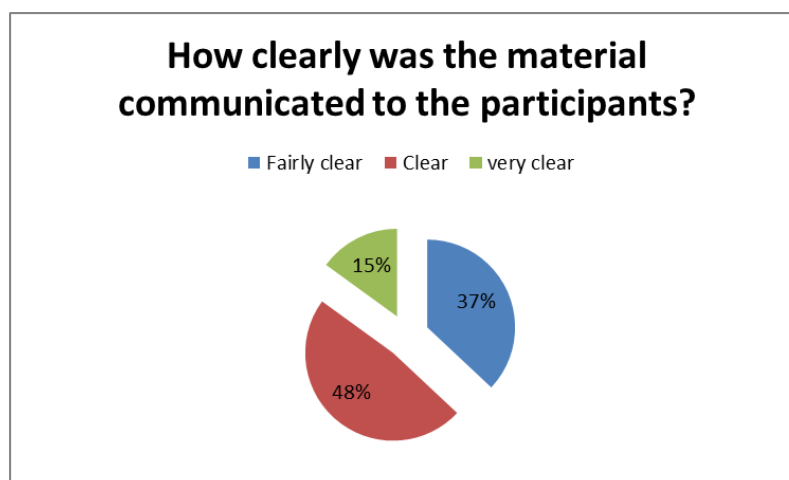


Figure 11. Third-Point Question

From Figure 11, it can be seen that for the third-point question, 48% of respondents answered that the material presented was clear, 37% said it was quite clear, and 15% of respondents answered that the material presented was very clear.

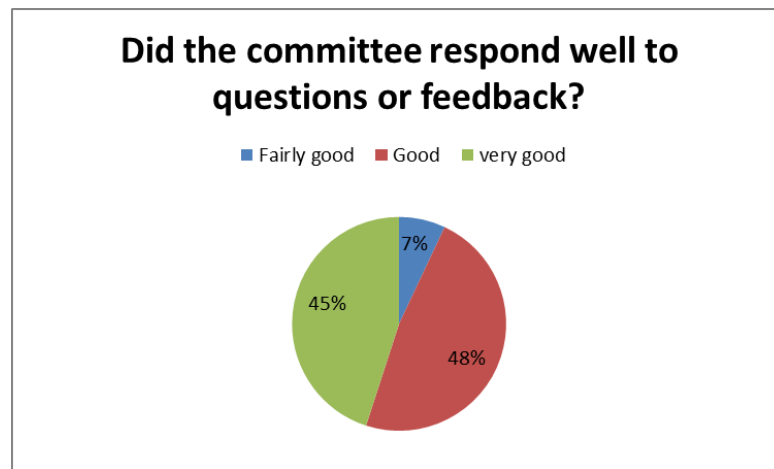


Figure 12. Fourth-Point Question

From Figure 12, it can be seen that for the fourth-point question, 7% of respondents answered that the committee responded quite well to questions or input from participants, 48% said it was good, and 45% of respondents answered that the response given was very good.

From the 27 students of SMK Al Falah Dago, Bandung, who attended this training activity, there were several suggestions that could be used as evaluation material for the training activities that had been carried out. The following are some suggestions that have been conveyed to the implementers:

- My suggestion is for brothers and sisters from Iteñas to be more confident in conveying this information.
- Hopefully, the materials and communication will be improved, and preparation in all aspects will be enhanced. Overall, very good.
- For more door prizes, wkwkwk, it's just a joke! Please prepare the materials better, bro, so that the participants can understand and delve into the materials that will be given.
- So far, it has been good, but the solidarity between the implementing committees must be improved. And to the brothers who implement, you are great at presenting excellent material. Keep your spirits up for the future.
- The time should be extended in order to allow for a deeper understanding.

4. CONCLUSIONS

The students of SMK Al Falah Dago think that the outreach activities held, which include presentations, are good. Four percent of the respondents answered 7, fifteen percent answered 8, fifty-five percent answered 9, and twenty-six percent answered 10.

Students of SMK Al Falah Dago believe that the content supplied by the organizing committee is understandable to activity participants. Forty-eight percent of respondents said the material was clear, 37% said it was good enough, and 15% said it was extremely clear.

Students from SMK Al Falah Dago believe that the organizing committee responded appropriately to the questions posed by participants.

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