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Basic Arduino Programming Training For High School Students

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Abstract:

Electronic devices have become a part of human life today that can not be ignored. Community Service Program conducted by Prodi Electrical Engineering, Maranatha Christian University aims to increase knowledge, increase interest, form the ability of cooperation, improve creativity and improve the fighting power of high school students on the operation of electronic devices, in the form of arduino programming training . Arduino is an open source electronic kit specifically designed as a controller that regulates the working process of electronic circuits. The method used in this PKM is Participatory Action Research (PAR) in the form of lecture method to describe the material that has been prepared by PKM team, the method of practice in the form of Arduino programming and assembling the electronic component connected with Arduino, the method of mentoring when the students do the programming and stringing electronic components, and discussion methods in the form of inter-group cooperation to solve the case given. The results of this training can be a provision for high school students in the form of programming skills, the ability to assemble electronic components, the ability to work with groups to solve existing problems, and increase confidence in designing and operating electronic devices

Keyword: *SMU, Devotion, Participatory Action Research, Arduino*

INTRODUCTION

Electronic devices have become a part of human life today that can not be ignored. Starting from electronic devices at home, in the office, and in school. The existence of electronic devices is so important then the necessary human resources who can design, realize, and operate the electronic devices it's also important. We often have difficulty when dealing with the reality to realize something electronic equipment,

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to control other desired electronics components so that "Community Service Program" conducted by Prodi Electrical Engineering, Faculty of Engineering, Maranatha Christian University of Bandung is aimed at improving knowledge, increase interest, ability to work together, increase creativity and increase the fighting ability of SMAK 4 Penabur Jakarta students and SMAK Penabur Tasikmalaya on the operation and design of electronic devices, in the form of arduino programming training held for 2 days (Thursday and Friday) on 5 and 6 October 2017 at Mechatronics Laboratory of Electrical Engineering Program of Maranatha Christian University with a target of 30 people. This activity continues with other high schools with different schedules according to the agreements and disagreements of each school.

Heri Andrianto and Aan Darmawan in their book of Arduino[1] said that Arduino is an open source electronic kit specifically designed as a controller that regulates the workings of other electronic circuits, to facilitate the users either technicians, designers, and anyone interested in creating objects or developing electronic devices which can interact with a variety of sensors and electrical equipment. In the devotion to the community used Arduino Uno which can be seen in Figure 1

Figure 1. Arduino Uno

The number of electronic devices shows one of the improvements in technology and the progress of a society. Technology improvement affect people's lifestyles, change in human lifestyles, and their influence in the socio-cultural field.

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Technology improvement have negative and positive impacts that can be overcome by synergizing the roles of family, education, community, and country have been exposed by Muhamad Ngafifi[2].

Improvement of education in the form of creativity development through handicraft has been done by Budi Purwantiningsih and M. Rasikhul Islam [3] in the foster children of Al-Amin Geluran Taman Sidoarjo. In this training, foster children are given skills training to make handicraft from materials available for their life.

According to Mamat Supriatna [4], the concept of life skills is learning to know, learning to do, learning to be, and learning to live together is important things that need to be given to education

METHOD

The method used in community service is done using Participatory Action Research (PAR). PAR has three main pillars, namely research methodology, action dimension, and the dimension of participation. That is, PAR is implemented with reference to a particular research methodology, should aim to encourage transformative action, and should involve as many citizens or community members as the implementers of the PAR themselves. On community service here PAR is implemented:

1. Lecture method to describe the material that has been prepared by the team of dedication to the community.
2. Practical method of Arduino programming and assembling electronics components connected with Arduino.
3. Mentoring methods when students work on programming and assembling electronic components.
4. Methods of discussion in the form of cooperation between groups to solve the case given.

Results and Discussions

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The results of this training can be a provision for high school students in the form of programming skills, the ability to assemble electronic components, the ability to work with groups to solve existing problems, and increase confidence in operating electronic devices.

On community service here PAR is implemented:

1. Lecture method to describe the material that has been prepared by the team of dedication to the community. Material given in the form of explanations of electrical principles, formulas on calculation of electrical circuits, electrical terms and quantities, how to read resistor components, introduction of electrical circuit components such as led and switch, Arduino explanation starts from arduino history, Arduino types , and the use of Arduino IDE software.
2. Practical method of Arduino programming and assembling electronics components connected with Arduino. In this activity high school students are guided directly by faculty and assistant lecturers and students to assemble electronic components to fit the circuit scheme, and also guided to program the Arduino device in order to control the circuit of the electronics. The drawing of the electronic circuit can be seen in Figure 2. Participants learning to program with the IDE Arduino software can be seen in Figure 3.

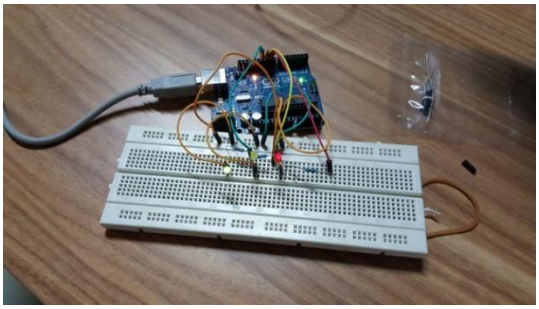

Figure 2. The series of electronics made by high school students

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Figure 3. High school students are learning to program with the Arduino IDE software

3. Mentoring methods when students work on programming and assembling electronic components. In this assistance 4 students are accompanied by one teacher / assistant so that every activity well monitored and directed as in Figure 4.

Figure 4. Assistance by teachers / assistant lecturers and students

4. Methods of discussion in the form of cooperation between groups to solve the case given. Participants are given cases to control on the basis of material already taught. Here the participants work together with their group to solve the existing cases. Group cooperation can be seen in Figure 5.

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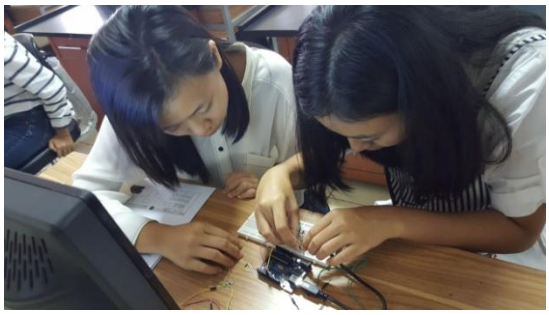

(a)

(b)

Figure 5. Group collaboration to resolve cases of control
(a) groups of girls students (b) groups of boys students

At the end of the event the students are certified after attending a community service program and taking pictures together (Figure 6). .

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Figure 6. In part of participants of PKM Arduino activity

Questionnaires to get feedback on the results of PKM activities are distributed to participants and answers to questions given are grouped into four categories: 1. Very good, 2, Good, 3 Good enough, 4. Less. From the result of questionnaire filled by participants of PKM Arduino obtained input that is: the material given 100% replied "Very good", assessment of the teacher who delivered the material 82% answered "Very good" and 18% answered "Good". Assessment of the assistant lecturers and students who guided the practice 100% answered "Excellent".

CONCLUSION

Participants are very interested if the prodi re-organizes the PKM with different materials, it indicates that the PKM runs well and improves students' ability to understand the material electronics and Arduino well. After the PKM program is expected the students can learn more and can provide the basis of their ability to take part in the community so that the ability and independence of the Indonesian nation can be better again.

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