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Knowledge Improvement through Smartphone Utilization in the Remote Control System Module of Electronic Equipment at SMKS Muhammadiyah 9 Medan

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Abstact: Control technology is currently growing rapidly, one of the utilization of control technology that is currently experiencing rapid development is control of smart homes and automation systems coupled with rapid advances in the field of the Internet of Things, so that control technology becomes a remote control concept that is widely applied. Thematic Community Service Collaboration (TCSC) activity is a series of community service activities intended for the downstreaming of research products of Medan State Polytechnic lecturers in collaboration with Universiti Teknologi MARA (Malaysia) lecturers that can be utilized by the community (partner), namely SMKS Muhammadiyah 9 Medan aims to provide training from modules / trainers that have been specially designed consisting of several electronic equipment that has been equipped with wireless communication so that students can control electronic equipment remotely only through an application from a Smartphone without having to make direct contact like using a mechanical switch in general. The method used in this service is the lecture method followed by the discussion and question and answer method followed by the module / trainer demonstration method and how it works and the direct interaction method, namely students can try or practice directly, so that this training increases students' knowledge, skills and creativity towards the development of remote control technology in the future.

Keyword: Smartphone, control, training, electronic equipment

INTRODUCTION

Today's control technology is developing rapidly and plays an important role in the advancement of Science and Technology (Muqit, 2020). The thing that greatly affects control technology is the need for work that can simplify and flexibilize system work (Hidayatullah, 2017). Complicated work and limited space or location are of course a problem in the work process so that control technology is needed that can be applied or used simply or does not require a fairly complicated process so that automatically the progress of control technology continues to increase (Widiyanto et al, 2020), one of the current uses of control technology that is experiencing rapid development is control of smart homes and automation systems coupled with rapid advances in the field of the Internet of Things, so that control technology is a remote control concept that is widely applied.

Vocational High School namely SMK Muhammadiyah 9 Medan is located on Jl. Garuda Gg. Masjid Taqwa, Sei Sikambing B Medan, Medan Sunggal, Medan City, Province of North Sumatra. SMKS Muhammadiyah 9 Medan is a Vocational High School with Technology and Engineering expertise with national standard accredited A in accordance with the Accreditation Decree No. 860/BANSM/PROVSU/LL/XII/2018 dated 02-12-2018. SMK Muhammadiyah 9 Medan has 4 (four) expertise programs, namely construction and property technology (expertise competencies namely construction and property business and modeling design and building information), electrical engineering (expertise competencies namely Electrical Power Installation Engineering), mechanical engineering (expertise competencies namely mechanical engineering and welding engineering) and automotive engineering (expertise competencies namely automotive light vehicle engineering and motorcycle business engineering) (KEMDIKBUD, 2022).

Based on the results of surveys and interviews conducted by the Community Service team to the Principal of SMKS Muhammadiyah 9 Medan, namely: Partners' knowledge of remote control such as control of electronic equipment is still limited, namely still using mechanical switches in general, so there is a need for knowledge about control technology insights, partners do not yet have knowledge of how to remotely control using / utilizing applications on Smartphones and partners do not yet know and use controllers that can be integrated with remote control modules to control electronic equipment so as to produce a remote control system as an enhancer of insight, creativity of teachers and students in designing and utilizing Smartphones for

remote control technology needs. The survey process with partners can be seen in Figure 1 below.

Figure 1. Discussion with SMKS Muhammadiyah 9 Medan Partners

Through interviews conducted and paying attention to the problems and needs needed by partners, the service team offers a solution to conduct technology-based training, namely Smartphone Utilization Training on the Electronic Equipment Remote Control System Module, because technology-based training is effective learning (Khotimah, Astuti, & Apriani, 2019), through training conducted by the Service Team will provide stages that can be a solution to partner problems starting with the lecture method followed by the discussion and question and answer method followed by the module / trainer demonstration method and how it works and the direct interaction method, namely students can try or practice directly, so that this training increases students' knowledge, skills and creativity towards the development of remote control technology in controlling electronic equipment using Smartphones.

METHOD

The methods used in the implementation of this Thematic Community Service Collaboration are carried out with several methods, namely:

a. Implementation Method

The implementation of this service activity, namely the stages or steps that will be taken in implementing the solutions offered and agreed upon by the service team with service partners to overcome the problems faced by partners, namely the application of Smartphones in the remote control system module on electronic equipment in the form of electrical equipment located at SMKS Muhammadiyah 9 Medan school, these stages can be seen from the flow chart, as follows:

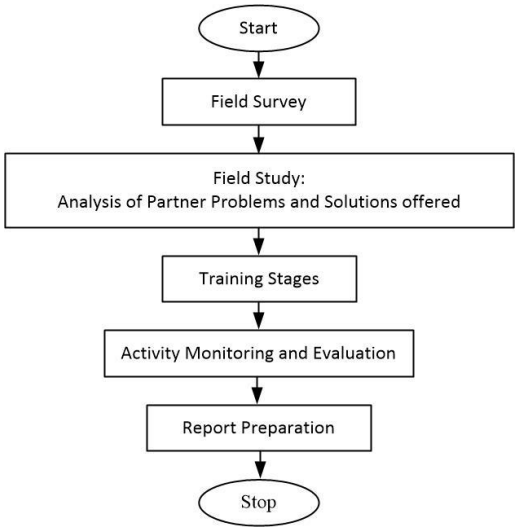


Figure 2. Flowchart of the Implementation of Service Activities

This service activity begins at the field survey stage with the approach method, namely reviewing the location of the service partner and interviewing the Principal of SMKS Muhammadiyah 9 Medan as a partner, this field survey process is carried out to collect data to obtain the information needed in the implementation of this service, approach partners to support the success of the program and design training materials in accordance with the objectives of the service program. The information data obtained will be analyzed so that solutions will be offered by the service team and agreed upon by partners for the service implementation process.

After the training stage in this service activity is carried out, monitoring and evaluation of activities will be carried out with the aim of knowing the scientific development of service participants on Android-based electrical equipment control tools so that this service activity is in accordance with the expected outcomes. After this service activity is carried out, the report preparation will continue. In the preparation of this report, it is carried out by collecting detailed data and information on the implementation of the service carried out. The report is reported to P3M Politeknik Negeri Medan as the responsibility of the service carried out.

b. Method of Approach

The approach method offered in this service activity, namely reviewing the location of service partners and interviewing the Head of SMKS Muhammadiyah 9 Medan as a partner, this location review and interview process is carried out to collect data in order to obtain the information needed in the implementation of this service, then approach partners by conducting discussions and sharing experiences to support program success, designing training materials that are in accordance with the

objectives of the service program, optimizing and evaluating the implementation of service activities to match the expected results and for sustainability programs.

c. Program Implementation Evaluation Methods

Evaluation of program implementation and program sustainability after completion of community partnership service activities is carried out with the aim of knowing the scientific development of service participants on the electronic equipment remote control system module so that this service activity is in accordance with the expected outcomes, namely the addition of knowledge and solving problems that become partner problems regarding Smartphone-based electronic equipment control, namely partners already have knowledge of how to control electronic equipment wirelessly using an Android Smartphone, partners already have knowledge of the control of electronic equipment that is still limited, partners already have knowledge of relatively cheap controllers such as Arduino that can be integrated with electrical equipment and wireless modules so as to produce a reliable electronic equipment control system and partners already have knowledge of Android application software that can be integrated with hardware equipment. So that with the addition of this knowledge, partners can add training materials in the learning curriculum, develop and apply and exhibit in technology expo events in Medan to socialize and motivate the spirit of work in the development of control technology.

RESULTS

The implementation of the Thematic Community Service Collaboration carried out by the Medan State Polytechnic Service Team with SMKS Muhammadiyah 9 Medan Partners has resolved partner problems from the survey results that have been carried out and analyzed, where based on the service team's review of the partners, there are problems, namely (1) Partners' knowledge of remote control such as control of electronic equipment is still limited, namely still using touch switches in general. so it is necessary to know how to do remote control wirelessly using / utilizing applications on Smartphones, (3) Partners do not know and use controllers that can be integrated with wireless modules to control electronic equipment, (2) Partners do not yet have knowledge of how to do remote control wirelessly using / utilizing applications on Smartphones, (3) Partners do not yet know and use controllers that can be integrated with wireless modules to control electronic equipment so that they can produce a remote control system as an addition to the insight, creativity of teachers and students in designing and utilizing Smartphones for remote control technology needs. The

solutions that will be given to the above problems are (1) Application of smartphone utilization in the remote control system module on electronic equipment, namely by providing exposure to the differences in how electronic equipment control works which are still conventionally using a switch with electrical controls that can be controlled remotely using only applications on Android smartphones, (2) Providing theoretical and practical presentation of material on how the working principle of a wireless electrical equipment control system using a smartphone that is widely applied in the smarthome concept, (3) Application and introduction of a relatively cheap controller, namely Arduino, which can be integrated with hardware and wireless modules so as to produce a reliable electronic equipment control system and conduct training on Android application software that can be integrated with hardware.

After the solution offered by the Devotion team and agreed upon by the partners, the Smartphone Utilization Training will be carried out on the Electronic Equipment Remote Control System Module. Where are the stages of the training, namely:

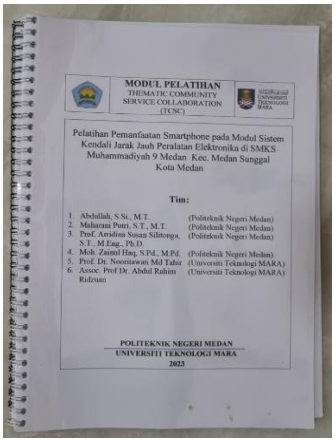
- Delivery of material using the lecture method, namely delivering understanding and theoretical knowledge about the trainner module that has been specially designed consisting of several electronic equipment that has been equipped with wireless communication so that students can control the electronic equipment remotely only through an application from a smartphone without having to make direct contact such as using a switch in general.
- A question and answer discussion was held to find out the knowledge that had been understood and to motivate the service participants to the trainner module training that had been specially designed consisting of several electronic equipment that had been equipped with wireless communication so that students could control the electronic equipment remotely only through an application from a Smartphone.
- Demonstration of the trainer kit is carried out to show important things both how to work, troubleshooting tools, techniques in the process of designing and making electronic equipment control devices using smartphones so that participants really understand the training carried out both assembling, programming and operating the electronic equipment remote control system module.
- This direct interaction / practice participants can directly practice from the remote control system module of the electronic equipment from the

demonstration process that has been carried out, so that this training is not just theory but direct practice in its application.

Service activities on Smartphone Utilization Training on Electronic Equipment Remote Control System Modules carried out at SMKS Muhammadiyah 9 Medan partners located on Jl. Garuda Gg. Masjid Taqwa, Sei Sikambing B, Medan Sunggal, Medan City, Province of North Sumatra. The implementation of this service activity was carried out by the service implementation team consisting of lecturers from Politeknik Negeri Medan (POLMED) in collaboration with lecturers from Universiti Teknologi MARA (UiTM) Malaysia, who were also present at the event including: Abdullah, S.Si., M.T. (Community Service Team Leader - Coordinator of the D4 Electrical Installation Engineering Technology Study Program), Maharani Putri, S.T., M.T. (Lecturer of D4 Electrical Installation Engineering Technology Study Program), Moh. Zainul Haq, S.Pd., M.Pd. (Lecturer of Electrical Engineering Study Program), Prof. Arridina Susan Silitonga, S.T., M.Eng., Ph.D. (Lecturer of Energy Conversion Engineering Study Program), Prof. Dr. Nooritawati Md Tahir and Prof. Madya Dr. Abdul Rahim Bin Ridzuan (Lecturer of Universiti Teknologi MARA-Malaysia), besides lecturers also involved Pius Fernando Hendra Hutauruk, A.Md (Education Personnel / admin of D4 Electrical Installation Engineering Technology Study Program) and students of D4 Electrical Installation Engineering Technology Study Program and D3 Electrical Engineering Study Program of Electrical Engineering Department of Politeknik Negeri Medan.

Design of Remote Control System Module

The design of the remote control system module is designed to suit the latest needs, namely the use of Smartphones in the remote control process, with the aim of providing training from modules / trainers that have been designed in the form of control of electronic equipment that has been equipped with wireless communication so that students gain insight and increase competitiveness in the form of applying Science and Technology.


MODUL PELATIHAN
THEMATIC COMMUNITY SERVICE COLLABORATION (TCSC)

Pelatihan Pemanfaatan Smartphone pada Modul Sistem Kendali Jarak Jauh Peralatan Elektronika di SMKS Muhammadiyah 9 Medan Kec. Medan Sunggal Kota Medan

Tim:

1. Abdullah, S.Si., M.T. (Politeknik Negeri Medan)
2. Maharani Putri, S.T., M.T. (Politeknik Negeri Medan)
3. Prof. Arridina Susan Silitonga, S.T., M.Eng., Ph.D. (Politeknik Negeri Medan)
4. Moh. Zunnil Haq, S.Pd., M.Pd. (Politeknik Negeri Medan)
5. Prof. Dr. Nooritawati Md Tahir (Universiti Teknologi MARA)
6. Assoc. Prof Dr. Abdul Rahim Ridzuan (Universiti Teknologi MARA)

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2023

Figure 3. Design of Remote Control System Module

Implementation of Service Activities

The implementation of the activity was carried out on Wednesday, October 11, 2023 as shown in the following figure.

Figure 4. Community Service Team Conducting Training

The implementation of the service of Smartphone Utilization Training on the Electronic Equipment Remote Control System Module includes the delivery of material using the lecture method, namely delivering understanding and theoretical knowledge about the stirrer system provided, discussions conducted to find out about how the trainer module works through demonstrations carried out.

Figure 5. Handover of Trainers/Modules to SMKS Muhammadiyah 9 Medan

Figure 6. Photo with the Activities of the Service Community Team with Partners

CONCLUSION

The implementation of Thematic Community Service Collaboration (TCSC) activities carried out by Politeknik Negeri Medan lecturers in collaboration with Universiti Teknologi MARA (Malaysia) lecturers, namely SMKS Muhammadiyah 9 Medan, is in accordance with the expected outcomes by carrying out a series of activity stages, namely providing training and modules / trainers of remote control systems integrated with Smartphone applications as learning remote control technology on electronic equipment by providing exposure to differences in how electronic equipment control works which are still conventionally using mechanical switches with electrical controls that can be controlled remotely using only applications on Android Smartphones, providing the presentation of theoretical and practical material on how the working principle of the control system of electronic equipment wirelessly using a Smartphone that is widely applied in the concept of remote control and monitoring and the application and introduction of relatively cheap controllers that can be integrated with hardware and wireless modules so as to produce a reliable

electronic equipment control system and conduct training on the design of applications on Smartphones that can be integrated with hardware, starting from how to design to accessing applications so that they can be used and communicated as remote electronic equipment control, so that the objectives and outcomes of this TCSC service have been successfully achieved, namely being a solution to partner problems with the transfer of knowledge, skills and creativity of teachers and students towards the development of remote control technology in controlling electronic equipment utilizing Smartphones.

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