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for Sustainable Societies

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PROCEEDINGS
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Cover Design:
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Layout:
Dr. Remon Lapisa, MT., M.Sc. M.Eng (Universitas Negeri Padang, Indonesia)
Rahmat Azis Nabawi, S.Pd., M.Pd.T.(Universitas Negeri Padang, Indonesia)
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FOREWORD

Welcome for all respected scholars, researchers, post graduate students and especially Keynote Speakers to the 4 ICTVET. The theme of the conference focus on Technical and Vocational Education and Training for sustainable societies and consist of six subthemes. i.e Development of learning model on TVET, Workplace Learning and entrepreneurship, Innovation on applied engineering and information technology, Management and Leadership on TVET, Vocational and Technical Teachers education, and Assessment and Evaluation on TVET.

Sustainable society shoul be followed by the improvement of various factors that have impacts to the quality of vocational and technical education and training, particularly to overcome the competitiveness of the world business. As we have already known the rapid change of technology as well as the change of demography, having a great effects to the life of peoples in this world, The competitiveness need a collaborativeness to survive the life of millions peoples who lost their jobs. Young peoples as a productive generation have to be creative and innovative to face the competitiveness. So this prociding contents consist of various findings of research in the field of vocational and technical education as well as applied technology and mainly based on the subthemes of the conference.

Finally, we would like to thank a million for all participants of this conference and all parties who support the success of this conference. Hopefully the seminars and scientific work of this seminar can be a reference material for basic education and elementary school teacher education in Indonesia.

Padang, July 2, 2018

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MICROCONTROLLER SKILL TRAINING FOR SMKN 2 PAYAKUMBUH AND SMKN 1 SUNGAI RUMBAI

Edidas¹, Legiman Slamet² dan Ilmiyati Rahmy Jasril³

¹Department of Electronic Engineering, Fakultas Teknik, Universitas Negeri Padang

Abstract: This paper describes microcontroller skill training for SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai. This training aims to train students to be skilled at creating microcontroller circuits and programs. The training method is the direct practice of creating and programing the microcontroller system. The result is the improvement of microcontroller skill of the students who participated in this training.

Keyword: Microcontroller Skill, Direct Practice.

1. INTRODUCTION

In vocational syllabus design and assembly as well as programming the microcontroller is a competence that must be mastered by the student areas of Electrical and Electronics engineering expertise also includes Automotive. One package of existing expertise in SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai is Power Installation Engineering and Mechanical Light Vehicle. In the syllabus of each package contained expertise Basic Competency (Kompetensi Dasar) on Microcontroller Competence. Microcontroller Basic competence is a competence that is very complicated but not too difficult to learn by vocational students. However, to make students master microcontroller properly, it should be the teachers involved in the teaching competence enhanced microcontroller (upgrade). Increased mastery of microcontroller for teachers of SMK 2 Payakumbuh dan SMKN 1 Sungai Rumbai is planned through the institution of Community Services on Universitas Negeri Padang at academic year 2016/2017.

2. SITUATION ANALYSIS

General portraits of the description of, profiles and conditions of target audiences to be involved in community service are seen through situational analysis. Situation analysis is an important part of the content of community service proposals that are activities of the application of Science, Technology and the Arts (IPTEKS). Looking at current technological developments almost all areas of expertise require controls made from microcontrollers. For example in the field of electrical expertise to control: Washing Machine, Air Conditioning (AC) and others. Electronics expertise such as controlling Television, Mobile, DVD player and others. In the field of Automotive for ignition control and oil flow in car engines. Similarly, other areas of expertise such as Informatics Engineering, Mechanical Engineering, and Building Engineering are not behind in utilizing the ability of the microcontroller in controlling the aircraft and its equipment. Thus the competence that must be mastered by a graduate of SMK not only competence in the field of expertise but also must master the control using a microcontroller.

In the syllabus, SMK microcontroller Design and assembly, programming is a competence that must be mastered by students in the field of Electrical and Electronics engineering expertise also including Automotive. One of the expertise packages that exist in SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai is Electricity Installation Technique and Light Vehicle Technique. In the syllabus of each skill package, there is Basic Competence (Kompetensi Dasar) about Microcontroller Competency. Basic Competency Microcontroller is a very complicated competence but not too difficult to learn by vocational students.
However, to be able to master the microcontroller well and correctly, then the students should be involved in teaching the competence of microcontroller upgrade. Increased mastery of microcontroller material for students SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai planned through the Institute of Community Service State University of Padang academic year 2016/2017.

3. AIM

Based on the background and formulation of the above issues, the purpose of this educational / training activity is to improve the ability of mastery of microcontroller skills for students of SMK in the field of expertise that intersect with control using a microcontroller.

4. BENEFITS

Benefits of training the students SMK N 2 Payakumbuh and SMKN 1 Sungai Rumbai is able to increase student competence in the field of Microcontroller, thus increasing students’ insight into the modern control system.

5. LITERATUR REVIEW

Training is one way to learn a skill. Education and Training is a learning activity within a short period of time that is expected to increase the ability of participants in certain skills. Skill training can be interpreted as a systematic and measurable way given to a person to acquire a particular skill.

Mastery of skills is measured in three elements, namely: knowledge (knowledge), attitude (attitude) and skills (psychomotor). Skills that are generally called competence is needed in the preparation of a job. Education and Skills Training is part of education that is to acquire or enhance knowledge to meet the requirements of an occupation that goes beyond the formal education system in relatively singular time and by prioritizing practice rather than theory.

In accordance with technological developments in the field of current control, both in hardware and software, almost most of the control system do with the help of Microcontroller. By using a microcontroller in the control system can be made a control system that is very simple but more powerful.

According to Moh. Ibnu Malik and Anistardi (1997: 1) write that microcontroller is a single chip microcomputer (SCM). This is because the microcontroller IC is able to work like a microcomputer although only a chip component only. For more complete understanding then in this book is defined that the microcontroller is a chip-shaped electronics components or Integrated Circuit (IC) in which there is a series of microprocessors and other support circuits that enable this component can work like a computer on a limited scale. Because of the ability that microcontrollers have that can work like a computer then the microcontroller is given the nickname as a computer in one IC or in Single Chip Computer English (SCC). Then Durham (2004: 4) mention that: “A Microcontroller is a microprocessor with additional interface components as part of the chip. In essence, a microcontroller is designed to connect directly to the input and output. In addition, it has some memory as part of the chip. In some cases, these are also called single chip computers”. In general, the microcontroller parts are as shown in Figure 1. Those sections are data center or central processing unit (CPU), ROM, RAM, Timer and Input Output (I / O) port data channels.

The block diagram of microcontroller architecture of MCS51 is like Figure 1. In it can be seen the parts of MCS51 microcontroller. The three types of MCS51 microcontroller ICs (AT89S51, AT89S52 and AT89S55) have the same inner construction, the difference lies in the PEROM Flash capacity and the number of ports. Microcontroller MCS51 requires only 3 additional capacitors, 1 resistor and 1 Xtal and a 5 Volt 1 Ampere power supply to assemble the circuit so it can work. A series of microcontrollers that can run certain control programs is called a minimum system microcontroller circuit. A 10 Farad Micro Capacitor and a 10 Kilo Ohm resistor coupled to produce a momentary reset pulse on the Foot Reset.
The reset pulse is a minimum positive square wave of 2 clock spins or 2 micro seconds (if using 12 MHz chips). The reset pulse will make the program counter program (Program Counter Register) to be re-run address 0000H. Resets the program to make the program run from scratch. The RC reset circuit serves as an automatic reset by utilizing a 10 uF capacitor charging time coupled with a 10K resistor. The length of charging time of a capacitor is 5 times the time constant of the RC circuit. The reset pulse will make the program counter program (Program Counter Register) to be re-run address 0000H. Resets the program to make the program run from the beginning.

Port P0, Port P1, Port P2, Port 3, Timer 0, Timer 1 and other means are physically registered registers specially placed in the Special Function Register (SFR) location. The location of the SFR register is the same as the 128 RAM address starting from the 80H address to the FFH. Although it has the same address, the program will not misuse it, as it is differentiated how to access it. As shown in Figure 2. above to access RAM 128 over used indirect access (indirect access) while to access SFR is done by direct access (direct access). What and how direct and indirect access will be explained in the instruction section of the microcontroller.

The SFR map can be seen in Figure 2. In the locations shown on the SFR map the address of each register and its original content (default) can be found. As the port register P0 resides at the location of RAM 80H and the initial contents of the register is 1111 1111. The location of address P1 is 90H, P2 at address A0H and P3 at address B0H. All Port registers have a default value of 1111 1111. Draw 128 locations of the SFR map register address are currently not fully loaded. Locations filled in are visible on the map. Make sure you can memorize the register names and address locations of each register in the SFR map.

3. Microcontroller Hardware Assembly

To assemble a microcontroller systems based on the circuit scheme that has been designed it needs 5 certainties as follows:

1. Make sure the 5 VDC power supply is plugged into pin 40 and GND is connected to pin 20.
2. Make sure the crystal is connected properly on pins 18 and 19.
3. Make sure the Reset circuit (either manual or automatic circuits) is properly connected to pin 9.
4. Make sure pin 31 (pin EA) is connected to 5 VDC.
5. Make sure the load used is connected to the correct port on the I / O port (P0, P1, P2 and P3).

How to determine the certainty can be done by performing cold measurement and heat measurement. Cold measurements are measured using the Ohm meter before the power supply is connected. The criterion of the result of measurement is that if the resistance between the point measured 0 Ohm means that the point is connected, but if the resistance is very large (~) then it is said that the two points are not suspended.
As with the heat measurement, the measurement is done when the power supply has been connected to the circuit. The voltage between two points is measured using Voltmeter. Figure 3. is one of the minimum system circuit schemes for LED control on Port P0. Minimum system circuit for Seven segment control, Dot matrix, DC Motor. Motor Stepper, Dummy Sensor input and others can be easily designed through microcontroller control.

4. Implementation Method Implementation of Science and Technology

The method of implementation carried out during the execution of this activity, both theoretical and practical are as follows:

a. Discussion Method

The method of discussion is considered appropriate in the delivery of theoretical material. To determine the determination of where the discussion material begins to explore the initial ability. Assessing the participants' initial ability is done through question and answer in the discussion forum.

b. Direct practice

After the trainees get theoretical knowledge, then held the practice directly in the form of planning, assembling and programming microcontroller.

6. RESULTS AND ANALYSIS

Community service activities with IPTEKS implementation program at SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai by training 60 students have produced a product in the form of MCS51 series of microcontroller circuit kits, in addition to increasing their skills in the field of the microcontroller. Results in the form of a series of MCS51 minimum microcontroller system can be seen in the images as shown in Figure 4. below:

![Image of circuit diagram](image1)

Figure 4. One of the Minimum System circuit schemes for LED Control on Port P0

![Image of product at SMKN 2 Payakumbuh](image2)

a. The product at SMKN 2 Payakumbuh

![Image of product at SMKN 1 Sungai Rumbai](image3)

b. The product at SMKN 1 Sungai Rumbai

![Image of circuit kit](image4)

Figure 4. MCS51 Microcontroller System Circuit Kit

5. CONCLUSION

Community service activity with a program of science and technology implementation in SMKN 2 Payakumbuh and SMKN 1 Sungai Rumbai can be concluded as follows:
1. Microcontroller skill training has succeeded in improving the skills of students as evidenced by the existence of MCS51 minimum system circuit kits that work well.

2. Built partnership and cooperation between the FT UNP and SMK N 2 Payakumbuh and SMKN 1 Sungai Mumbai well.

6. REFERENCES


7. AUTHOR'S BIOGRAPHY

Edidas is a lecture in the Departement of Electronic Engineering, Universitas Negeri Padang, Sumatera Barat, Indonesia. May contact E-mail is edidasunp@yahoo.com

8. AUTHOR'S CONTRIBUTIONS

Legiman Slamet: Conception, design, acquisition.

Ilmiyati Rahmy Jasril: analysis and interpretation of data and drafting the article.