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Implementation of Automatic Car Cleaning System with Microcontroller System Atmega 8

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Abstract

The design is supported by several components such as the pump driving motor, control system, and sensors. The design is in the form of a miniature simulation or called a prototype on a small scale but with the same functionality and performance as the real size. A chip or integrated circuit (IC) technology is growing and becoming more sophisticated, thus providing opportunities for automation development through the Atmega 8 microcontroller. For example, car cleaning is done by human power. The idea arose to design and build a simpler but more useful automatic car wash system. The automatic car wash system uses a mechanical and electrical system that functions as a car wash tool that works automatically. By using several components such as ICs, capacitors, resistors, piezoelectric sensors, and Atmega 8 programmed with 12 volt and 5-volt power supplies. Based on the Atmega 8 microcontroller, the system works by pumping water and soap into the car and drying it with a blower. The input comes from the start user command, namely via the push-on button. Tests are carried out on all components connected to one system, when the start button is pressed the controller will start the car in the right position. The motor that drives the car starts and pulls the car inside. Then the water pump turns on automatically for 2 seconds to pour water into the car and is accompanied by spraying detergent for 2 seconds. After that, the car was rinsed with a cloth with a motor drive for 20 seconds. After that, the water is poured again into the car to clean the detergent residue for 5 seconds and then the last step is the drying process by a wind blower for 10 seconds until the car wash is finished.

Keywords
automatic car wash; Atmega 8 controller; DC motor; automatic timer

I. Introduction

The chip or integrated circuit (IC) technology is growing and increasingly sophisticated, providing opportunities for further and complex automation developments. Automatic is a system that works automatically will provide many benefits for humans, namely supporting human tasks to be more efficient, practical, and economical. Many human tasks are routinely carried out and require a long time to complete so that they are impractical and waste a lot of time. One example is the task of washing a car, in general, the process of washing a car is done by human power (Aryza et al., 2018).

The existing automatic washing machines are quite complex and cannot be held at home. Only a few major car wash services can provide such a machine so it's not something you can own. For this reason, the idea arose to design and build an automatic car wash system that was simpler but more useful (Yazidi & Sivert, 2016). The system will work according to the instructions, namely to start and stop. The process is carried out automatically, namely spraying water into the car, spraying detergent liquid, rinsing clean

water, and drying. The system is designed to be simpler so that it can be applied to private housing. Based on a microcontroller IC chip, the system is programmed for the washing process from start to finish. Microcontroller IC is an IC that can be programmed according to the user's wishes, for example, the input-output work sequence, setting the time and output logic, reading sensors or inputs, and arithmetic calculations. The microcontroller is programmed in C language using code vision software Avr. According to its function, the microcontroller will control the water spraying pump, heater dryer, and so on (Adityawarman, Dimas Zebua & Hakim, 20116).

The rapid development of technology in the current era of globalization has provided many benefits in progress in various social aspects. The use of technology by humans in helping to complete work is a must in life. System automation can not only be applied in the industrial world, but is also now applied in offices and private homes (Furqan, 2018). As with other areas of life, technology is used to make changes, so also with the legal system as technology in making changes (Hartanto, 2020).

Many people in Indonesia have used public transportation cars and private as a means of transportation. This is influenced by the car companies spend a lot of money on new variants at affordable prices, especially the middle and upper class. every year four-wheeled vehicles in Indonesia are increasing, the number of vehicles registered in Indonesia as of January 1, 2018, reached 111 million, or to be precise 111,571,239 vehicle units. This figure includes the number of motorcycles that provide the largest contribution was 82% or 91,085,532 units of motorcycles. Following Private Car with a contribution of 12% or as many as 13,253,143 cars. The rest is contributed by Bus Cars, Goods Cars, and Special Vehicles.

In several big cities in Indonesia, currently most of the people who are still living not paying attention to the cleanliness of their private cars. Car maintenance can be done between another by cleaning, through the washing process. Washing the car can be done alone or take advantage of car wash services that are currently available quite a lot. It's good to wash it yourself or take advantage of washing services, If you use washing services, the time needed especially for queuing and waiting for the washing process using Process Manual car washing takes quite a long time. This matter

This is because the price of an automatic car wash machine is very expensive. Many factors This causes the high cost of the automatic car washing machine, including components, equipment, and its expensive body design. The assembly and installation process is still fairly complicated. By considering time efficiency, queuing, and waiting for the washing process of the car manually which is quite long, if there is a car washing process that fast and satisfactory results and affordable car wash prices, then it will be interested in the community.

Therefore, the author designed a water-spraying and soap spraying system on an automated car wash prototype. This tool functions as a car cleaning with the method of sprinkling water when the car first enters to remove dust and dirt on the car body, while the tool for spraying soap works spraying on the car body with soap spray after the watering process finished. This can also save time because all washing processes are carried out automatically and takes a short time.

The design process is quite simple whenthe sensor reads the presence of a car entering the watering will start pouring water on the parts of the car, when the sensor does not read the presence of a car then the watering will stop. After the process of sprinkling water, the car will go to the process of spraying soap, after the existing sensors in the process of spraying soap read the presence of a car, the spraying will start spraying soap until the sensor does not read the presence of a car.

Car maintenance can be done, among others, by: cleaning through the washing process. Wash the car can be done alone or use services car wash which is currently available is sufficient many. Whether you wash it yourself or use the service washing, the time required is generally sufficient long. If you use a washing service, time needed especially for queuing and waiting for the washing process.

Based on these problems, it arises the idea to make a prototype car wash system automatic with three dirty washing methods (method light dirty, medium dirty method, and dirty method weight) using a control device, namely a microcontroller. The problem formulation of this design is What is the process of creating a program for use of three washing methods (dirty method light, medium gross method, heavy gross method) using a microcontroller. The purpose of this design is to make ladder diagram and Application of microcontroller on washing control three dirty methods with predefined timer.

The development of technology in this era is very rapid, especially in demanding jobs that can be completed quickly. Various tools and facilities were created to be able to work quickly, effectively, and efficiently in supporting these human needs. In this case, one of the technologies that have a very fast process and is related to control is supported by advances in the field of computers. One industry that uses advanced technology that uses control is the car wash industry. Car wash is currently very much needed in society because of the efficiency of time and energy spent. The middle and upper-class people who have four-wheeled vehicles tend to choose to go to a car wash instead of washing their own because it is more practical. The popular technology today uses microcontroller because it is easier to use, but to make microcontroller is expensive and the weakness in car washing. The use of microcontrollers requires high electrical power and high maintenance costs, while microcontrollers are widely used at the industrial level only, microcontroller applications can cover several functions at once. On the other hand, some applications are applications with one function. This makes microcontroller users in one-function applications ineffective and can even cost more. Operations with a series that is still not optimal and effective even waste costs if the operation is carried out continuously, the process will be slow and affect the results. microcontrollers are susceptible to temperature changes making it a consideration when a device to be used as a weakness that is quite worrying. Therefore, in this study the author will provide an alternative to automatic washing technology that is more effective and cheaper, namely "Designing a prototype of an Arduino Atmega 2560-based automatic car washing machine using the SR-HC04 sensor".

II. Review of Literature

2.1 Automation

Automation is a way of implementing procedures and work procedures automatically, with comprehensive and efficient use of machines or machines, so that existing materials and resources can be utilized. Automation explains that automation is the use of machines to carry out physical tasks normally performed by humans (Deptt & Jabalpur, 2013). So equipmant is just as important as any other part of the car. This tool has a role that cannot be underestimated to ensure your safety. So, it's not just the brakes or seat belts that must be checked regularly. Wipers also need attention. Many people think that this part is nothing more than accessories. So that there is no need to carry out periodic checks, it is a mistake, because it turns out that this tool has a very important function (Rossanty et al., 2018).

2.2 Arduino

Arduino is an electronic kit or open-source electronic circuit board in which there is a main component, namely a microcontroller chip with the AVR type from the Atmel company. handle program uploads from computers. b. Already have a USB connection facility, so that laptop users who do not have a serial/RS323 port can use it. C (PAHRODF, 2017). The programming language is relatively easy because the Arduino software is equipped with a fairly complete collection of libraries. d. Has a ready-to-use module (shield)) which can be plugged into the Arduino board. For example shield GPS, Ethernet, SD Card, and others. The image is presented in Figure 1 (Andi Aulia Rahman, 2019).

Figure 1. *Arduino Board*

2.3 Electronic Components

Electronic Equipment is an equipment that is formed from several Types of Electronic Components and each. These Electronic Components have their own functions in an Electronic Circuit. Along with the development of technology, electronic components are increasingly varied and the types are increasing (Chandra et al., 2018). But the basic components that make up an electronic equipment such as resistors, capacitors, transistors, diodes, inductors and ICs are still used today. The images are presented in Figure 2

Figure 2. *Electronic Component*

2.4 Automatic Car Wash

Automatic car wash systems are divided into two types, namely, those that use drive conveyors and some that do not use conveyor drives. An automatic car washing machine that using a conveyor is also divided into two, namely at each stage the car wash will stop, and at each stage, the car wash does not stop. The model that will be used in this final project is a car wash system with a driven conveyor and does not stop at each washing stage. The author chose this model because it saves time in car wash work. This system uses a robotic system which is a system consisting of design, construction, operation, structural disposition, manufacture, and applications of devices commonly called robots. All activities of the robotic system are controlled and completely automatic. Therefore, the development of robotic technology has begun to be applied to the car wash business.

III. Research Methods

Research object automatic car wash system in miniature size for simulation purposes. The research method used is the design or design of the system. Where the design process is discussed as an analysis. The results of the design will be tested systematically to obtain data. For further discussion of the system built will be discussed in the following section.

Equipment

a. Material

1. Atmega 8 . microcontroller IC
2. IC AN7805
3. Capacitors 1000uF/50V, 10uF/25V,220uF/50V etc.
4. Crystal 11.0592 MHz
5. Several resistors
6. Water pump
7. Blower fan
8. IRFZ44. MOSFET transistor
9. DC Motor
10. Miniature mechanics
11. Circuit board (PC board)
12. 28 pins. IC socket
13. Push-on switch
14. 12V/3A . Transformer
15. Terminals, cables, and so on

b. Support Equipment

1. Electrical measuring instrument
2. Power tools or toolset
3. Drilling machine, saw, and so on
4. Supporting software/programs etc.
5. Computer/Laptop equipment

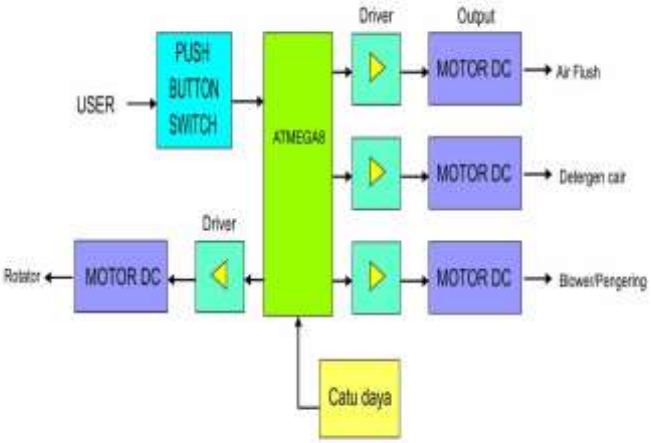

Figure 3. *Block Diagram*

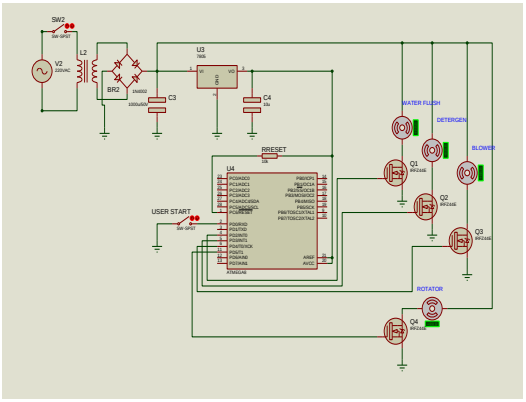

Figure 4. *Schematic Wiring*

The software design process composes a systematic program algorithm (command) so that the system can work as desired. The software created is then uploaded to the atmega 8 microcontroller ic so that the controller ic can run as programmed. In this design the programming language used is C language. The C language was written with the help of the Avr Codevision software, which is a tool for editing and compiling program algorithms. The software version is 3.27 which can be used to edit to upload programs.

IV. Results and Discussion

4.1 Results

The result of the research is the realization of an automatic system, namely an automatic vehicle washing system that uses mechanical and electrical systems. The system functions as a car wash tool that works automatically. Consists of several components such as motors, pumps, control systems and sensors. The design is in the form of a miniature simulation or called a prototype on a small scale but with the same functionality and performance as the real size. The system will work when a car enters the starting position.

4.2 Testing on the Microcontroller Atmega 8

Controller testing is carried out to determine whether the controller circuit has worked according to the program or not. For this reason, a comparison is made between

the program made and the measurement results. Where each output port is measured with a voltmeter and then compared with the programmed data. If there is a logical difference, it means that there is an error and it means that the controller is not working properly.

The voltage data measured on the pins of the Atmega 8 microcontroller are as follows:

Table 1. Atmega 8 Microcontroller Test Results

Pin	Vout(V)
1.	4,99
2.	0,0
3.	0,0
4.	0,0
5.	0,0
6.	0,0
7.	5,0
8.	0,0
9.	2,47
10.	2,06
11.	5,0
12.	0,0
13.	5,0
14.	0,01
15.	5,0
16.	0,0
17.	5,0
18.	5,01
19.	4,99
20.	5,01
21.	4,98
22.	4,98
23.	0,01
24.	5,0
25.	0,01
26.	0,0
27.	5,01
28.	0,0

Result: controller circuit is working well

4.3 Mosfet Driver Test

To test this mosfet transistor, the input output circuit must be made so that the input and output voltages can be measured. The mosfet transistor is set to work as a switch or switching. The inputs given are logic 0 and 1 with a voltage of 0V and 5V. The mosfet output i.e. the drain pin is connected to a load that is a 1K Ohm resistor to a 12V source voltage. When the input gate is given a logic 0. The drain output will be 12V. When a logic 1 is applied to the input the drain voltage will approach 0V. Here are the results of the tests and measurements made on the mosfet transistor.

Table 2. Mosfet Driver Measurement Results

Input(gate)	Output(kolektor)	Arus(mA)
0,02V	12,08V	0,0
5,01V	0,01V	12,1 mA

V. Conclusion

Voltage measurement data on the pins of the Atmega 8 microcontroller the controller circuit works well

1. The measurement results of the mosfet driver / current amplifier show that it is working well
2. Measurement results of 5.04 V power supply without load and 5.0 V . load
3. The system is controlled by a microcontroller programmed to control the washing process from start to finish as expected
4. The system works based on a timer set in the program and executed by the microcontroller. Sequentially the process works according to the program that has been made 42 seconds
5. The realization of the program was successfully created with the C programming language and successfully uploaded to the atmega 8 microcontroller so that the tool can work as desired

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