Automatic Locker Key With Barcode Based Microcontroller Atmega 8535

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Abstract. MCB (miniature circuit breaker) is an electromagnetic device that embodies complete enclosure in a molded insulating material. The main function of an MCB is to switch the circuit, i.e., to open the circuit (which has been connected to it) automatically when the current passing through it (MCB) exceeds the value for which it is set. Unlike fuse, an MCB can be easily reset and thus offers improved operational safety and greater convenience without incurring large operating cost. The principal of operation is simple. In simple terms MCB is a switch which automatically turns off when the current flowing through it passes the maximum allowable limit. Generally MCB are designed to protect against over current and over temperature faults (over heating). Sometimes the overload the current through the bimetal causes to raise the temperature of it. The heat generated within the bimetal itself enough to cause deflection due to thermal expansion of metals. This solution is used by LDR, and LM 35 as the sensor to control center. Therefore it is very important because it is related about local control switches, isolating switches against faults and overload protection devices for installations or specific equipments or appliances.

1 INTRODUCTION

Electricity is one of the most important blessings that science has given to mankind. It has also become a part of modern life and one cannot think of a world without it. Electricity has many uses in our day to day life. But using the electricity we found that the fire as the reaction of a substance with oxygen. An electric spark is an area where the air conducts electricity by ionization. is the transfer of electrons along a wire, fire is the reaction of a substance with oxygen.

Nowadays we use more commonly miniature circuit breaker or MCB in low voltage electrical network instead of fuse. The MCB has some advantages compared to fuse. It automatically switches off the electrical circuit during abnormal condition of the network means in over load condition as well as faulty condition.

The operation of the MCB includes two stages, i.e., thermal operation and short circuit operation. The former operation based on the thermal effect of over current while the later operation is based on the electromagnetic effect of over current. All MCBs operate on the air-break principle where the arc between the contacts is forced into the splitter plates through arc runners. This causes to split single arc into a series of arcs and then extinguishes the arc by extracting the energy from the arc and by cooling it.

With the use of bimetallic strip, thermal operation is achieved in case overload conditions. When overload current flows through the MCB, the bimetallic strip gets heated and causes to deflect. In doing so, it moves the trip lever and releases the latch mechanism and hence the contacts open under spring mechanism. The electricity spark is to detected by LDR and LM 35 as the sensor to detected about temperature to the control center.

The AVR 8535 microcontroller and its new version ATmega8535 are versatile, high-performance but low-cost chips. This article is Integrated other electronics or called minimum system. The result is to detected the sensor and to input the Atmega 8535, when the electricity spark and over load in this control panel upper 35 so this indicator will be sounded and sparks will be displayed on the LCD.

2. Literature Review
The first popular microcontroller made by Intel in 1976, the 8 bit microcontroller Intel 8748. Microcontroller is part of the microcontroller family MCS 48. Previously, Texas instruments has marketed the first 4 bits microcontroller TMS 1000 in 1974. TMS 1000 that began to be made Since 1971 is a microcomputer on a chip, complete with RAM and ROM.

Microcontroller is an intelligent chip that becomes a trend in automatic control. With many family types, memory capacity, and various features, the microcontroller becomes an option in mini-processor applications for small-scale control. We can seen the picture in the below it:

![AVR ATmega 8535 Microcontroller](image)

Figure 1. AVR ATmega 8535 Microcontroller

Configuration Pin Atmega 8535 Microcontroller with 40 pin DIP (dual in line package) package can be seen in the figure below To maximize performance and parallelism, AVR uses Harvard architecture (with separate memory and bus for program and data). The CPU architecture of the AVR is shown in Figure 6 The instructions on program memory are executed with 10 pipelining single levels. While an instruction is being done, the next instruction is taken from the program memory.

![ATMega 8535 Microcontroller Configuration](image)

Figure 2. ATMega 8535 Microcontroller Configuration

LM35 temperature sensor is a temperature sensor in the form of integrated circuit and has a voltage output of a voltage change linear and proportional to temperature (scale celsius) that is 10 mV / oC. LM 35 does not require external calibration to produce ¼oC accuracy at temperatures to be measured from 2 to 40 o C (Andrianto Heri, 2015: 145). Electronic components have a function to convert the amount of temperature into electrical quantities in the form of voltage. The LM35 temperature sensor used in this research is the electronic component produced by National Semiconductor. LM35 has high accuracy and ease of design when compared with other temperature sensors, LM35 also has low impedance accuracy and high linearity so it can easily be connected with a special control circuit and does not require advanced settings.

Although this voltage can reach 30 volts but given to the sensor is 5 volts, so it can be used with a single supply provided that LM35 only requires a current of 60 μA this means that LM35 has the ability to generate heat (self heating) from the sensor Can cause a low reading error of less than 0.5 ºC at 25 ºC

In principle the sensors will perform sensing at the time of temperature change every 1ºC temperature will show a voltage of 10 mV. In the placement LM35 can be affixed with adhesive or can also be cemented on the surface but the temperature will slightly decrease about 0.01 ºC as it is absorbed at the surface temperature. In this way it is expected that the difference between air temperature and surface temperature can be detected by the LM35 sensor equal to the ambient temperature, if the ambient temperature is higher or lower than the surface temperature, then LM35 is at surface temperature and ambient temperature.
Another type of resistor is the Light Dependent Resistor. The LDR resistance changes with the change in the intensity of the light that it uses. In a gela state, the LDR resistance is about 10 M ohm and in a light state, of 1 K ohm or less. LDR is made from cadmium sulphide. With this material the energy from falling light causes more discharged loads or increased current, increases.

Downloader is a tool used to insert / download programs created and compiled into the chip / ic microcontroller. The interface between the computer with the microcontroller, through downloader program that has been made on your computer can be embedded into the microcontroller, so the microcontroller can work as we expect. The downloader used is shown below:

LCD (Liquid Cristal Display) is used the LCD that can only display the characters. The LCD has a display with 16 columns width and 2 rows or often called 16x2 character LCD with 16 pin connector.

Generally, alarms can be defined as warning sounds or notifications. Alarms can also be a message of notification when a device is experiencing damage (performance degradation). This message is used to alert the operator of a problem (danger). Alarms give alarm signals, sounds, or rays. A alarms notify in case of danger or damage or unexpected events on an apparatus so as to give a clear warning in order to be anticipated. In the picture below a buzzer can be supplied DC voltage of 3 - 24 Volts.

3 Research methodology

The method used for Automatic Lock Locker With Atmega 8535 Microcontroller Based Barcode, based on data that has been collected through the laboratory.

Field method is also done, that research is done by way of directness to get good information about comparison between theory and practice in accordance with what expected, by determining the design of hardware and software that will be used in determining the classification of system. It is intended to test the concept before proceeding with the creation of the entire program as a final step is to create a user interface (User Interface).

4. Design of series and tools, materials, equipment and used it

The workings of this system is when there is more burden due to the use or short circuit so as to cause a spark of fire then the LDR sensor will detect the light and also resulted in an increase in temperature then LM 35 sensors will detect the temperature. To provide input to the microcontroller.

With the appropriate settings in accordance with the desired relay will work to decide the current to the load and issued an alarm sound to let you know that there has been excess heat or there is a spark on the control center. Also on the LCD displays the value of the degree of temperature and the presence of light from the spark. To design this sensor using a separate sensor design because the function of each sensor is different. For LM35 sensor is a single component that resembles a transistor but LM 35 is working to detect the temperature around itself, sometimes this component is given the body pads and feet so as not exposed to marinade or splashing water. For this LDR sensor is a series of kits consisting of additional components such as resistors, capacitors and potentiometers to regulate sensitivity of sensor detection.

![Figure 3. PCB Design Layout Sensor LM35 and LDR](image)

The minimum system set serves to enable the microcontroller to work in accordance with the program that has been designed.
The series of downloaders used are systems and Atmega 8 in conjunction with other supporting components, such as: 100nF ceramic capacitors, 22pF capacitors, 4.7 K, 10K and 1K resistors, Crystal X1 12 MHz. For inputs connected to the USB through the port path of the microcontroller that is Pin D2 (INT0) and Pin B0 and Pin B1 as well as for output connected to PORT B (MISO, MOSI, SCK). From the circuit generated PCB layout then in PCB will be occupied its components. The design of the component layout can be seen in the picture below:

In this circuit required R 220 ohm, 1N 4001 Diode, 6 Volt relay and C9014 transistor. Then make the PCB layout according to the circuit. Resistor here as input voltage for transistor work. The transistor acts as a switch to connect the voltage to the relay, so the relay works.

In the simple transistor circuits below, there is an alarm that we describe as a load. One NPN transistor which will replace the working function of a switch. A potentialo meter is used so that you can perform analysis on different base current conditions by varying the conditions of the pot.
5. Discussion of Design Results

The design of the fire prevention device over the mechanical load due to the short circuit current or excessive load is to detect the temperature of the cable used to flow the current and the light that is caused by sparks, consisting of a series of temperature sensors, light sensors, microcontrollers as a controller Inputs / outputs, software or programs to control that the designed device works as expected, then software and hardware testing is performed.

5.1 Software Discussion

The software used in this fire preventer is the programming language C AVR. After the program is designed then the program is inserted into the microcontroller using the downloader and then test the program entered on the microcontroller.

Testing the program is done by AV C Programming Language Language. To test the program that has been designed successfully and then the program and then compile whether an error or error occurs. Also required is the port setting of the downloader connected to the laptop / computer, by selecting Atmel AVR as a chip, Com 1 is used as the interface to the tool, and baud ratenya 115200.

And as shown in the illustration programming in the appearance of data detected the temperature and light on the LCD.

In the design of the program through Code Visioner AVR is checked again to ensure no errors in the design of the program, and if in the design of the program error occurs it will provide an error declaration at the time of checking or when compiled, as shown in the following figure:

Then the program designed by C AVR is downloaded through software by clicking on the chip program to include program designed into microcontroller IC

5.2 Hardware Discussion

To ensure that the designed hardware has functioned in accordance with its function, then the testing tool. This hardware testing starts from testing the Atmega 8535 Microcontroller circuit, sensor testing, power supply testing and LCD display testing, and relay chain testing.

5.2.1 Power Supply Discussion

Power used is full wave power supply. Power supply testing is done by providing alternating input voltage (AC) which varies by using AC voltage regulator to tap 0 and 220. For the output voltage of the travo that has been connected to the power supply circuit, a measurement is made for 12-CT-12 tap at the output of the power supply voltage. Output from a variable power supply serving a load of 1k ohm can produce a stable voltage with good voltage regulation.

![Transistors As Switches](image)

**Figure 8. Transistors As Switches**

| NO | POWER IN PUT (AC) | Resistor (ohm) | POWER OUTPUT (DC) | SIGN |
|----|------------------|----------------|------------------|------|
| 1  | 12 V             | 1 k            | 11.75            | -    |
| 2  | 9 V              | 1 k            | 8.85             | -    |
| 3  | 7.5 V            | 1 k            | 7.28             | -    |
| 4  | 4.5 V            | 1 k            | 4.35             | -    |
| 5  | 3 V              | 1 k            | 2.91             | -    |

Table 1. Power Supply Testing
Testing can be done by using a multimeter to measure the output voltage of the power supply.

5.2.2 Discussion of Microcontroller

This microcontroller testing is done by programming the microcontroller by using the C programming language AVR, and test the microcontroller used whether it is still working properly or in a state not working. Below is a picture of microcontroller test results. The voltage of the power supply (input) supplied to the microcontroller varies not passing through the voltage of the microcontroller and then measured the voltage on one of the output / input ports on the VCC and Ground pins.

5.2.3 LM 35 and LDR Sensor Testing

For testing the LM35 and LDR sensor circuit is required a multimeter to measure the output voltage of sensor test results manually. If for LM 35 by providing heat to the sensor while the LDR by providing light on the sensor so that there is a change in voltage values on the multimeter. This sensor circuit test is done by measuring the output voltage to ground.

Each sensor is given a voltage source VCC and Ground and the pin (output) is connected with a positive probe multimeter (Red wire) and black wire (negative probe) connected to the gorund, then see the change in the value of the number indicated by the needle pointer on the multimeter.

![Figure 9. Sensor Testing](image)

The LCD used in this discussion is a 16x2 character LCD. Which in this discussion LCD function as a media viewer results. The detection of the sensor is displayed on the LCD. If the temperature has reached 35o it will show “35o” and if there is a spark light it will show “Light Ada” it will be given input voltage to the microcontroller, so the microcontroller will activate the relay to decide current To the electrical load. Results LCD Display can be seen in the picture below:

![Figure 10. LCD Display](image)

So there are two logic data inputs that if there is light coming from sparks and the rise in temperature in the cable due to a short circuit or excessive load. The whole circuit image can be seen in the picture below:

![Figure 11. Outomatic locker key circuit](image)
For the whole circuit of this tool can be seen in the ganbar below:

![Figure 12. Overall Circuit Tool](image)

### 6. Conclusions

From the discussion in the previous chapters can be concluded that is:

1. In the current-flowing cable can be taken provisions if the burden is served excessively will lead to heat on the cable, what else happens short circuit then the heat on the cable will rise.
2. The temperature rise resulting from this overload is detected by the LM 35 temperature sensor under conditions at 35 °C.
3. In MCB contact relationship with the output cable to the load can be worn out due to the increasing electrical load so that the cable connection is less good it will cause sparks.
4. Sparks will emit light detected by the LDR sensor so as to provide the input voltage to the relay so as to disconnect the circuit.
5. Data obtained from the detection of LM35 and LDR sensors are controlled by using Atmega 8535 Microcontroller which has been programmed first using C Programming Language C AVR as a tool for fire prevention caused by electrical overload or short circuit.

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