

The proper selection of microcontroller depends on the inputs and based-on its pre-programming. The perfect microcontroller for performing this mission should characterize with some properties and should be offered by this controller such as:

- 1- Offering an analogy input.
- 2- Offering digital inputs.
- 3- Average speed of its internal processor unit.
- 4- Large ROM and Ram.
- 5- Offering a Pulse Width Modulation (PWM) outputs.
- 6- Low electric power consumption.

Based on above specifications, Arduino Mega 2560 R3 as shown in the Figure 13 is utilized for this mission.

With the following features:

Operating voltage	5V
Input voltage (7-12) V (recommended)	Input voltage (7-12) V (recommended)
Input voltage (limit) (6-20V)	Input voltage (6-20) V (limit)
DC current per (input/output) Pin	20 mA
	50 mA
Digital (input/output) Pins	54 (of which 15 provide PWM output)
Analog input Pins	16
Flash memory	256 KB of which 8 KB used by boot loader
SRAM	8 KB
EEPROM	4 KB
Clock speed	16 MHz

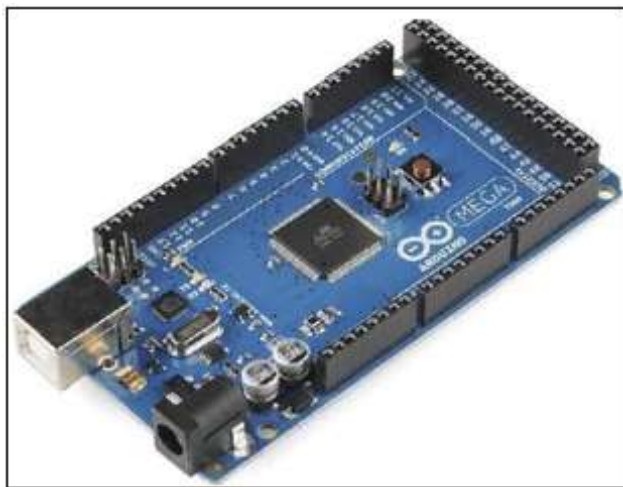


Fig.13 Arduino Mega 2560 R3

8 EAUCCCS Block Diagram and Wiring

Figure 14 shows a block diagram for the general arrangement of the EAUCCCS components and wiring.

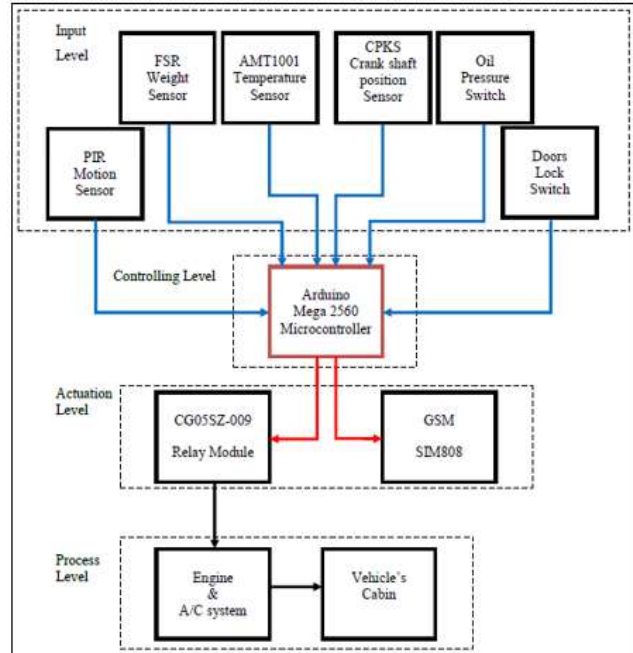


Fig.14 EAUCCCS block diagram and wiring

8.1 Wiring Connection System

The wiring connection system is accomplished individually for each component in EAUCCCS.

8.2 AMT1001

The wiring starts with the most important component in the system which is AMT1001 (Temperature sensor). The sensor has four terminals as shown in Figure 15.

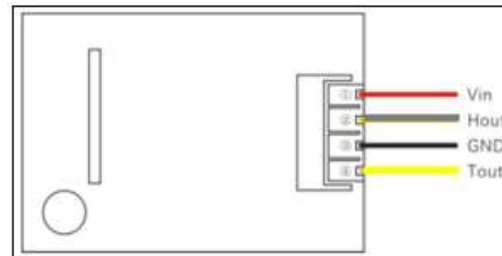


Fig.15 AMT1001 terminals

Red terminal is the input voltage; this terminal connects to the 5-volt source taken from the Arduino Mega 2560 microcontroller. The second terminal is black this terminal connects to the ground (zero volt), which taken from the common ground pin in the

microcontroller. Finally, the yellow terminal is the output temperature signal; this terminal must connect to an analog input pin in the microcontroller to give the controller a specific voltage at every change in the surrounding temperature.

8.3 PIR motion sensor

The second component is the PIR motion sensor, terminals shown in Figure 16.

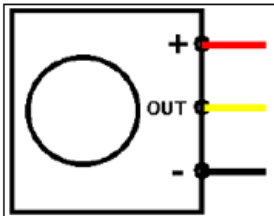


Fig.16 PIR motion sensor terminals

8.4 Force Sensitive Resistor

It's the third input element in EAUCCCS. The sensors with blue terminal is connected to the digital input in Arduino Mega 2560 microcontroller for detecting any force acting on it caused by weight, and the red terminal connected to the 5-volt source as shown in Figure 17.

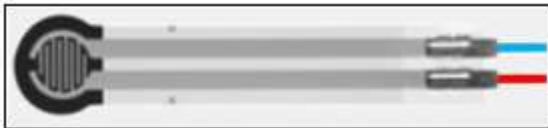


Fig. 17. Force sensitive resistor.

8.5 GPS GSM GPRS SIM808 module terminals

SIM808 module has five terminals one of them is ignored, the other terminals are Rx, Tx, Vin, GND. Tx green terminal will connect to the Rx1 of Arduino Mega 2560, Rx blue terminal of sim808 module connect to the Tx of microcontroller, then the power source will be connected to the Vin terminal with the red colour, and finally, the GND will be connected to the ground pin of controller as shown in Figure 18.

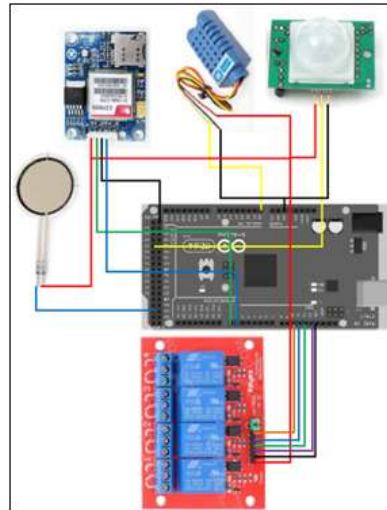


Fig.18 EAUCCCS block wiring

8.6 CG05SZ-009 module terminals

This module has six low current inputs and four high current outputs. Every single relay has three controlling terminals, one of them connects to the microcontroller and the second one is connected to the common 5 volts, while the third terminal is connected to the common GND as shown in Figure 18.

The CG05SZ-009 module is considered to be the main output module that controls the vehicle's engine. Figure 19 shows the wiring connections of vehicle's ignition switch to start the engine. First relay is connected to the terminal 5 and 6 when these terminals are connected together, the ECU will supply with 12 volts, then the second relay will connect the terminal 5 with the 4 terminals, this makes the motor to start.

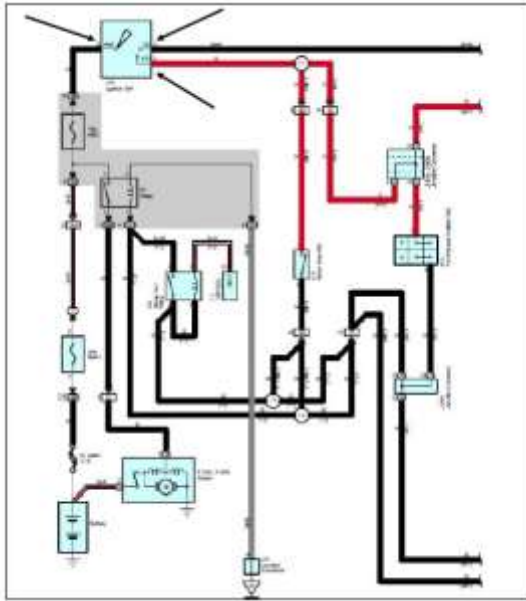


Fig.19 Ignition switch wiring

To control and activate the air conditioning system, the other two relays will do this mission. First relay is connected to the terminal 6 and 5 and these terminals will activate the low speed of blower and the A/C request. The second relay will connect the terminal 4 with terminal 5 (GND), to speed up the blower at the maximum speed as shown in Figure 20.

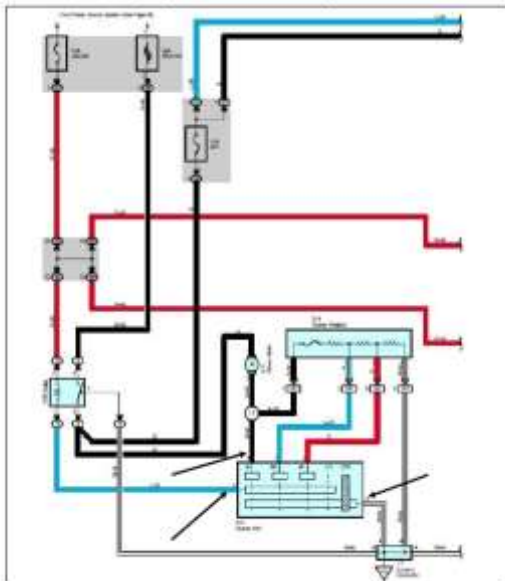


Fig.20 Blower speed connector.

9 Conclusions

- 1- This Control System can solve the problem of the heatstroke situation and even prevent it, but this does not mean that there isn't a main responsibility on parents or driver.
- 2- This design developed a smart urgent cabin climate control system to alert the driver that there is a passenger on board.
- 3- A modern microcontroller is used which allow to interact with the driver's cell phone by using a GSM communication network.
- 4- EAUCCS will start the internal combustion engine preparing it for the next action.
- 5- Using this design, the A/C will be turned ON after ensuring that the engine is started and running well.
- 6- This System can be developed by the manufacturers of vehicles and integrate it with vehicle's ECUs.
- 7- A feature can be added to this system, is that the driver can control vehicle's Engine and Air-conditioning system, when he/she at his/her home or during shopping and vehicle parked out.

10 Acknowledgment

This work has been carried out during sabbatical leave granted to the author (Dr. Suleiman Qasim Abu-Ein) from Al-Balqa' Applied University (BAU) during the academic year 2021/2022.

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