

# Main Supply Detection and Intimation by Using Arduino and GSM Module

M. Narendra Kumar<sup>1</sup>, G. V. Naveena Reddy<sup>2</sup>

<sup>1</sup> Assistant Professor, Department of Electrical and Electronics, RSR Engineering College, Kavali, Kadanuthala, Andhra Pradesh, India

<sup>2</sup> IV year Student, Department of Electrical and Electronics, RSR Engineering College, Kavali, Kadanuthala, Andhra Pradesh, India

**Abstract:** Now-a-days, various automatic change over switches have been available and implemented in various disciplines. But its implementation and cost is high. In order to overcome this drawback, we are implementing the wireless communication technique, GSM. GSM (Global system for mobile communication) is vastly used because of its simplicity in both transmitter and receiver design. It can operate at 900 or 1800MHz band, faster, more reliable and globally network. The proposed module, is capable of sending calls and SMS in the presence and absence of main supply. Arduino Uno is the heart of our system, which controls the overall operation. System always alerts the operator on the occurrence of power problems i.e, on and off of power supply by sending a call and message to him.

**Keywords:** Automatic changeover switch; Global System for Mobile Communications (GSM); Short Message Service(SMS); Arduino Uno

## 1. Introduction

In the past, it has been one of the problem in our college to know whether the main supply is present or not when we are switched to the generator supply. As the generator source works by using diesel as fuel, it leads to the wastage of non-renewable energy resources when we forget to switch off the generator source even at the presence of main supply. Even though the automatic change over switches are now available in the markets, but they are very cost to buy for small scale industries, Colleges and hospitals.

Some of the major communication technologies like Bluetooth, WiMAX and Wireless LAN, Zigbee and Global System for Mobile Communication (GSM). Among all GSM is one of the most widely used cellular technology in the world. With the increase in the number of GSM subscribers, research and development is heavily supported in further investigating the GSM implementation. The Arduino acts as the bridge between the GSM network and main power supply. Internet and wireless communications may also be implement in parallel with GSM for this system. Among the cellular technologies, GSM network is preferred for the communication between the user and the main supply due to its wide spread coverage which makes the whole system online for almost all the time. Another advantage of using the GSM network is its high security infrastructure, which provides maximum reliability whereby other people can not monitor the information sent or received. Hence, this research work implements the SMS and call based intimation using the GSM architecture without accessing the local network.

## 2. Stage Realization

The design of our proposed model of main supply detection and intimation by using GSM module system is shown in fig. 1. The architecture consists of mobile phone and GSM modem. In the proposed system design, 230V, AC main supply is stepped down and converted into the 5V, DC

signal. The 5V signal is given to the Arduino Uno controller whereas both the Arduino input and output operates at 0 to +5V. According to the program dumped in the Arduino it sends a signal to the GSM module. The outgoing sent message from the GSM modem to the user as a text message via cellular network. The supply to the entire system is separately given by using an external 6V, 4.5 Ah battery.

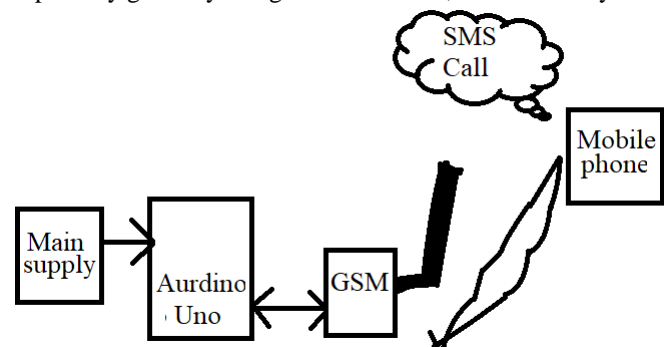
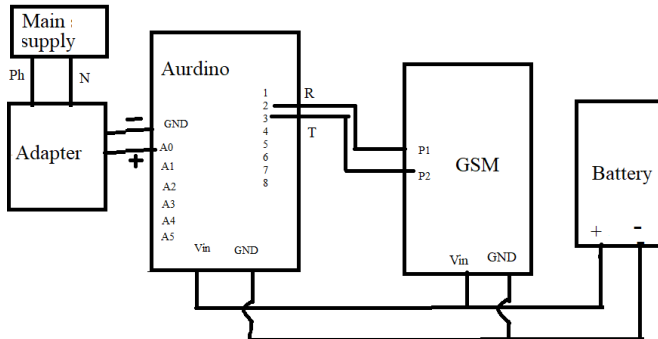


Figure 1: Stage realization

Various kinds of Arduino boards are available depending on different microcontrollers used. However, all Arduino boards have one thing in common, they are programmed through the Arduino IDE. The differences are based on the number of inputs and outputs (the number of sensors, LEDs, and buttons you can use on a single board), speed, operating voltage, form factor etc. Some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V. The Arduino UNO board has five analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor. Each Arduino board has its own microcontroller. You can assume it as the brain of your board. The main IC (integrated circuit) on the Arduino is slightly different from board to board. Most of the components used with Arduino board works fine with 3.3 volt and 5 volt. Some of the important pins of Arduino are:

GND (8) (Ground): There are several GND pins on the Arduino, any of which can be used to ground your circuit.

Pin (9): This pin also can be used to power the Arduino board from an external power source, like AC mains power supply.



**Figure 2:** Pin connection of main supply detection and intimation

One of the phase of the three phase main supply which is having the rating of 230V AC is given to an mobile adapter. The adapter step downs and converts that supply into 5V, DC signal. This 5V signal is given to the one of the analog input pins (A0 to A5). The Arduino converts that analog signal into a digital value that can be read by the microprocessor. Based upon that digital value the Arduino controller sends a command signal to the GSM module to send SMS and call via wireless communication network. If the digital data read as 0 then the transmitter pin 3 sends the command to the GSM to send call and SMS to the user texted as “supply gone”. If the digital data read as 1 then the transmitter pin 3 sends the command to the GSM to send call and SMS to the user texted as “supply came”.

### 2.1 Application algorithm

The programming language used in the Arduino is embedded C. The softwareserial.h is one of the library function of the Arduino software. First initialise the pins 2 and 3 of Arduino interfacing GSM as transmitter and receiver pins. The analog input from the main supply is given to the A0 pin as input to the Arduino. The A0 pinmode is set as digital input. Two variables are declared named as sen and state. The digital input read from the A0 pin is assigned to the state and sen variables.

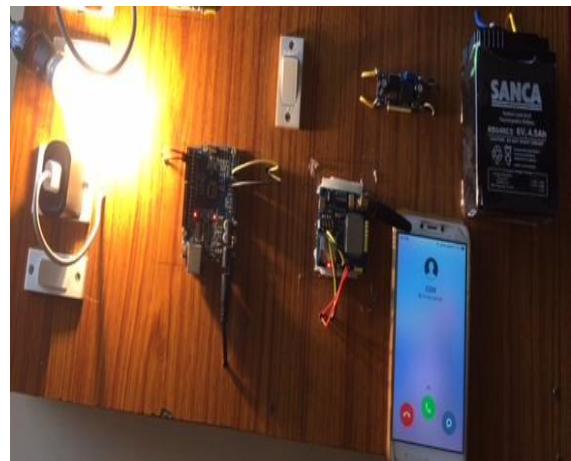
If the input read as 1 then (i.e., sen =1) then the controller checks the same condition repeatedly for 30 seconds. If the same value exists at the end of the 30 seconds then the value of sen is assigned to the state. Then the controller checks for the condition if state=1. If the state value is 1 then enters the function named as func() in the above programme. In the function func() the Arduino commands GSM to dial to the user. The command used to dial to the user by GSM is ATD<number> . The command ATD indicates Attention Dial. GSM sends a call upto 10 seconds and then holds due to the command ATH. The command ATH means Attention Hold. After 1 second the Arduino commands the GSM to open the create message. The command

AT+CMGS=<number> represents that to send the short message service texted as *supply came* to the particular number that was entered during coding. While the sen value equal to 0 it checks the input iteratively. After the value of sen becomes 0 it returns back from the loop.

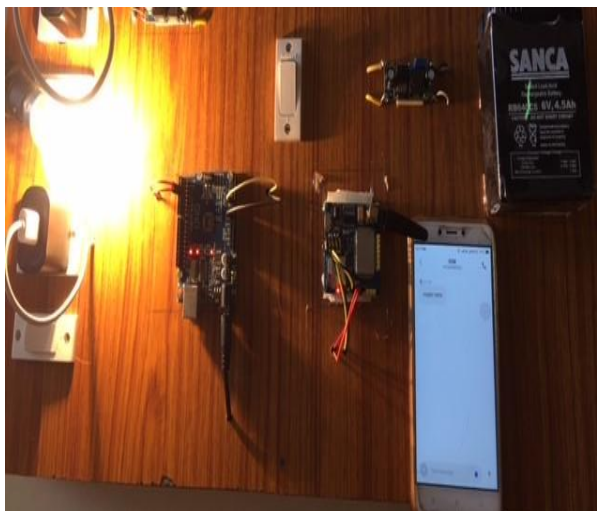
If the input read as 0 then (i.e., sen =0) then the controller checks the same condition repeatedly for 30 seconds. If the same value exists at the end of the 30 seconds then the value of sen is assigned to the state. Then the controller checks for the condition if state=0. If the state value is 0 then enters the function named as del() in the above programme. In the function del() the Arduino commands GSM to dial to the user. The command used to dial to the user by GSM is ATD<number>. The command ATD indicates Attention Dial. GSM sends a call upto 10 seconds and then holds due to the command ATH. The command ATH means Attention Hold. After 1 second the Arduino commands the GSM to open the create message. The command AT+CMGS=<number> represents that to send the short message service texted as *supply gone* to the particular number that was entered during coding. While the sen value equal to 1 it checks the input iteratively. After the value of sen becomes 1 it returns back from the loop. The whole process is executed within a short period of time.

### 3. Results

The prototype of the proposed GSM based main supply detection and intimation is shown in the below figure 3. The Arduino detects the presence or absence of main supply and commands the GSM to send call and Short message service to the user.



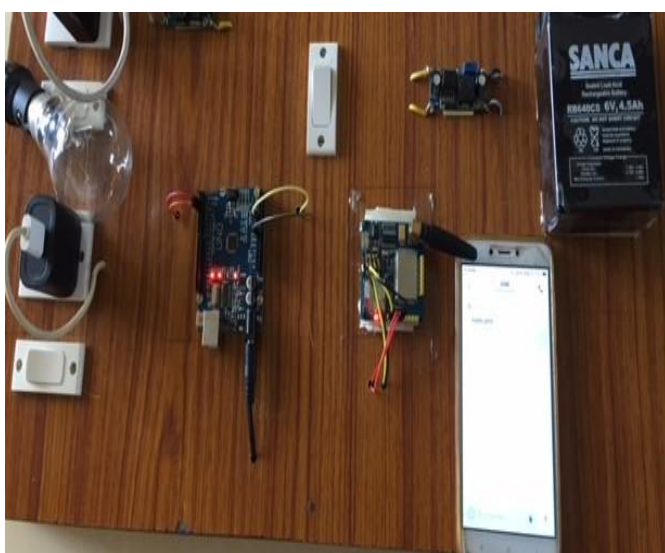
**Figure 3:** Intimating call from the GSM modem during the presence of power supply



**Figure 4:** Intimating SMS from GSM modem to the user when the presence of power supply



**Figure 5:** Intimating call from GSM when the absence of power supply



**Figure 6:** Intimating SMS from GSM modem when the absence of power supply

world. So, every colleges, hospitals and industries implemented another conventional source like generators in parallel with the main supply to carry the loads during power cuts. It is not possible to buy automatic changeover switch for small scale industries, colleges etc, and also these switches during operation may generate harmonics in the supply. Due to this, this prototype will become more helpful to the users who are not able to buy such costly equipment. This prototype occurs with minimum cost. This prototype intimates the user within 30 seconds during the power cuts.

## References

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## 4. Conclusion

The continuous power supply is mandatory in every field as it is the basic thing to power any electronic device in the