

# Security Alarm by Global System for Mobile (GSM) Communication Using SIM 900 A

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## Abstract

The system is constructed using GSM 900A module, arduino uno board, SIM card, PIR motion sensor, LED, mobile phone and buzzer module. The system operates communications with android phone and arduino via GSM module by four keys, making call, hanging up, sending message and receiving message. The system can be displayed on serial monitor and android phone. If one passes in front of sensor, the motion sensor gives the information to arduino. The arduino sends the message on android phone using GSM module. The red light emitting diode will blink and buzzer will make a sound for alarm system. The programming is written by C Language.

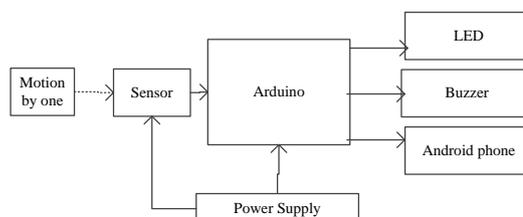
**Key word:** GSM module, Arduino, Mobile Phone, PIR sensor, Buzzer

## Introduction

The GSM network functions as four various portions, are the base station subsystem, the mobile device, the network switching and the operation subsystem. The mobile device connects to the network through hardware. The subscriber identity module, SIM card runs the network with identifying information about the mobile user. GSM (Global System for Mobile Communications) is a standard developed by the European Telecommunications Standards Institute. It was created to describe the protocols for second-generation, digital cellular networks used by phones and is now the default global standard for mobile communications – with over 90% market share, operating in over 219 countries.

## Scope of Work

The system controls between the sensor and android phone. The message will appear on android phone if one is across the security area. The android phone, Blinking LED, and Buzzer module are used as a display system.



**Fig.1 Basic block diagram of constructed system**

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### Electronic Devices Used in this Research

The devices used in constructed system are presented.

#### SIM900A GSM Module Features

Single supply voltage is between 3.4V and 4.5V. It has Power saving mode. Typical power consumption is 1.5mA. The SIM900A can search the two frequency bands by AT command. IT has GPRS connectivity. Transmitting power has Class 4 (2W) at GSM 900, Class 1 (1W) at DCS 1800. Operating Temperature is about 30°C to +80°C. Storage Temperature is about -5°C to +90°C. Fig.2 is the pin diagram of SIM 900 A. Fig.3 is the photograph of SIM 900 A.

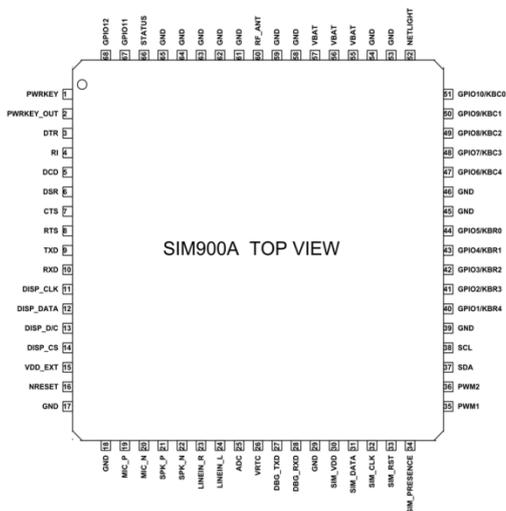


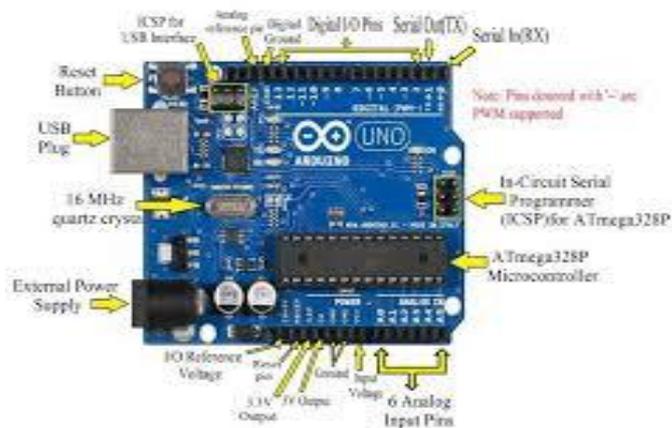
Fig.2 Pin diagram of SIM 900 A



Fig.3 Photograph of SIM 900 A

## Arduino Uno Board

Arduino Uno is a microcontroller board, it consists other components such as crystal oscillator, voltage regulator, serial communication etc. Arduino Uno has 14 digital input/output pins, 6 analog input pins, a USB connection, a reset button, Power jack, and ICSP header. The 14 digital pins can be used as input or output pins using pin Mode(), digital Read() and digital Write() functions in programming. Each pin operates at 5V, 40mA current, and has an internal pull-up resistor. Some pins have specific functions. Received pin and Transmit pin are used to receive and transmit serial data with ATmega328P to TTL chip. External pins and Interrupt pins can be configured to trigger. PWM Pins 3 pins provide an 8-bit PWM output. Fig.4 is the photograph of arduino uno.



**Fig.4 Photograph of arduino uno**

## HC-SR501 PIR Motion Sensor

The HC-SR501 auto-senses light in various applications for ventilator control, alarm, etc. It is made Infrared technology. It has high sensitivity, and high reliability. It is used especially for battery-powered products.



**Fig.5 Photograph of PIR sensor**

### Design and Construction of the Constructed Security System

In the system, the arduino which is used as a control unit, GSM module, and motion sensor are the input unit and the smart phone, LED, Buzzer are used as display unit. To operate the SIM 900 A with arduino, insert the SIM card in holder in module and set the antenna. And the module is provided the power. The LED will blink 800 ms. Then the net light LED will blink. Fig.6 is the complete circuit diagram on printed circuit board.

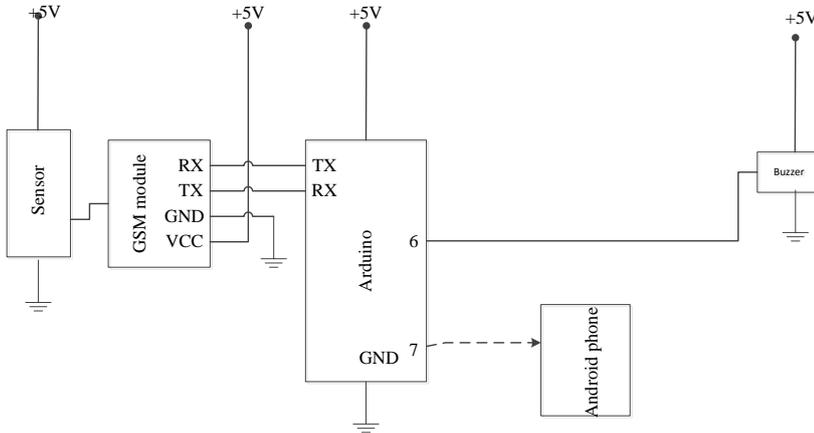


Fig.6 The complete circuit diagram on printed circuit board

### The Programming Section for the System

At the beginning of the program, we configure the serial port. Declare the Tx and Rx pin which is connected to Rx and Tx pin of arduino. Configure the baud rate as 9600 ms. Then serial monitor is ON. After 2 s, the network log on. The system can be made a calling, hanging up, sending and receiving message shown in Fig.7. If the system is used as a security, the sensor input pin is defined. And also lighting emitted diode pin and buzzer pin are declared as output pins shown in Fig.8.

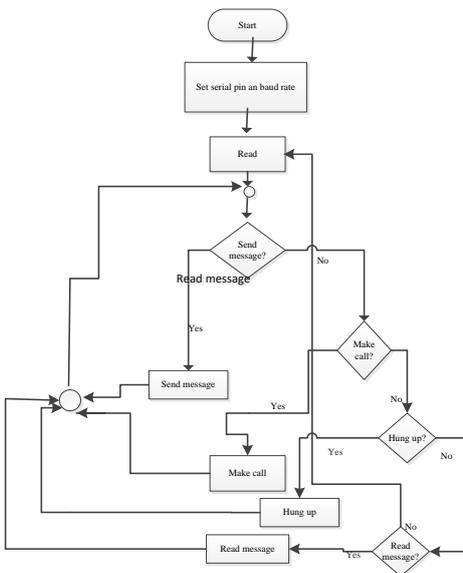
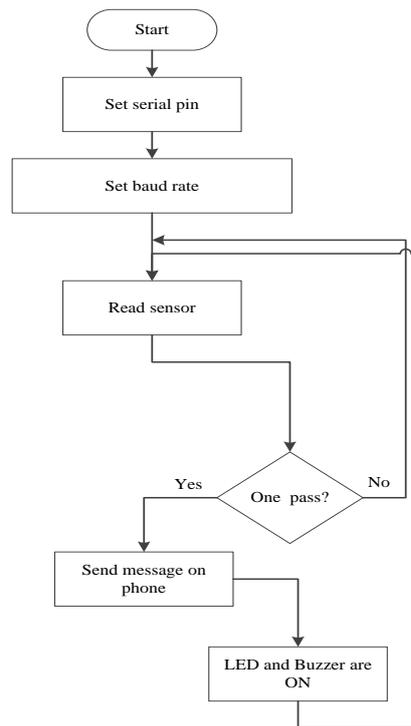


Fig.7 The flowchart for four key functions

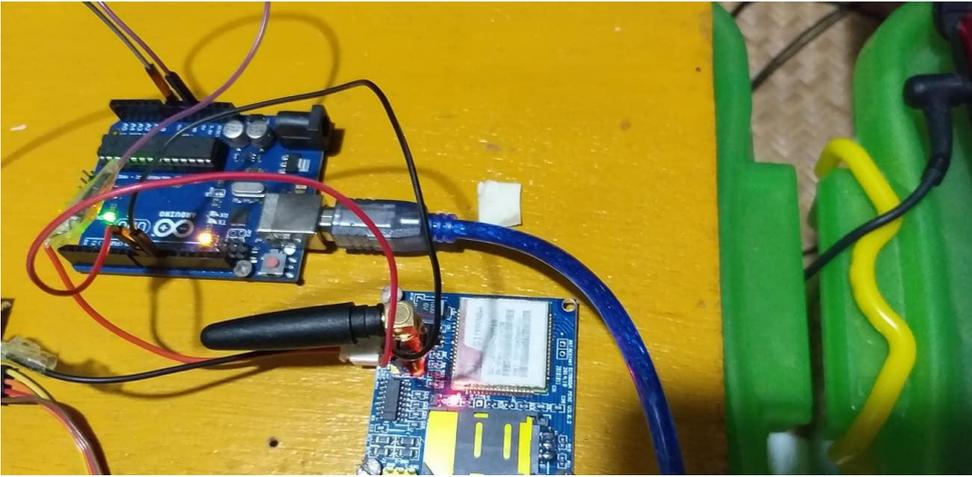


**Fig.8 The flowchart for security programming**

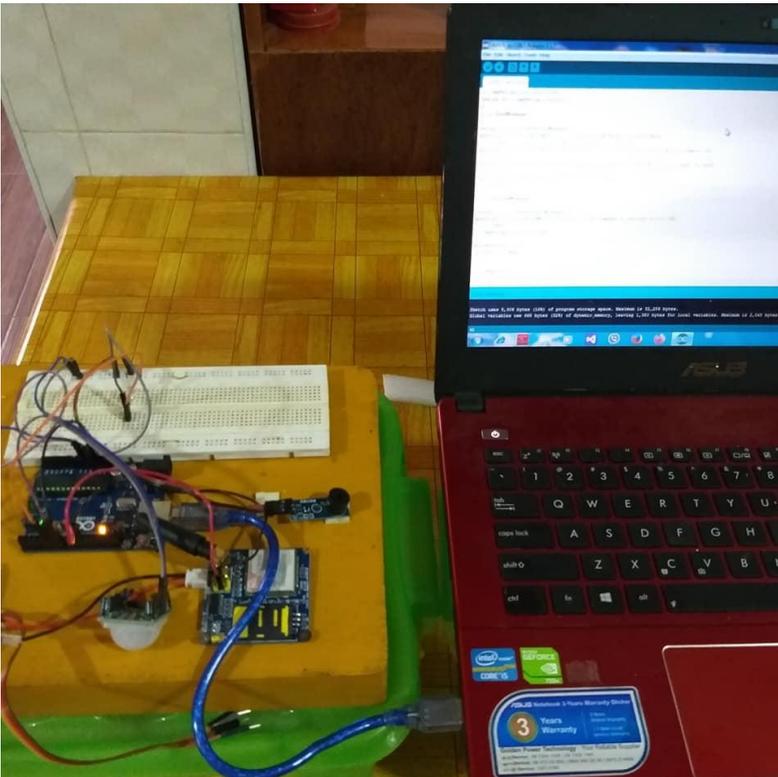
### Result and Discussion

This research work is intended to control the home and office security. The GSM module, SIM 900 A card, Buzzer, Light emitting diode and PIR motion sensor are used. Firstly SIM card is inserted to GSM module and it is powered. The antenna is joined with module. If the connection is right, the LED will blink every three seconds.

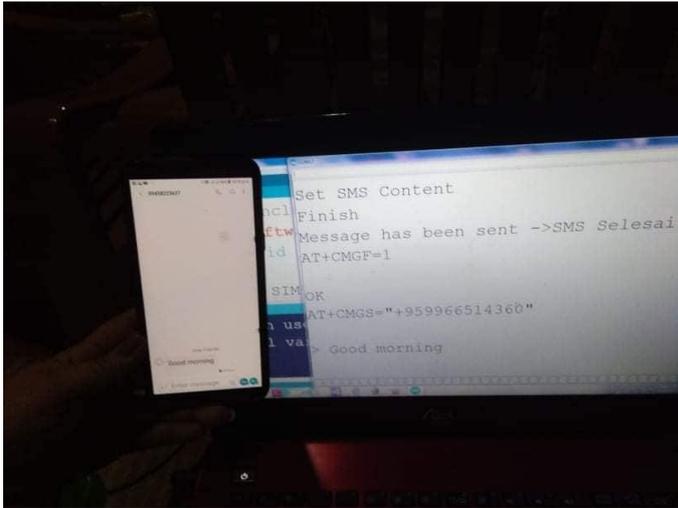
The PIR sensor is joined to the input of the arduino. The transmitted pin and received pin of GSM module are connected to the received pin and transmitted pin of module. The arduino shield operates as a standard phone. The infrared sensor measures light radiating if one passes the security area. Then the sensor informs the arduino. The arduino accepted the signal, after that it gives the message to android phone through the GSM module. Also the buzzer makes a noising sound and light emitting diode blinks for alarming. Fig.9 is the photograph of GSM SIM900A module with arduino. Fig.10 is the photograph of GSM SIM900A, arduino, PIR sensor, buzzer, and LED. Fig.11 is the photograph of sending the message GSM SIM900A with arduino to mobile phone. Fig.12 is the photograph of a missed call from mobile phone with date and time (displaying on serial monitor) Fig.11 is the photograph of receiving message on mobile phone when the person is moving in security area.



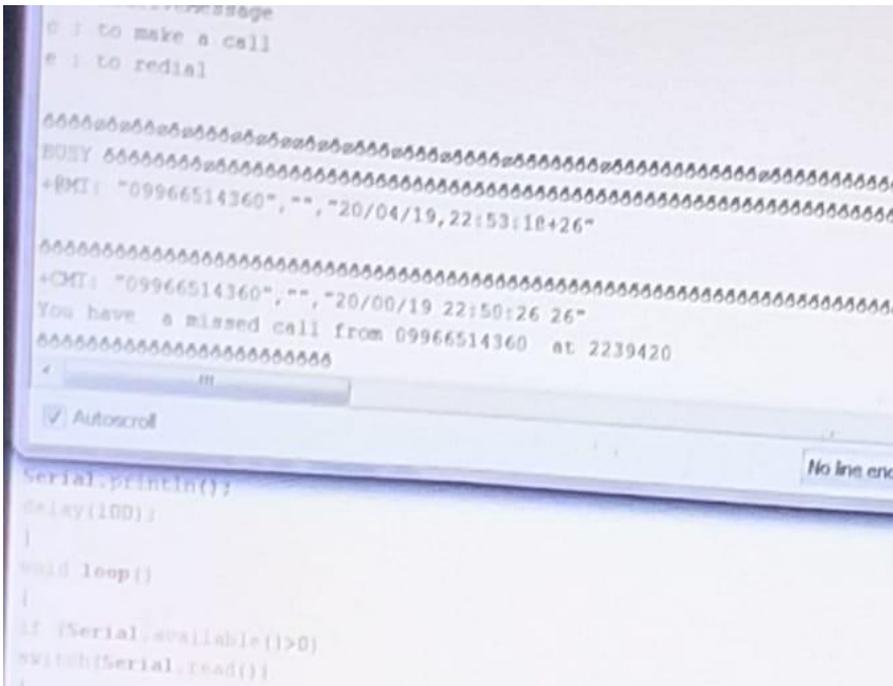
**Fig.9 The photograph of GSM SIM900A module with arduino**



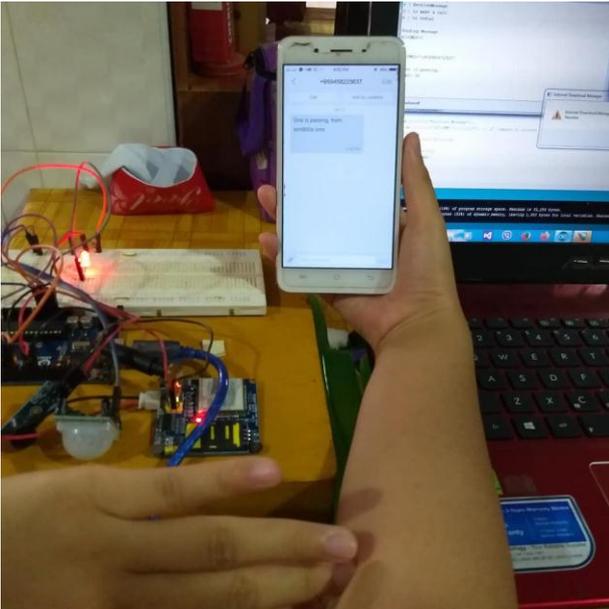
**Fig.10 The photograph of GSM SIM900A, arduino, PIR sensor, buzzer and LED**



**Fig.11 The photograph of sending the message GSM SIM900A with arduino to mobile phone.**



**Fig.12 The photograph of a missed call from mobile phone with date and time (displaying on serial monitor)**



**Fig. 13** The photograph of receiving message on mobile phone when the person is moving in security area.

### **Conclusion**

GSM technology is standard for mobile system. The system can be modified as cellular communication, robotics applications, and home appliances.

### **Acknowledgements**

We wish to express our sincere gratitude to Dr. Lei Lei Win, Professor, Head of Physics Department, Mandalay University, Dr. Kalyar Thwe, Professor, Department of Physics, Mandalay University, Dr. Nay Win Oo, Professor, Department of Physics, Mandalay University, and Dr. Nyein Wink Lwin, Professor, Department of Physics, Mandalay University for allowing to do this research.

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