Xbee based Automated Secured Door Lock Control System

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Abstract–The development of new technologies has brought changes in day to day life of people. These technologies has tremendously changed almost all the fields like industry, telecommunications and home automation. Home automation is not popular in India because of its high cost. A sincere attempt is made to provide a low cost, reliable and secured door lock control system in this paper

Keywords: Home automation, security, ardunio ,GSM,XBee

I. INTRODUCTION

In recent years there is lot of risk on assets. Securing assets and valuables is a tough and challenging task. Fortunately the growth in technology has relived from threats on assets by proving automatic alerts and alarming systems. Such a system is called home automation. Home automation is automation of home, household activity or housework. It includes centralized control of lighting, HVAC (heating, ventilation and air conditioning) appliances, security locks of gates and doors and other system. [1] The term "smart house" was first coined by American Association of House builders in 1984. Cost was too high and was only a domain of rich till 1990s[1]. In recent days development in technology has taken a curve. Cost effective, reliable systems have emerged. These developments have helped in the emergence of home automation systems which are affordable by common people. There are several advantages of home automation: Secures home through automated door locks, increases awareness through security cameras, temperature control and burglar alarms. The rest of

the paper is organized as follows. The related work is discussed in Section II. In Section III proposed System is explained and Section IV concludes the paper.

II.RELATED WORK

In [2] N. Sriskanthan, F. Tan and A. Karande has introduced a Bluetooth based home automation system. The system has a primary controller and a number of Bluetooth sub-controllers. Bluetooth sub controller is physically connected to the home devices The communication between the devices and the sub controller is wired. And communication between sub controller and primary controller is wireless. The System is expensive as each device must have dedicated Bluetooth module.

In [3] S. Ok and H. Park has anticipated a home gateway based on the OSGI (Open Service Gateway Initiative), which allows access to home automation systems for administration and maintenance services. the system is divided into two subsystems.

DSM (Digital Home Service Distribution and Management System): provides a user interface to control and monitor connected devices.

Home Gateway: manages the home automation system.

In [4] Khusvinder Gill, Shuang-Hua Yang, Fang Yao, and Xin Lu presents a Zigbee based robust home automation system. The architecture is designed to reduce wired communication, total cost and increase security. Using this system the users can control the

connected devices through Zigbee based remote control and wifi enabled devices.

In [5] Armando Roy Delgado, Rich Picking and Vic Grout provides insight about home automation with different networks. The paper discusses the benefits of home automation, proposes a standard architecture, and also issues related to remote control systems.

III.PROPOSED SYSTEM

This section describes the components used followed by the description of system implementation.

Components used:

- Arduino uno
- GSM SIM900A
- Xbee
- Vibration sensor
- LED
- Connecting wires
- Bread board

ArduinoUno

Fig. 1. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328 and is shown in Fig.1. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button[6].

GSM SIM900A

GSM SIM900A module helps in sending and receiving text messages and is shown on Fig.2. It has a slot to insert an activated simcard. rx(receiver)and tx(transmitter) pins helps in serial transmission of messages with arduino.

Fig.2.GSM SIM900A

XBee

XBee module is shown in Fig.3.Xbee works on 3.3v power supply. This helps in wireless communication between two xbees at one time. Configuration of xbees is done using xctu software so that it can communicate withonly those which are allowed exchange data between them.
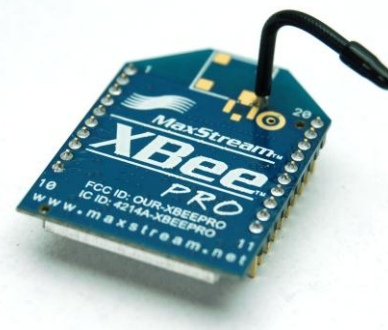

Fig.3. Xbee pro

Vibration sensor

Vibration Sensor is connected to Arduino. It senses vibrations and sends values to arduino. Further flow of the process is handled by arduino.

Fig.4. Vibration sensor

The proposed system provides the following functionalities.

1)Controlling door locks remotely

2) Alerts owner in case of intrusion

3) Fault recognition in the system

The system has two divisions (1)Base system (2) Sub systems.

The base system is shown in Fig.1 below.
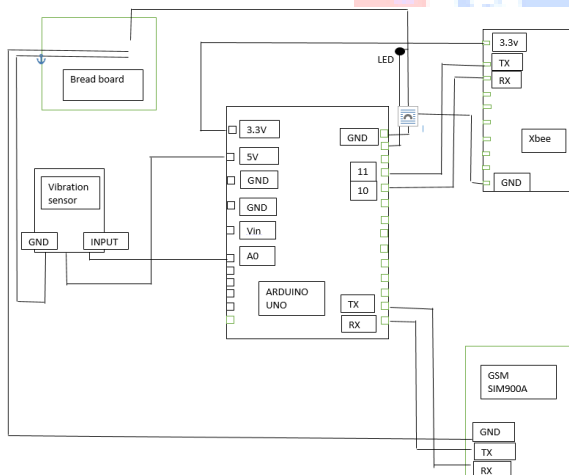

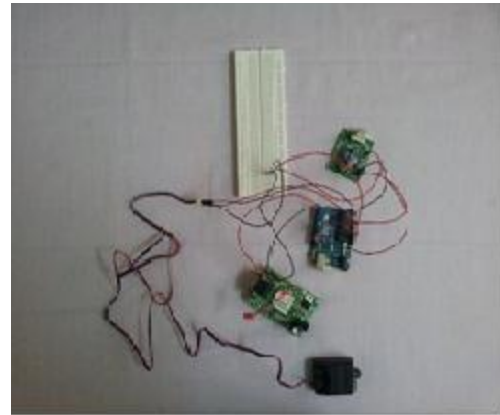**Fig .5. Complete circuit diagram of Base system**

Fig.6. Base system implementation

The base system consists of four units. Arduino GSM SIM900A, vibration sensor and xbee.

The components in the base system is connected as shown in Fig.5.. Vibration sensor is connected to analog port Ao of arduino. A 5v power is supplied to sensor by arduino. GSM SIM900A is used to send and receive messages toand fromthe owner. It is connected to arduino with the help of rx(receiver) and tx(transmitter) pins. Xbee is connected to the system to send and receive messages to and from the sub system. It is connected to arduino with the help of digital pins 10 and 11. Since rx and tx pins are needed for both xbee and GSM and the actual rx and tx pins are already used to establish connection with GSM, digital pin 11 is programmed to work as rx and 10 as tx. Base system implementation is shown in Fig.6.

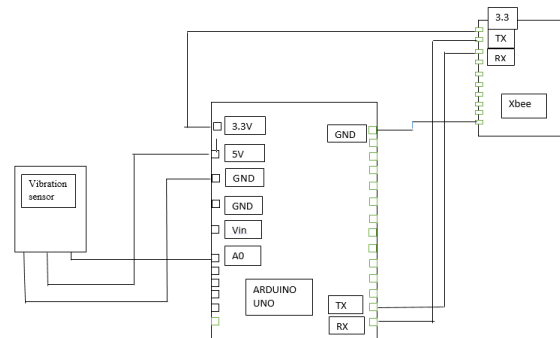Subsystem has three components. An Arduino, Xbee and a vibration sensor.

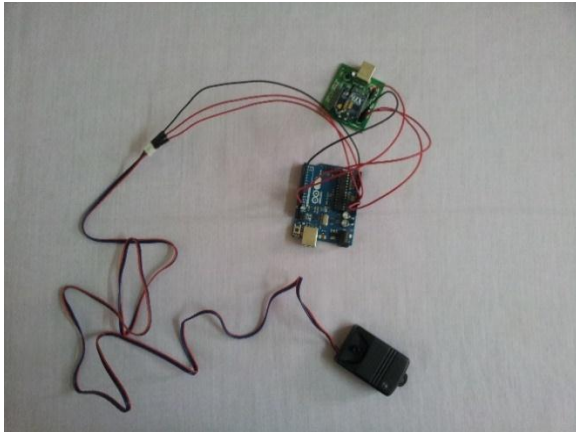**Fig .7. Complete circuit diagram of subsystem.**

Fig.8. subsystem implementation

Fig.7.shows the circuit diagram of the subsystem. Vibration sensor is connected to Ao(analog port) of Arduino. A 5v power supply is given to Vibration sensor from Arduino.The Xbee is connected to Arduino with the help of rx(receiver) and tx(transmitter) pins. A 3.3 volt power supply is given to Xbee from arduino. Any vibrations sensed are read by the sensor and sent to arduino. Arduino sends a message to the base system with the help of xbee. The base system alerts the user with a message. The subsystem will periodically send a message to the base to ensure that the system is working properly and no one has tried to hack the system.

The main door is installed with the base system. When the user sends atext message "OPEN" through mobile phone,this message is received by GSMand unlocks the door. The user is acknowledged with a text message saying "THE DOOR IS OPEN NOW". Similarly when a "CLOSE"   message is sent, the door is locked and acknowledged with a text message saying "THE DOOR IS CLOSED NOW". Programming with any other convenient secret code instead of "OPEN" and "CLOSE" messages is possible.Text messages are used to communicate with the system since internet is vulnerable to hacking.A vibration sensor is integrated with the base system.Vibration sensor on the door is active only when the door is locked. If an intruder tries to open the door or bangs the door, the sensor senses the vibrations and alerts the concerned authority with a text message "SOMEONE TRYNG TO OPEN THE DOOR".

If an intruder or a thief has entered the house by breaking through a window, then a second levelsecurity is provided by the subsystem which is placed on thelocker (since valuables are preserved in a locker). Assuming such possibilities a sensor is integrated on the locker. If the thief tries to open the locker then the sensor senses the vibrations on the locker and alerts the base system with a message. The base system in turn alerts the owner with the message "SOMEONE TRYING TO OPEN THE LOCKER".

This system has fault recognition. Subsystem will be periodically communicating with the base system. If the periodical message is not received by the base system from the subsystem then it alerts the owner with a message. The same system can be implemented in class rooms of a college and office.

The whole system can be controlled with a 9v rechargeable battery. Hence power cut does not have any effect on the system.

IV.CONCLUSION

The system provides low cost, reliable automated secured door lock control facility. The system is less vulnerable to hacking since it is controlled using text messages. Fault recognition is achieved through periodical communication between base system and the subsystem. The intruder can break into the system only if he knows the phone number of the installed activated simcard and the secret code. Hence the system is secured and reliable.

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