



Shackle Restriction System

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Abstract—This paper presents you a new security system which is capable of sending you a warning message, when an intruder enters. In recent times scenarios like breaking into banks and houses are elevating to an embracing figure. Seeing this admonishing trend we have come up with an advanced system namely SHACKLE RESTRICTION SYSTEM, which can make you aware of thief breaking in. This system uses infrared radiations to detect intruder which in turn sends warning message to owner and nearby police station through GSM. As it deals with only simple devices like Bluetooth and sensors, it provides you with feasibility of using anywhere you require, may be in house, Bank, Organization etc. By making use of this kind of system we can eradicate crimes of stealing to a greater extent and give a helping hand for the nation's progress.

Keywords— Bluetooth, Global System for Mobile Communications (GSM), IR (Infrared rays), Android Package (APK).

I. INTRODUCTION

In all the industries, security is concerned with the assurance of confidentiality. There are many tools and techniques that support the security providence. For this reason every entrepreneur needs many automated and manual systems like Image identification systems, Retina identification systems, smart cards, RFID, manual ID cards, thumb impression techniques, etc. to validate the person entering and to block the entry of unauthorized person. But these techniques are very time consuming. So there is a need for some advanced technique. Instead of maintaining many devices for authentication purpose, it is possible to integrate the authentication processes of entry and exit into mobile phones with the support of Bluetooth. Bluetooth is a proprietary wireless technology standard for exchanging data over short distances.

Today the cost of Bluetooth enabled mobile is very cheap. It means mobile phone can be used as an ID card for the purpose of authentication. The main purpose of this system is to reduce the amount of money spent on check in, check out by organizations and provide better security.

II. RELATED WORK

Existing techniques for providing authentication of person are Alarm system, Thumb impression system, Image identification system, Password protection system, Retina identification system, smart card etc., Alarm's system is hardware system. It sounds when thief is identified. But this is not much efficient system for identifying thieves because other people may / mayn't get alerted of this sound. One more notable point is this is not a stand alone system and requires other systems' help to carry out process. Thumb Impression System: It is another type of hardware system for identifying the authorized person and restraining him from entering into confidential room. Image Recognizing System: Even this is a kind of hardware system for identifying authorized person with the help of face detection. But the drawback of this kind of system is that it fails in the case of intruder morphs his face.

This can reduce the efficiency of this system. Password protection system: It is another hardware system for identifying authorized person with help of password protection. In this kind of system you are permitted to enter wrong password only thrice, exceeding which can block you completely. Retina identification system: It is one more hardware system for identifying authorized person with the help of retina checking. It's one of the prominent systems we have till date authenticating at best yet it's very costly one.

This issue of cost is making many users to drop out from opting it. If we keenly get through all the above systems we can identify a common flaw, which we neglect all the time. That is all those systems are embedded to door and never concern about the walls side of them. What if the intruder breaks the wall and get in neglecting the secured door? What happens to the security? Obviously security gets compromised. Taking this into consideration we have proposed our new system which can assure you with the best security that too at low cost.

III. ARCHITECTURE

Architecture below depicts what are the components we had used in our system and how they connected with paragraphs must be indented.

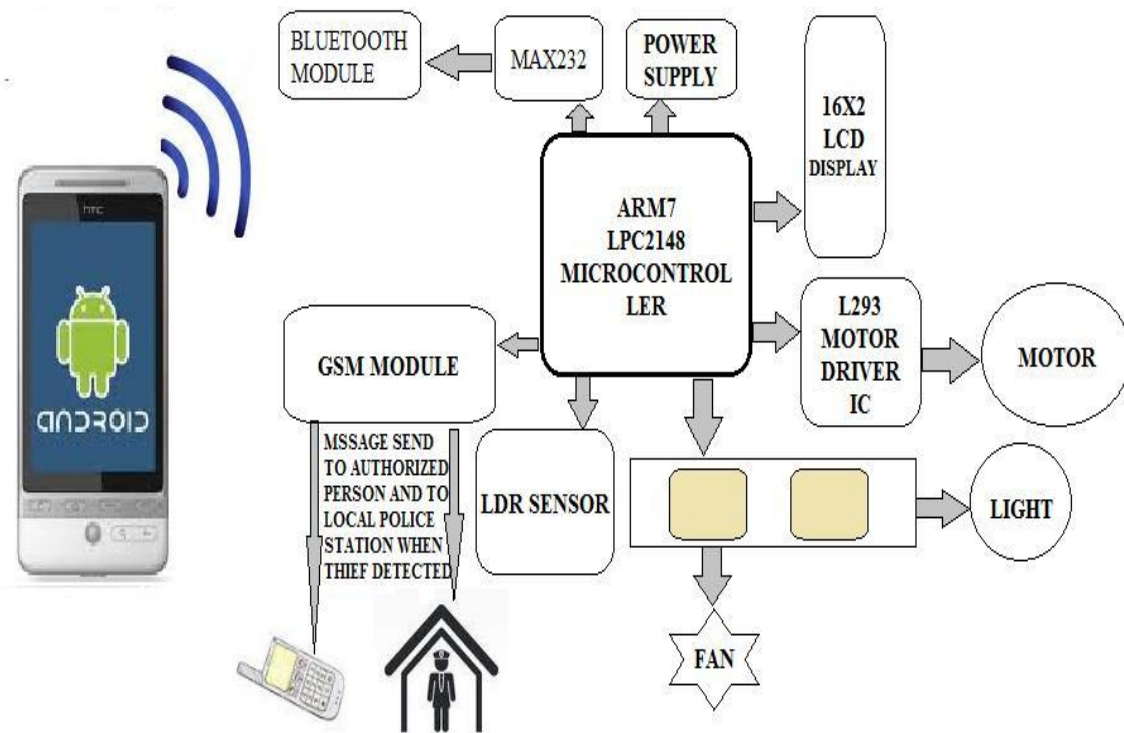


Fig: 3.1 Architecture of Shackle restriction System

Components used in our hardware implementation are listed below,

- ARM LPC 2148 Microcontroller,
- LCD 16*2 Display,
- SIM-300 GSM modem,
- IR (Transmitter & Receiver) sensors,
- DC Motor,
- Bluetooth module,
- Relays (2),
- ULN 2003 IC,
- LED's (2),
- 555 Timer IC,
- Step down transmitter(12volts),
- 7805 regulator, L293D IC.

In Fig: 3.1 we can see that mobile phone's Bluetooth is communicating with Bluetooth modem which is connected with micro-controller. With the help of motor we can open / close the door. GSM module is used to send messages to authorized person and to local police station. IR sensor is used to identify the thief when he enters into the room. Power supply is used to provide power to activate microcontroller. In this fig: 3.1 we can also see a LCD display which has no effect on working of system yet it's used for developer convenience(to understand the working condition of micro-controller).

IV. PROCESS

1. PROCESS FOR ENETRING THROUGH DOOR (For the Authorized Person) :

First you have to install the Android APK file in mobile. Later you are expected to pair the Bluetooth of mobile and Bluetooth device in micro-controller by entering the security code (the security code is default for Hardware Bluetooth device).

Open your Android application in mobile (Welcome activity / window page will be displayed).

Generally sensor-OFF button is invisible in our application. So, authorized person must find the Sensor-OFF button on the application screen and then press it to stop the sensors working in room.

Next, he/she needs to switch on the light in that room.

- if (light-ON == true) then
Activity will navigate from Light screen to door screen in mobile application.

Else

Displays error message that you are not the authorized person to operate this application.

- If the above condition is satisfied then he/she will continue the process.

Now, click on the Door-Open button and the password screen will be displayed.

```
If (light-ON == true) then
{
```

```
    If (OnClick_Door-Open == true) Password screen will be displayed
```

```
}
```

- If Password Matches then

DOOR will **open** Else

Display the password screen error message (Only three chances are available after that the system will be blocked for 30minutes).

Note:* Password must be entered through **voice** only. If the password matches then the DOOR OPENS and that AUTHORIZED Person will enter into room. After that, he must Press the **DOOR_CLOSE BUTTON** in

ANDROID App.

- if (OnClick_Door-Close == true)
 Door will close.

The same process is applied for coming out of the room. When the authorized person returns back, automatically the Sensor will get activated.

2 PROCESS FOR ENTERING THROUGH WALL / WINDOWS (For a Thief):

If any unauthorized person enters into room by breaking the wall?

When an unauthorized person enters into the room by breaking walls or through windows then the infrared rays will fall on him and the GSM-Module gets activated to identification system, smart card etc., send the message to Local Police station and to the authorized person.

V. Restricted Ways

- ❖ If any unauthorized person simulates our Android application then
 - He doesn't know which data we are sending to BTM005 Bluetooth device through our mobile Bluetooth.
 - He doesn't know the MAC address of BTM005 Bluetooth device.
 - He doesn't know the security code for pairing the BTM005 Bluetooth device to his mobile device.
- ❖ If an unauthorized person steals the authorized mobile phone then
 - Maybe he doesn't know how to operate our application.
 - Even if he knows the entire process of android application, he still can't find the **Sensor-OFF** button because it is hidden.
 - Maybe he doesn't know the unique password to enter.
 - Even though the password matches, the voice can't be same as the authorized person.
- ❖ If an unauthorized person want to crash the hardware system then
 - Our hardware system is inside the room. It is not visible to everyone. So, no one can crash our shackle restriction system.

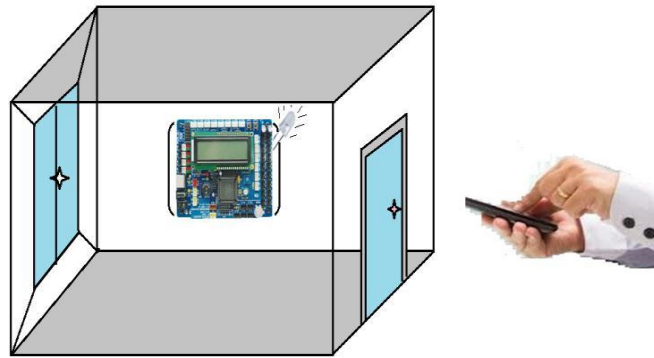


Fig: 5.1 Operating hardware devices with mobile phone

- If an unauthorized person enters through wall(break the wall)
 - If he/she breaks the wall and enters the room by breaking the wall, then a stream of infrared rays fall on the unauthorized person and the GSM-Module gets activated and sends a message to the local police station as well as the authorized user.
 - Many sensors are used based on the room's length & breath. All sensors are placed in the room by covering the entire room.

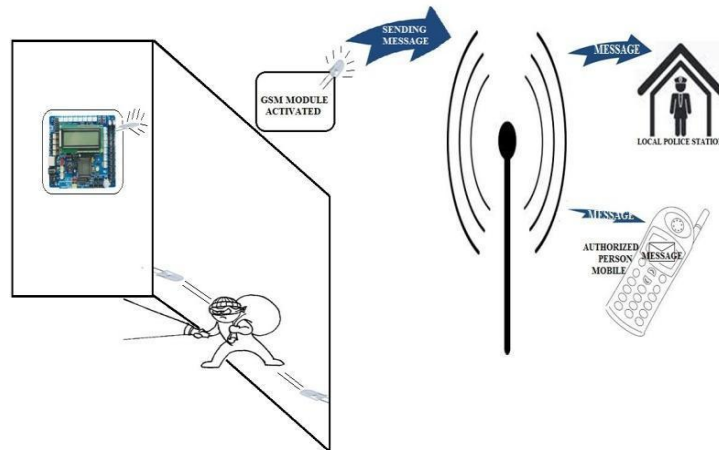


Fig: 5.2 Operation of IR-sensor and GSM modem

Working of GSM modem by the help of IR-sensor:

IR-sensor has both transmitter and receiver diodes. The transmitter diode is in forward bias and is used to transmit the infrared rays to receiver diode. If any object falls in between these two then the infrared rays doesn't fall on receiver and the logic becomes one ("1").

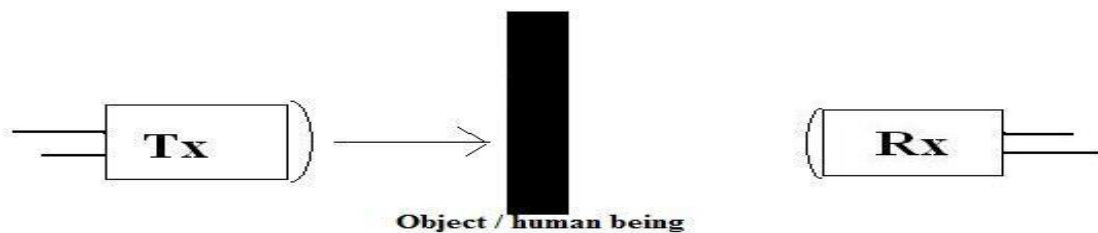
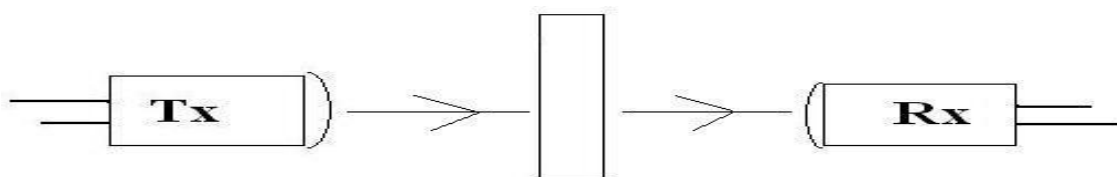


Fig: 5.3 any object within TX & RX

Without any object in between the transmitter and the receiver, the infrared rays pass from transmitter to receiver as shown below:



Space in between TX and RX
Fig: 5.4 space between TX & RX

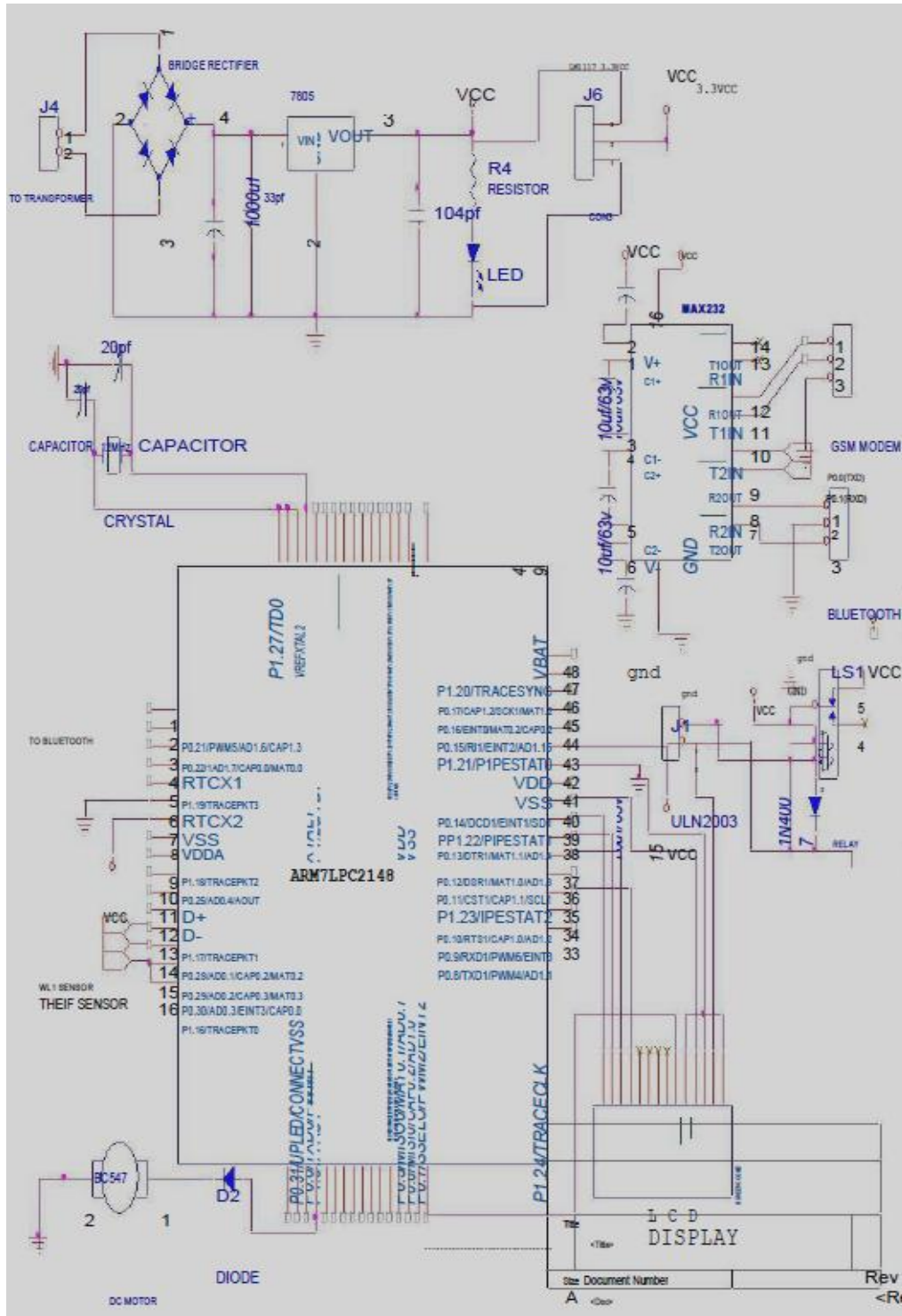
If any object occur in between the diodes then the logic = 1.

GSM modem sends message (**Pre-stored SMS transmission**) to the authorized person and to local police station.

AT Commands of GSM modem for sending SMS,

1. **AT**
2. **AT+CMGF=1(Text mode)**
3. **AT+CMGL="ALL"(if any messages from others to this modem)**

VI.CIRCUIT DIAGRAM



VII.IMPLEMENTATION

The Android application must be installed on the authorized person's mobile. By using Bluetooth we can connect with Hardware Bluetooth device on the microcontroller by pairing (must enter security code)

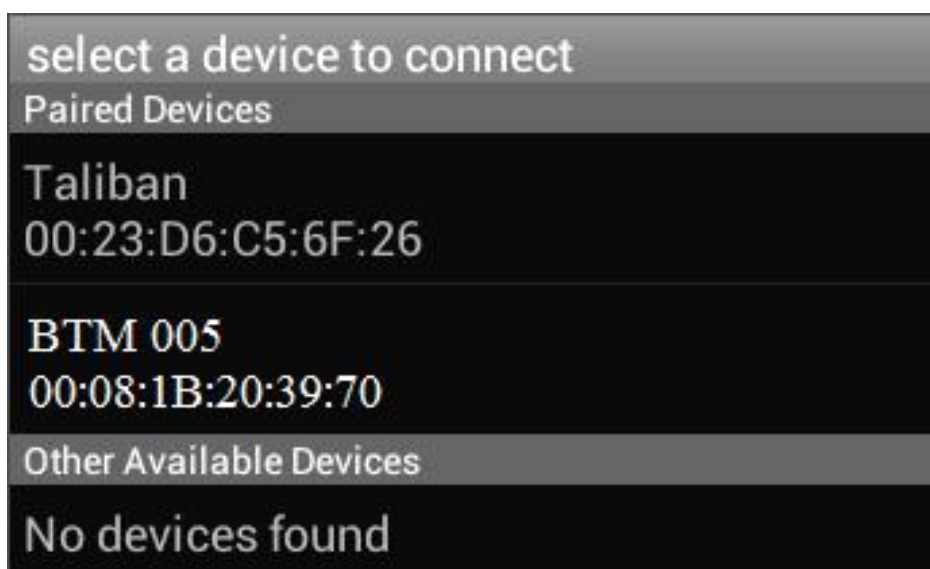


Fig: 7.1 Paired devices list

Open our application and operate it, we already mention the entire process by following that process we easily operate our application in mobile (You can see some of the screen shots of our android application).

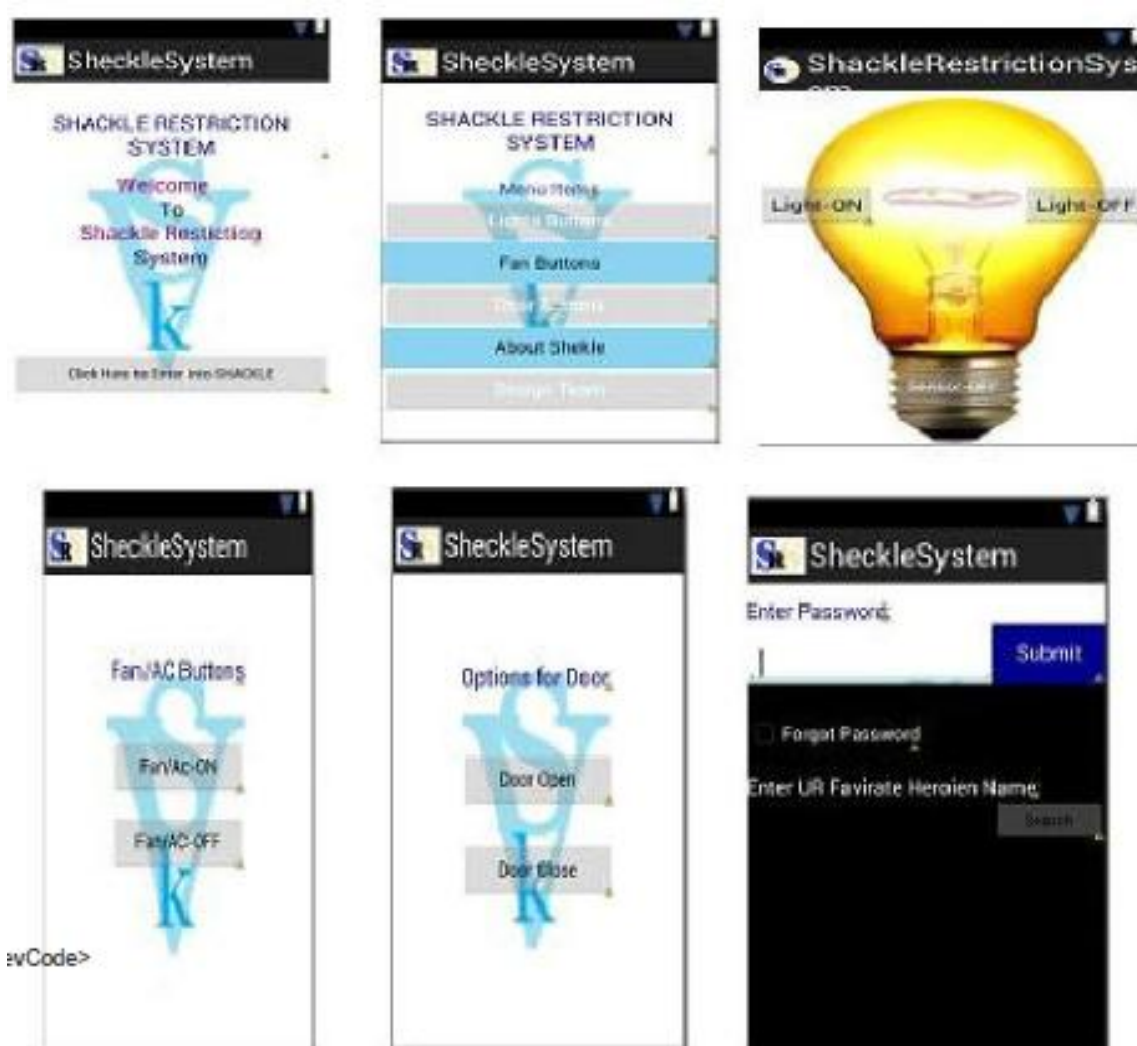


Fig: 7.2 Software screen shots

The prototype model of our shackle restriction system is given below

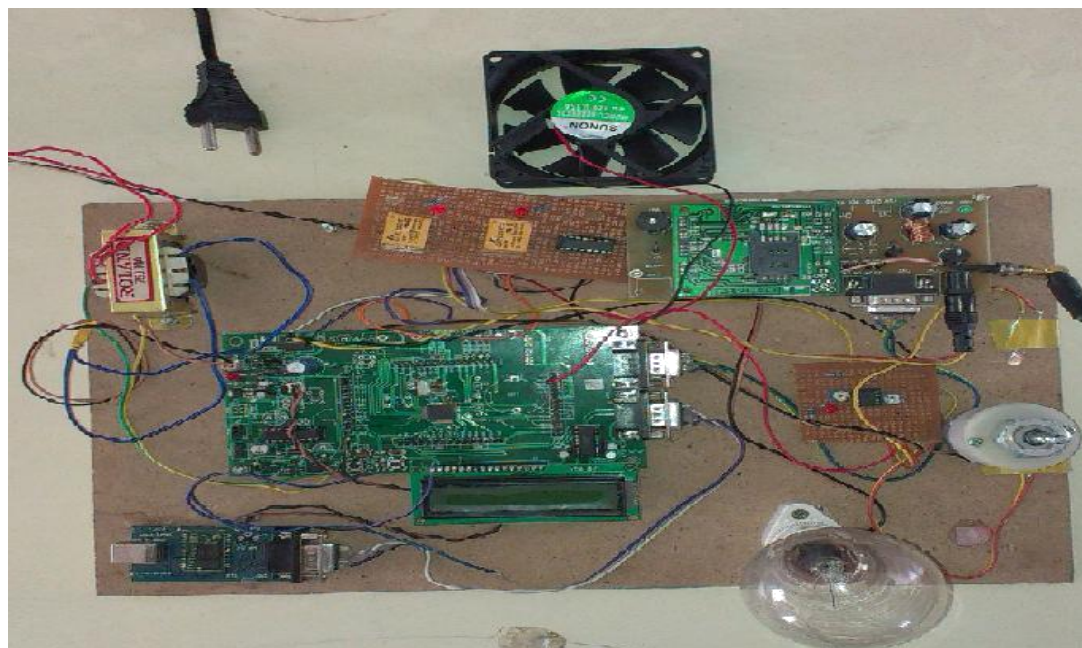


Fig: 7.3 Hardware kit for prototype

VIII. CONCLUSION

This system is very helpful for Banks, Organizations, and Homes etc., where we need more security. The possibility of identifying the thief/intruders increases by a huge extent. Our system is of low cost when compared to other existing systems. By using this system we can reduce the robberies and easily find thieves in action.

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