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Smart Handbag Enabled with Location Tracking

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Abstract- The world is becoming unsafe in all aspects. The crimes are increasing at a higher rate. This paper proposes a quick responding mechanism that uses a speaker to alert the user and provides a way to safeguard his/her belongings. As a snatch theft has become a serious problem to the society, it is required an immediate action to put an end to this problem [1]. All the electronic inventions are to reduce manual effort upon mechanical work and to create an interaction between human and machine [2]. The framework of project is based on a 555 timer IC [NE555P] in astable configuration that produces square wave of definite frequency. A loudspeaker which is used as a load at the output generates sound and alerts the user in case of breaking of wire or discontinuity in the loop (cutting the bag strap with scissors-based theft) also in case of direct snatching the bag, we can track the bag as it is interfaced with a GPS GSM module [SIM808]. This project can be used to protect our wallets, carry bags or even just in case to mention caution so that people alert. The applications are not just limited to this as it is portable, reliable, cost efficient and small as it uses only battery supply.

Keywords- 555IC, SIM808, Arduino Uno, GPS, GSM.

I. INTRODUCTION

Insecurity and crime constitute some of the major problems facing our immediate society today. People live with fear of being attacked by burglars, vandals, and thieves. Despite all the effort, resources and time that has been devoted to the development of tools that will reduce crime rates and make the world a safer place to live, these problems are still on the increase. These gave rise to the need for an increasing development in the technology of alarm systems which utilizes sensitive electronic devices.

Some instances of snatch theft have caused fatalities, when the person holding onto the handbag has been dragged by the motorbike or through subsequent acts of violence. The crimes have caused severe injury to head and let them to death [1]. With the introduction of these alarm systems which have reduced greatly the level of insecurity.

1. Alarm:
Whenever, the handbag theft occurs by cutting of straps (with scissors) of the bag, usually we carry them around the shoulder. Then, an alarm is made to ring alerting the user. The wire loop along the straps is grounded, but in case of discontinuity or when the wire loop breaks, the circuit is activated and the current from the battery will be forced as input for the buzzer (alarm). Thereby, alerting the user and valuables are secured.

2. Location Tracking:
In case the thief snatches the handbag and runaway, the location of the bag can be found with the use of SIM808 module. SIM808 is a GSM/GPRS module with quad band which performs satellite communication using GPS technology. Both GPRS and GPS are integrated into a compact SMT package thus saving both time and cost for customers using the module to develop applications [3].

II. LITERATURE REVIEW

The snatch theft alarm system has been developed using the RF signal [4]. In this model, there are two individual circuits. First, the circuit contains the siren and the receiver unit for the RF signal and in the second, the transmitter unit for generating the RF signal and will control the siren from a distance using RF signal. The user gets near the transmitter unit in form of a keychain, belt rings around the waist of the jeans or can be placed in the user's pocket. Another circuit that contains the receiver unit will be placed inside the user's handbag/ belongings. In this way, the RF sensor detects the change in distance and alerts the user by sounding the alarm.

The main disadvantage of this model is the device is limited to a certain range, not using the rechargeable battery and the location of the bag is unknown if the thief run away with the bag.

Another attempt in the same field is that use of ultrasonic sensor HC-SR04 [5]. The alarm system was developed to determine the distance between the device and the ground. The sensor is attached on the handbag straps. If the snatch theft happens, then this handle is snapped and separated from the bag, and then fall on the ground. When the sensor detects the ground, the alarm is activated.

However, this model undergoes many problems due to practical issues like the device may not hit the ground and thereby the alarm may not even ring and another disadvantage is that the alarm may be activate if the device is accidentally hitting the ground.

A similar model proposed with the use of 555timer with hand wired system [6]. The design is implemented by using 555timer, and with an audio mono jack plug. The main theme is that the user must wear a necklace that contains an audio mono jack. The jack should always be plugged into a socket in the circuit, which is inside the handbag. If the bag is snatched, the jack is forced to plug out, which then breaks the circuit and hence, the alarm is activated. The main disadvantage in this type is the mono jack is always caried along with necklace and if the snatch theft occurs, the location of the bag is unknown.

Another model which is much like this proposed model is with the help of RF sensor and SIM908 module [1]. It contains two individual circuits, one for the RF receiver and other for the RF transmitter and the sim908 module. If the separation between both circuits exceeds 50metres then the alarm rings and if the snatch occurs the location known by using sim908 module. The limitations include the size of the circuit, and the alarm activates only after the distance is more than 50metres, in the meanwhile he bags can be hidden somewhere when the incident is occurred in a busy, populated places.

III. WORKING

In this proposed model, we use the 555timer IC and SIM808 module which is integrated with Arduino uno.

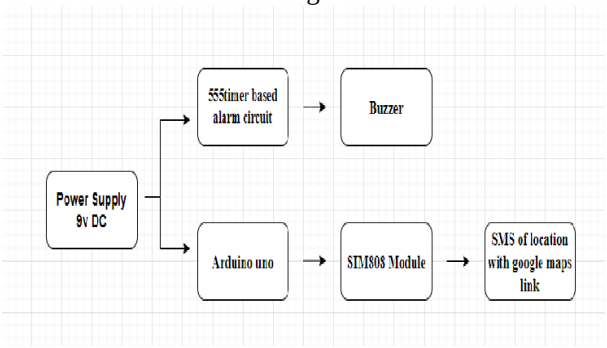

Fig 1. Block diagram of the model.

The block diagram consists of a power source (usually a 9v battery), the power from the battery is shared among the alarm circuit and the Arduino, SIM808 integrated module.

IV. 555TIMER BASED ALARM

555 Timer when operated in a stable mode produces a definite frequency wave (usually square wave), so this becomes as an oscillator source for the buzzer to ring at load side of the circuit.

Fig 2. Picture of IC555

The IC NE555 timer was selected for this project because of its ability to produce square wave pulse and due to small and compact size makes it easy to embed it into any system. NE555 is one of the widely used integrated circuits because of its simplicity and robustness [7]

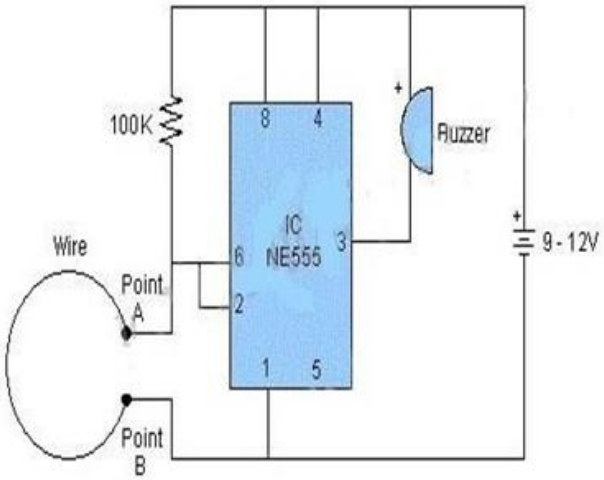

Fig 3. Circuit diagram for alarm circuit.

By connecting the above circuit, with the same pin connections, the 555timer can be made to work in a stable configuration. An astable multivibrator is nothing but a free-running oscillator to achieve this operation the pin 2 and pin 6 of NE555 is short- circuited so that it triggers itself on every cycle.

During each cycle, with the help of the timing resistors R1 and R2, capacitor C charges but it can discharge only through resistor R2 as the other end of resistor R2 is connected to the discharge pin of NE555 IC [8]. Here above timing resistors R1,R2 and capacitor C are connected as in multivibrator configuration, which can be known in detail from [9].

In this way, whenever there is discontinuity in the loop, which is connected between pin1 and pin6 then the current is driven through load at output pin3. Thereby, the buzzer is made to ring.

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V. LOCATION TRACKING USING SIM808 MODULE

SIM808 module is a GSM and GPS two-in-one function module. It is based on the latest GSM/GPS module SIM808 from SIMCOM, supports GSM/GPRS Quad-Band network and combines GPS technology for satellite navigation. SIM808 is integrated with Arduino uno. SIM808 GPS Tracker is an IOT (Internet of things) Solution based on the ATmega328 and GPRS/GSM GPS module SIM808. it integrates a microcontroller atmega 328, GRRS/GSM module SIM808, which is the upgrade version of SIM900, power management and storage [10].

The Arduino Uno is a microcontroller board based on the ATmega328. 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. It contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable or power it with AC-to-DC adapter or battery to get started [11].

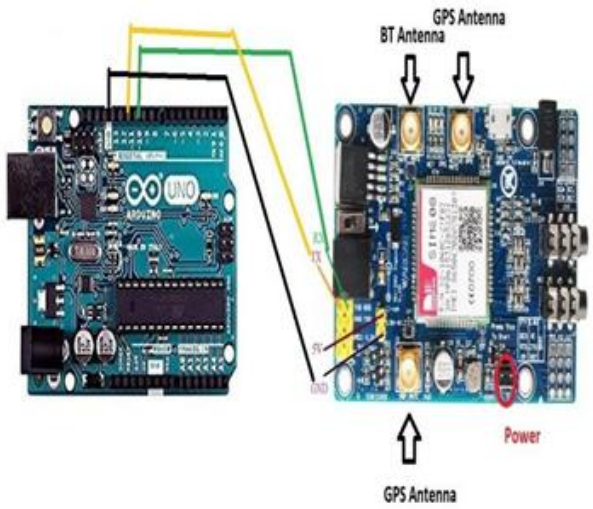

Fig 4. Connections of SIM808 interfacing with Arduino.

Whenever a handbag snatch theft is occurred the user can get the location of the bag with just a text message. The SIM808 module consists of a SIM slot tray, in which the 2G sim card is to be inserted. If at all the theft is occurred, then the user needs to send a text message to the phone number of the sim which is inserted inside the module. The module in return sends the location of the bag to the user with a google maps link.

Basically, in our proposed model Arduino uno is the brains of the entire system. It takes input from GSM Module (SIM808) and then obtain the location coordinates of the bag with the help of GPS interface (also in SIM808) and then generating a google maps link of the location and signal he module to send it to the user mobile.

The generalized for the Arduino for this type of interface can be obtained from [12].

VI. RESULTS

The prototype alarm is working perfectly in case of any discontinuity in the loop.

Fig 5. The 555timer alarm circuit connections on PCB.

The location tracking of the bag, when asked by the user. The module responded and gave the location with google maps link as a reply to the text message.

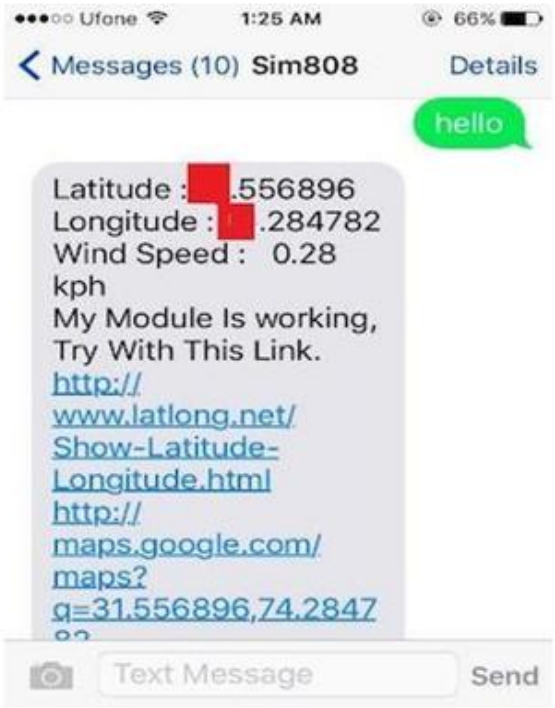

Fig 6. Text reply from the module to the user.

VII. DISCUSSIONS

With all proper connections and correct code to the Arduino uno, this prototype model can work correctly but not accurately.

The location link sent by the module is near to the actual location but not exactly at the location. The observed variance in the distance from the actual location is about 100-150 metres far. This can be acceptable in less populated areas.

VIII. LIMITATIONS

The use of 2G modules, which are not that accurate. As SIM808 module is also 2G module we need to insert only 2G simcard in the slot, which means it is limited to only any other cellular providers except Jio. Occupying more space in the handbag because of carrying two separate circuits.

IX. RECOMMENDATIONS

As we used modules of 2G specifications, the location may not be accurate. However, this prototype model when produced on a single board and with use of new generation integration techniques the size of the model will be compact and with better efficiency.This model can be further interfaced with the finger sensor for better security of the bag.

X. CONCLUSIONS

Smart handbag with location tracker was designed to provide mobile security system, especially for women to prevent the snatch theft crime [2].This prototype model is working well, it can be better, with few improvements and recommendations considered by the researchers. It can also be synthesized as a product and sold in the market.

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