

Location Based Unlocking System

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ABSTRACT: Location based unlocking system using GPS provides an additional layer of security unmatched by other present security systems, based on the location of the device and to find the nearest places from the current location of the mobile device. The location based unlocking system will give you alert when you reach your desired destination. Location based Unlocking system is a GPS based system, the user have to save the current location using longitude and latitude, the system will alert when the user is near to the location. Here, the container can only be accessed at a particular location which is predefined. Additionally, a keypad is also present to obtain a pass code from the person trying to open the container. This system can also be incorporated into other security systems, to provide this added advantage.

I. INTRODUCTION

Currently, the transportation of rare and expensive materials and items is very prone to theft and tampering. In the present scenario, access is always given to the transporter or another particular individual. This leaves the above arrangement vulnerable as unauthorized access as container can be opened at any particular place or time. For example, strongboxes of various banks are susceptible to theft as the authorities involved in transporting the money have the keys themselves. This leaves an opportunity for the corrupt guards to steal, or, thieves to overrun the guards and disappear with the money. The problem here is that the access to the container carrying the goods is carried around along with the container itself. To solve this unpleasant scenario, current security systems use keypads to enter passwords, biometric identification, and voice identification and so on. However, the problem still remains that the container can be opened at any location if the person who can access the container is present during transportation, by will or by intimidation. Even with these security measures, more thefts occur during transportation than at the source or at the destination. Also, all these attempts at security involve a person or an authority who has been granted access. Thus, there is a need for a security system which eliminates the human element and is capable of being accessed only at the source or the destination. Hence, the Location Based Locking System provides an additional layer of security unmatched by other present security systems. Here, the container can only be accessed at a particular location

which is predefined. Additionally, a keypad is also present to obtain a pass code from the person trying to open the container. This system can also be incorporated into other security systems, to provide this added advantage.

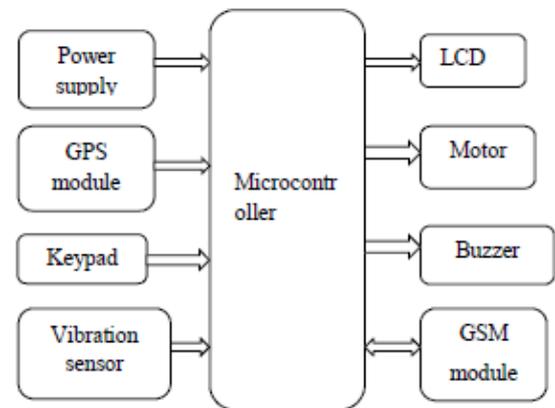


Fig.1 Simple block diagram of location based unlocking system

II. METHODOLOGY

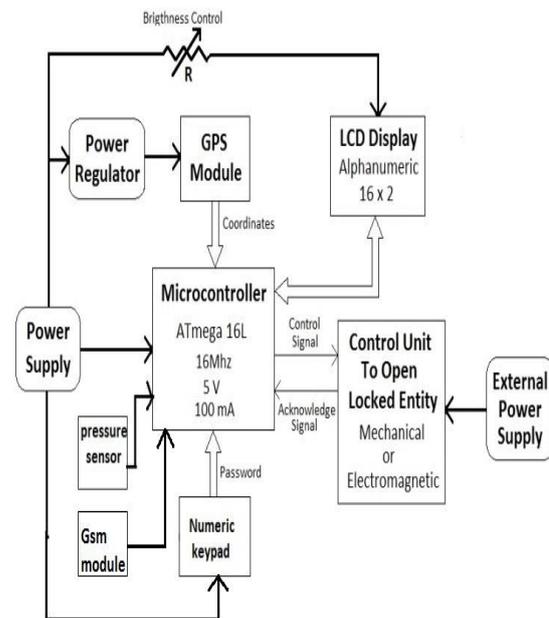


Fig.2 block diagram of location based unlocking system

a. Working procedure

The GPS module sends the location, altitude and direction parameters of the locked entity to the ATmega16L microcontroller. The microcontroller checks if the received data lies inside a predefined threshold region centred at a precise location, and if true, it provides access to the user to enter password using a 4x4 matrix keypad. If the user password matches with the predefined password, the microcontroller generates control signals to open the lock and provide access to the items inside. An LCD is used to provide required information to the user to access its functionalities. When a person forcefully tries to open the door the vibration sensor sends a signal microcontroller and with a help of GSM module the message is received to owner. The locked entity is basically a relay driven motor assembly with a latch system. On receiving the control signal, the inductor in the relay unit is energized to switch on the supply to drive the motor assembly, which in turn moves the latch to open the lock. The user who owns this system will have the ability to access the system by passing through two levels of security. The first being GPS location and other being a password. The user interface is built in such way that it provides mobility, saves power and to provide a simple way for using the device.

b. Description

- **Pressure sensor**

BMP180 is an absolute barometric pressure sensor especially designed for. The sensor module is housed in an extremely compact package. Its small measurements and its low power consumption assent to the implementation in battery driven devices like mobile phones, GPS modules or watches. Numerous device operation options offer highest flexibility to optimize the device regarding power consumption, resolution and filter performance. A tested set of default settings for example use case is provided to the developer in order to make design-in as easy as possible.

- **GPS Module**

A QUECTEL L70 M-39 GPS module has been used in this project. It is a low power GPS receiver-tracker which has one inbuilt antenna for receiving the GPS signals. It can communicate with other devices serially using UART protocols. The default baud rate is 9600, which is modifiable. The default refresh rate is 1Hz. The string format put out from the GPS module follows the NMEA

protocol standard. This standard involves the consecutive transmission of up to 16 different datasets, each carrying data of a particular characteristic.

- **Microcontroller**

An ATmega 16L (ATmel) microcontroller has been used as the core computing unity for this work. It works on a clock of frequency 16MHz. The VCC given is +5V and it draws a maximum current of 100mA. It has 4 ports of 8 pins each. It has one Tx pin and one Rx pin for UART communication.

- **Power supply**

The 220v, 50Hz voltage is stepped down to 9-0-9 ac and the regulated to get 5v dc using 7805 voltage regulator in order to provide the power to Microcontroller and other modules shown in the block diagram. An alternate power supply of 9v using Battery can be provided.

- **AC supply and transformer**

A power supply is used to provide the required amount of power at specific voltage from a primary source which can be ac mains or a battery. A transformer changes the ac mains (line) voltage to a required value. It is used to step the voltage up or down. In a transistor radio it may be a step-down transformer and in a CRT it may be a step-up transformer. Transformer provides isolation from the power line. It should be used even when any change in voltage is not necessary.

- **Rectifier**

A rectifier converts ac into dc. It may be a half-wave rectifier, a full-wave rectifier using a transformer with centre-tapped secondary winding or a bridge rectifier. But the output of a rectifier may be fluctuating.

- **Filter**

A filter circuit is used for smoothing out the ac variations from the rectified voltage. There are four types of filters: 1) Capacitor filter, 2) Inductor filter, 3) L-C filter and 4) R-C filter.

- **Voltage regulator**

A voltage regulator is necessary to maintain a constant output dc voltage by providing line regulation and load regulation. A zener -regulator, transistorized regulator or three terminal IC regulator can be used for this purpose. A switched mode power supply (SMPS) is used to provide large load current with negligible power dissipation in the series pass transistor.

- **Gsm module**

This GSM Modem can accept any GSM network operator SIM card and act just like a mobile phone with its own unique phone number. Advantage of using this modem will be that you can use its RS232 port to communicate and develop embedded applications. Applications like SMS Control, data transfer, remote control and logging can be developed easily. The modem can either be connected to PC serial port directly or to any microcontroller. It can be used to send and receive SMS or make/receive voice calls. It can also be used in GPRS mode to connect to internet and do many applications for data logging and control. In GPRS mode you can also connect to any remote FTP server and upload files for data logging. This GSM modem is a highly flexible plug and play quad band GSM modem for direct and easy integration to RS232 applications. Supports features like Voice, SMS, Data/Fax, GPRS and integrated TCP/IP stack.

- **Keypad matrix**

A 4X4 keypad matrix has been used in this work. There are 16 keys present in the keypad matrix, having 4 keys in each row and 4 keys in each column. One end all the keys in rows are shorted. Similarly the other end is shorted with column keys. Thus we require 8 pins to access any of the keys efficiently. The key can be identified if and only if we know the corresponding column and row of it. The column position can be identified by programming, by passing logic 0 to any one of the column. The key when pressed, the logic 1 on the input port will become zero. Based on which row the transition had occurred, the row is identified.

- **16X2 Alpha-Numeric LCD**

The LCD 8 data pins, 3 control pins and 3 power pins. The control pins are rs (register select), r/w (read or write) and e (enable). The module has the microcontroller embedded in it. The LCD has 3 memory regions namely, SRAM, DRAM and ROM. The ROM is where the predefined codes and ASCII lookup table is stored. The DRAM is the region where temporary memory is stored during the operation. The SRAM is the programmable region when we can define our own symbols required for us. The module works in 4 or 8 bit mode. In 8 bit mode, we send the lower and upper nibble separately. In 8 bit mode we can send it together. The LCD supports the display address from 0x80 – 0x9F in first row and 0xC0 – 0xDF in the second row. The user in order to use the LCD need to initialize the LCD in either 4 or 8 bit mode. The send suitable instruction to set up the LCD and finally send the data.

- **Control Unit to open the Locked Entity**

It is a simple relay unit. This provides the isolation between the low powered microcontroller unit and the high powered opening unit. The relay is basically Single Pole Double Throw (SPDT) switch. The relay we are using in our project is 5v relay. The input for the relay is provided using the micro controller pins. On receiving the potential difference of 5v, relay makes the connection for external system to operate.

III. RESULT

The locking or unlocking system option of the security system is achieved if and only if the GPS module co-ordinates of the system match with then predefined GPS co-ordinates of a particular location after entering the correct password.

IV. APPLICATIONS

- [1] Oil and petroleum transportation.
- [2] Milk transportation vehicles.
- [3] Transportation of currency between banks.
- [4] Transportation of confidential government and company documents.
- [5] Transportation of nuclear (radioactive) materials.
- [6] Military and defence applications.
- [7] Robotic delivery system. (Examples: In power plants, Amazon drones)

V. CONCLUSION

Owing to the versatility of the system in take any shape, it is possible for it to be added on to most of the existing access and locking systems by making minor mechanical alterations to them. The system can also be integrated with any new products by making required design changes to fit in any kind of packaging. This makes this system highly desirable to most applications at the least cost. This would be the scope for further development of this system.

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