

NFC based safety and secured vehicle movement system

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Abstract: The main objective of our project is movement of vehicle only when code is matched with programmed number. NFC code is inscribed in vehicle Papers. These procedures are usually handled using conventional ways such as NFC code was simple to exchange data and conduct transactions. This project presents a high frequency wireless communication (NFC) based vehicle immobilizer system, which features low hacking probability of hijacking the vehicle. The immobilizer uses the active NFC technology where the tag is generated with comparatively large character sets. The receiving unit is intelligently integrated into two control circuits in the vehicle namely ignition circuit and power control unit. It helps the vehicle user to avoid theft. It also helps the police to find the entire details of the vehicle user by storing the entire database about the vehicle and user to the individual NFC Tags.

Keywords: NFC, NFC Reader, GSM, PIC Microcontroller

INTRODUCTION

Present industry is increasingly shifting towards automation. Two principle components of today's industrial automations are programmable controllers and robots. In order to aid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation. PIC Microcontroller is a heart of the device which handles all the sub devices connected across it. It has the flash type programmable, memory. It has some peripheral devices to play this project platform. It also provides sufficient power to inbuilt peripheral devices. It need not to give individually to all devices. The peripheral devices also active as low power operation mode. These are the advantages are appeared here. The rate of increase in the car theft in this part of world has reaching the alarming rate. In the rave of this development, engineers in the country have been performing researches aimed at providing a lasting solutions throughout of exploring the GSM Technology coupled with some digital control technique as possible remedy.

1. LITERATURE SURVEY

2.1 EXISTING SYSTEM

A. What is Internet of Things (IoT)

The Internet of Things is the connected network between devices (wearable, portable and house-held devices etc.),

Which was first proposed by Prof. Aston while performing the research related to Radio-frequency identification (RFID) in

1999. The service composition is fully supported by IoT with various applications. The communication among millions of

Devices (any type of internet connected) are possible through IoT. The Three Layer Architecture (most popular) is illustrated

In Fig. 2. The layers are: Perception, Network and Application Layer. Sensors, Actuators, Proximity tags (RFID, NFC etc.)

and other emended devices are connected to the IoT via Perception layer. Network layer establish the communications

Between Things and human. User interface/applications are 624 provided by Application layer. More details specifications and applications domain of IoT are nicely listed on [4 –7].

Fig. 2: Three-layer architecture of IoT.

Terms and Basic Definitions:

x Internet of Things (IoT): A network of Internet connected devices (electrical) able to interchange data between them using sensors and actuators.

x IoT device: Any type of electrical Internet connected device/s that can be monitored and/or controlled through Internet from anywhere(remote location).

x IoT ecosystem: All the components that enable consumers, governments and businesses to connect with their IoT devices, including remotes, networks, dashboards, gateways, storage, analytics and security.

- x Entity: Mainly includes the users of IoT system such as consumers, governments and businesses etc.
- x The Physical layer: The physical components (hardware) that makes an Internet of Things (IoT) device which includes sensors, actuators and networking gear.
- x The Network layer: The main duty of network layer is transmitting the data collected from physical layer to IoT devices.
- x The Application layer: All the protocols and interfaces used by the connected devices for identification and communication.
- x Dashboard: The dashboard is used for visualizing the information about the Internet of Things ecosystem. It also used for controlling the IoT ecosystem. It acts as a special type of remote control for IoT.
- x Analytics: Software systems that analyze the data generated by IoT connected devices. The analysis can be used for a different purposes, such as predictive maintenance.
- x Storage for IoT: The cloud storage/data bucket, where data from IoT devices are stored temporary or permanently.
- x The Networks: The Internet communication layer that enables the entity to communicate with their embedded devices, and enables devices to communicate with each other.

B. Vehicle Fuel System

The function of the vehicle fuel system (see Fig. 3) is to store and supply fuel to the engine. The engine intake system (details in [8–9]) is where the fuel is mixed with air, atomized, and vaporized. Then it can be compressed in the engine cylinder and ignited to produce energy or power.

Fig. 3: Typical Vehicle Fuel System(left) and a Fuel Pump(right) [10].

The fuel is stored in the fuel tank and the fuel pump is responsible for flowing the fuel from the tank. The fuel then travels through the fuel lines and is delivered to the fuel injectors. When the fuel is delivered, the final conditions for providing complete combustion are atomization and the spray pattern of the fuel. More details about vehicle fuel system is illustrated on [11–13]. Fuel generates the power and the power moves the car. The engine unable to generate any power if fuel pump refuses to draw the fuel.

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GPS based vehicle tracking and monitoring system- A solution for public transportation-

The author of the paper provides a solution for tracking and monitoring the public transportation vehicles using devices such as Raspberry Pi and GPS Antenna. Raspberry Pi processing board can be used to receiving values and gives the result.. In this paper, there is a use of GPS receiver module for receiving the latitude and longitude values of the present location of the vehicle continuously. A passenger of the vehicle will give different locations to the system between the source and destination locations. These values will be stored in the Raspberry Pi database and Raspberry Pi processor will compare the passenger specified values with the current vehicle location values and if the result is not the same then the passenger will be informed with warning message via display system that driver is driving in the wrong direction.

Real-time GPS vehicle tracking system

In this paper implementation and designing of a real-time GPS tracker system via Adriano was applied. This method was applicable for salesman tracking, private driver and for vehicle safety. The author of the paper also tried to solve the problem of owners who have expensive cars to observe and track the vehicle and find out vehicle movement and its past activities of vehicle. The system has GPS/GSM modules controlled by Adriano MEGA placed inside the vehicle. The vehicle position will be updated every time as the vehicle moves. Then User will send SMS on registered number and they will receives the coordinate location. At the same time the data will get stored on SD card continuously. The location will be accessible to users by system via website over the internet.

Android app based vehicle tracking using GPS and GSM

The author of this paper has explains an embedded system, used to know the location of the vehicle using technologies like GSM and GPS. System needs closely linked GPS and GSM module with a microcontroller. Initially, the GPS installed in the device will receive the vehicle location from satellite and store it in a microcontroller's buffer. In order to track location the registered mobile number has to send request, once authentication of number get completed, the location will be sent to mobile number in the form of SMS. Then GSM get deactivated and GPS get activated again. The SMS consist of latitude and longitude value of vehicle. This value received in the SMS can be viewed via android app and this coordinate will be plotted in the app automatically.

Survey paper on vehicle tracking system using GPS and android

This paper propose a GPS based vehicle tracking system to help organization for finding addresses of their vehicles and locate their positions on mobile devices. The author states system will give the exact location of vehicle along with distance between user and vehicle. The system will have single android mobile, GPS and GSM modems along with processor that is installed in vehicle. When vehicle get activated and starts moving, the location of the vehicle will be updated continuously to a server using GPRS service. Monitoring unit will access the database from server to check the vehicle location. The location information present on database will be plotted using Google maps on monitoring device. Monitoring unit can be a Web application or Android application or a through which user will get to know the actual position of the proposed vehicle.

Review of Accident Alert and Vehicle Tracking System

In this paper, the author has described the system that can track the vehicle and detect an accident. There will be automatic detection of traffic accidents using vibration sensors or a piezoelectric sensor. This sensor will first sense the occurrence of an accident and give its output to the microcontroller. As soon as vehicle meets accident the GPS module will detect the latitude and longitudinal position of a vehicle. Then the GSM module sends latitude and longitude position of the vehicle to the ambulance which is near to that location. This message sending operation will be automatically done and an alert message may send to the central emergency dispatch server. This system is familiar with vibration sensor, Raspberry Pi, GPS and GSM modules to detect traffic accidents.

2.2 PROPOSED SYSTEM

Set the NFC code for vehicle-based papers such as License, Registration Certificate, Insurance etc... Read the barcode using NFC code reader (NFC code scanner). If the NFC code number is matched with programmed number, then vehicle will start. Otherwise it won't start and send the notification message to the vehicle user can mobilize/immobilize their vehicle through GSM. By sending the message to the GSM in the vehicle, they can operate their vehicle. Type the SMS us

#1 -To on their vehicle for other use.

#2 - To off their vehicle in case of theft

It helps the vehicle user to avoid theft. It also helps the police to find the entire details of the vehicle user by storing the entire database about the vehicle and their user for the individual barcode. It allows selected members only to start the vehicle .

2. SYSTEM ARCHITECTURE



Figure 4.1: Block diagram of Proposed System

Near Field Communication

NFC or near field communication is a technology that uses high frequency wireless communication to transfer data

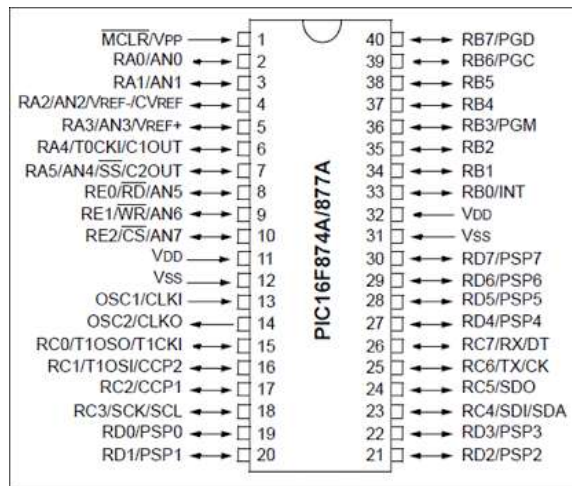


Figure 4.3 PIC 16F877A Pin Diagram

between devices over a short range (usually about 10 cm or so). This technology makes your life easier as well as more convenient by making it very simple to exchange data and conduct transactions. When you are comparing NFC or Bluetooth you cannot say one is better than the other as they are different technologies. However, NFC is quicker to setup, requires less power and provides more security when compared to Bluetooth because of its shorter range. Here are the five uses for NFC on your smartphones in India.



Figure 4.3 NFC Module

PIC – Microcontrollers

PIC is the family of modified Harvard architecture microcontrollers made by Micro strip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics division. The name PIC initially referred to "Peripheral Interface controller". PICs are popular with both industrial developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming (and re-programming with flash memory) capability.

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such line.



Figure 4.4 LCD Display

Alcohol sensor

An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10 to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers.



Figure 4.5 Alcohol Sensor

Bluetooth

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration.

The **HC-05** has two operating modes, one is the Data mode in which it can send and receive data from other Bluetooth devices and the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes by using the key pin as explained in the pin description. It is very easy to pair the HC-05 module with microcontrollers because it operates using the Serial Port Protocol (SPP). Simply power the module with +5V and connect the Rx pin of the module to the TX of MCU and TX pin of module to Rx of MCU



Fig 4.6 Bluetooth HC-05

Alarm Buzzer

A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. Initially this device was based on an electromechanical system which was identical to an electric bell without the metal gong (which makes the ringing noise).

Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example, a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification.



Figure 4.7 Relay

Power supply

Power supply unit (or PSU) converts mains AC to low-voltage regulated DC power for the internal components of a computer. Modern personal computers universally use switched-mode power supplies.

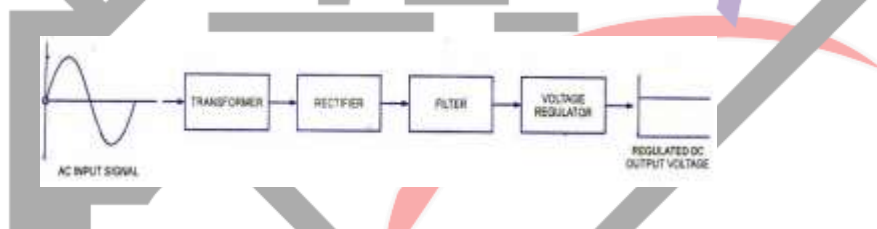


Figure 4.8 Power Supply

Panic button

A panic button is a set of buttons arranged in a block which usually bear digits and other symbols but not a complete set of method of alphabetical letters. The other devices such as calculators combination locks and telephones which require largely numeric input.



Figure 4.9 Panic Button

GSM

Global System for Mobile Communication is used as a media which is used to control and monitor the transformer load from anywhere by sending a message. It has its own deterministic character. Thereby, here GSM is used to monitor and control the DC motor, Vibrating sensor, Alcohol sensor and Mobile call detector by sending a message through GSM modem.

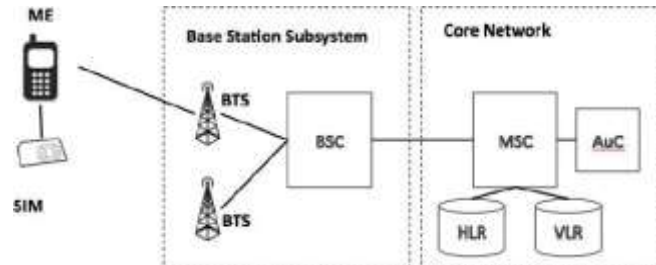


Figure 4.10 GSM Communication

Develop a uniquely decoded 'E' strobe pulse, active high. To accompany each module transaction. Address or control lines can be assigned to drive the RS and R/W inputs. Utilize the Hosts extended timing mode. If available, when transacting with the module. Use instructions, which prolong the Read and Write or other appropriate data strobes, so as to realize the interface timing requirements. If a parallel port is used to drive the RS, R/W and 'E' control lines, setting the 'E' bit simultaneously with RS and R/W would violate the module's set up time. A separate instruction should be used to achieve proper interfacing of requirements.

Embedded C is a set of language extension for the C programming language by the C standards committee to address commonality issues that exist between C extensions for different embedded system

One of the key features of GSM is the Subscriber Identity Module, commonly known as SIM card. The SIM is a detachable smart card containing the user's subscription information and phone book. This allows the user to retain his or her information after switching handsets.

Simply by changing the SIM. Some operators will block this by allowing the phone to use only on a single SIM issued by them; this practice is known as SIM locking and is illegal in some countries

OPERATION

In our project the main operation was due to safety and security purposes. So we can provide various elements that can control and perform the operation. It consists of three main conditions. For the security process we can provide the two different types of parameter and sensor; both were used to avoid accident and theft control. In this theft control we are using unlocking the door of cars using secured near field communication tag reading with the help of Near field communication reader and another one was third person authorization with help of Bluetooth voice and text receiver and due to safety precaution we following the parameter like sensors that one was alcohol sensor that was sense and detect the presence of alcohol consumed by drive person if the sensor was sense the person was consume then it will slowly stop the vehicle or stop and another one was seatbelt sensor that was able to detect the person was properly wearing of seatbelt or in two wheelers the provide the conformation for wearing of helmet if the driver was not wear a helmet or seatbelt then the vehicle will not provide to drive the car or two wheelers. In our total setup one main components that can control and take care of all the process was PIC Microcontroller (PIC 16F877A) and that was acts as a heart of our project. and additional we are adding another one safety parameter that was ADX (Automatic drive movement System) this parameter is used for control of vehicle movement and prevention of accident control if any shaking of vehicle this ADX is used to indicate the vehicle is at danger condition and alert the person by means of buzzer or display system. In the future we can further modification and sending the Emergency on ambulance service

3.ADVANTAGES AND DISADVANTAGES

Advantages

This system is easier to operate manually.
More flexibility

Disadvantage

It is costlier

CONCLUSIONS

Due to the probability of high technology (PIC Microcontroller) used this "NFC BASED SAFETY AND SECURE VEHICLE MOVEMENT SYSTEM" is fully software controlled with less hardware circuit. Authentication is also provided so that only the authorized users can access the vehicle. The use of GSM makes it almost impossible for the thief to ignite the vehicle. The model can be implemented in bikes with adjustments made to spark plug, battery and key. In this system, the authors used NFC technology. By doing this we eliminate the human interaction and increase the security. The NFC contains the information such as License, Insurance and RC details. A wide future scope guarantees that an enhancement to this system finds a great importance in real time system. By placing GPS in this kit in the future helps to find the exact location of the vehicle and can catch the thief during the vehicle theft time.

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