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INTELLIGENT PARKING SLOT PREDICTION USING GSM MESSENGER

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ABSTRACT

The proliferation of traffic problems is the biggest issue in highly populated countries such as India. The usage of numbers of vehicles are more in such area. In mostly in malls, theatres and bazaars area people stuck in traffic only due to the improper parking system. To provide more parking area in less space is possible only through multi-storey parking. The main issue in multi-storey parking is knowing availability space and parking a car is difficult and time consuming too. The proposed aims to solve it by using pic microcontroller and GSM technology. The controller receives the input from sensors after the car is locked in a slot. User used to enter his or her mobile number. The OTP for a particular is generated and send. Before withdrawal of car otp has to be entered. After verification car is released. If wrong buzzer alert is give. The requirements are.... (PIC16F877A, keypad, LCD, GSM module, relay circuit, driver circuit L2392D). This uses to reduce the parking demands upcoming future days.

I. Introduction

Stack car parking is basically stacking more than one car in a single parking spot. As you can see there is usually a lift to get the first car up and off the ground and then raised. Once up in the air the second car pulls under neither it.In smart parking system, a vehicle parking that helps drivers find a vacant spot. Using sensors in each parking space that detect the presence or absence of a vehicle, signs direct incoming drivers to available locations.Smart Parking uses sensing devices such as cameras, vehicle counting equipment, sensors installed in pavements, etc. to determine occupancy of the parking lot. ... The system increases the availability of parking with the use of sensors. It prevents the drivers from spending too much time searching for a parking space.

This Smart Parking Control System Project Designed with Microcontroller attempts to cut the time to park the vehicles in the lot and help the motorists to recall the exact parked space. Motorists often spend a significant amount of time to park their vehicles in the parking lots during peak hours. They also may not remember the parked space of their vehicle precisely, while picking up the vehicle.To solve this problem, an automated vehicle parking system is designed which serves the motorist to find a space for his vehicle within less time. The system displays about the details of freed-up parking spaces. The waiting time to park the vehicle can be reduced by providing this vacant space information to the motorists before he/she enters the system. The system recognizes the vacant space and displays automatically, this display system can be provided at the entrance of the main gate, so that while entering in to the parking space, the motorist can find his parking place without anybody's direction.

II. Important Components

1. PIC16F877A Microcontroller

The term PIC stands for Peripheral Interface Controller.The PIC16F877A is a CMOS FLASH based 8-bit microcontroller with 40 pins. The features are 256 bytes of EEPROM data memory, self-programming, an ICD, 2 Comparators, 8 channels of 8-bit Analog to Digital (A/D) Converters, 2 Capture/Compare/PWM Functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI) or 2-wire Inter Integrated Circuit (I^2C) bus and a Universal Asynchronous Receiver(USART). The pin diagram is shown in this Fig.1.

The PIC architecture is characterized by the following features:

- Separate code and data spaces (Harvard architecture) for devices other than PIC32, which has a Von Neumann architecture.
- A small number of fixed length instructions.
- Most instructions are single cycle execution (2 clock cycles), with one delay cycle on branches and skips.
- One accumulator (W0), the use of which (as source operand) is implied (i.e. is not encoded in the opcode).
- All RAM locations function as registers as both source and/or destination of math and other functions.
- A hardware stack for storing return addresses.

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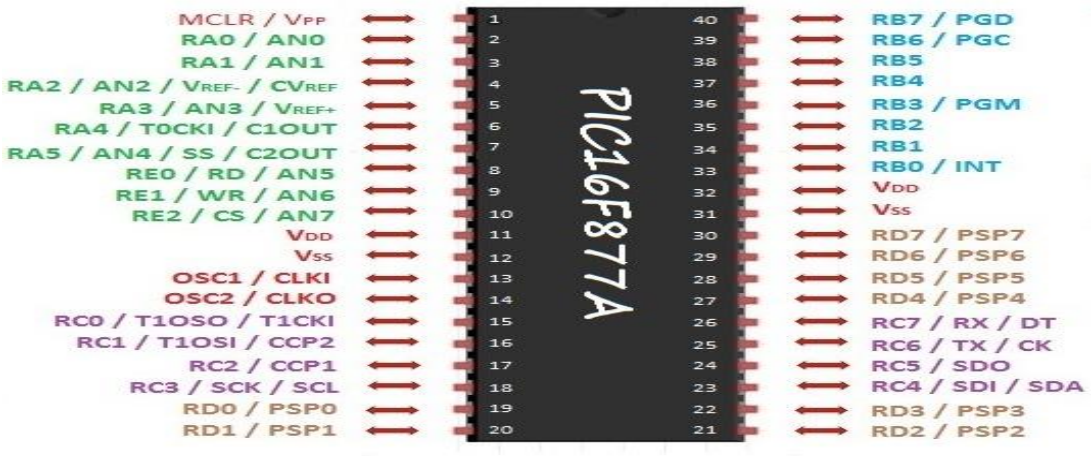

Fig.1. Pin Diagram of PIC16F877A

2. Monitoring System

The monitoring system in this project is provided with the GSM module, the commands and functions of the system is displayed by LCD display.

2.1. GSM Module

GSM, which stands for Global System for Mobile communications, reigns as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. The GSM900D is shown in this Fig.2.

GSM (Global system for Mobile Communication) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls data transfer speeds of up to 9.6 kbps, together with the transmission of SMS (Short Message Service). In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards.

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.

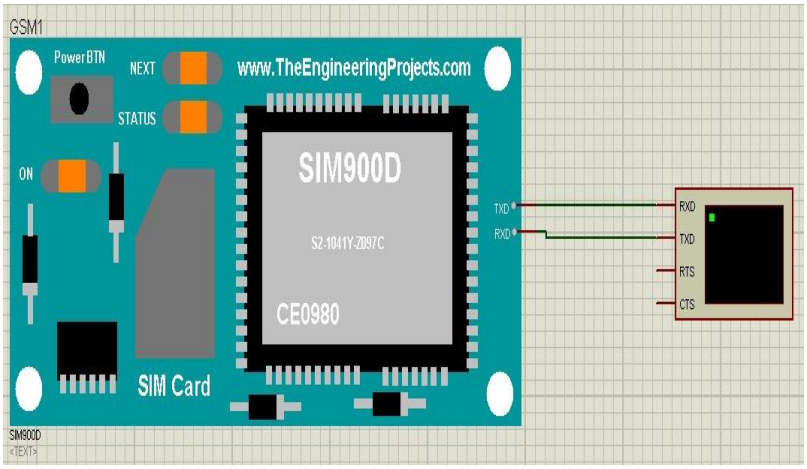

Fig.2. GSM900D Module

2.2. LCD Display

A liquid crystal display (LCD) is an electronically-modulated optical device shaped into a thin, flat panel made up of any number of colour or monochrome pixels filled with liquid crystals and arrayed in front of a light source (backlight) or reflector. Used for the applications such as, display of numeric and alphanumeric characters in dot matrix and segmental displays. It is often utilized in battery-powered electronic devices because it uses very small amounts of electric power. LCD has material, which continues the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered from similar to a crystal. The 2×16 LCD is shown in this Fig.3.

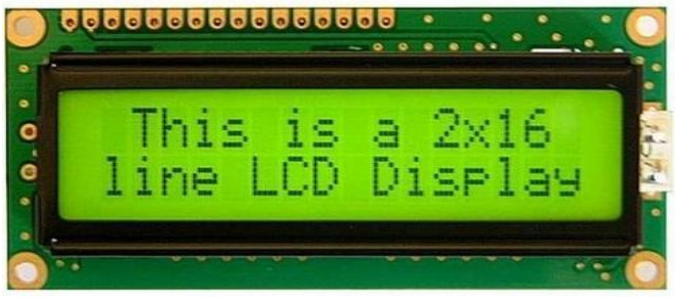

Fig.3. 2×16 LCD Display

LCD consists of two glass panels, with the liquid crystal materials sandwiched in between them. The inner surface of the glass plates is coated with transparent electrodes which define in between the electrodes and the crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. When a potential is

applied across the cell, charge carriers flowing through the liquid will disrupt the molecular alignment and produce turbulence.The description of pins is shown in Table 1.

Table 1. LCD Display pin out

PIN NAME	DESCRIPTION
Vss	Ground terminal of Module
Vdd	Supply terminal of Module,+5v
V0	Power supply for liquid crystal drive
RS	Register select RS=0…… Instruction register RS=1…… Data register
R/W	Read/Write R/W=1… Read R/W=0… Write
EN	Enable
DB0-DB7	Bi-directional Data Bus, data transfer through DB0-DB7 and interface data length is 8-bits
LAMP-(L-)	LED or EL lamp power supply terminals
LAMP+(L+) (E2)	Enable

3. Keypad

Typically, we use single I/O pin of a microcontroller unit to read the digital signal, like a switch input. In few applications where 9, 12, 16 keys are needed for input purposes, if we add each key in a microcontroller port, we will end up using 16 I/O ports. This 16 I/O ports are not only for reading I/O signals, but they can be used as peripheral connections too. As those pins are connected with the switches/keys, we can't use them but only as I/O ports. This is makes no sense at all. The Pin output is reduced using a hex keypad or matrix keypad; we can reduce pin counts**,** which associate 4x4 matrix keys. It will use 8 pins out of which 4 connected in rows and 4 connected in columns, therefore saving 8 pins of the microcontroller's. The keypad is shown in this Fig.4.

Fig.4. Keypad display

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III. Working Methodology

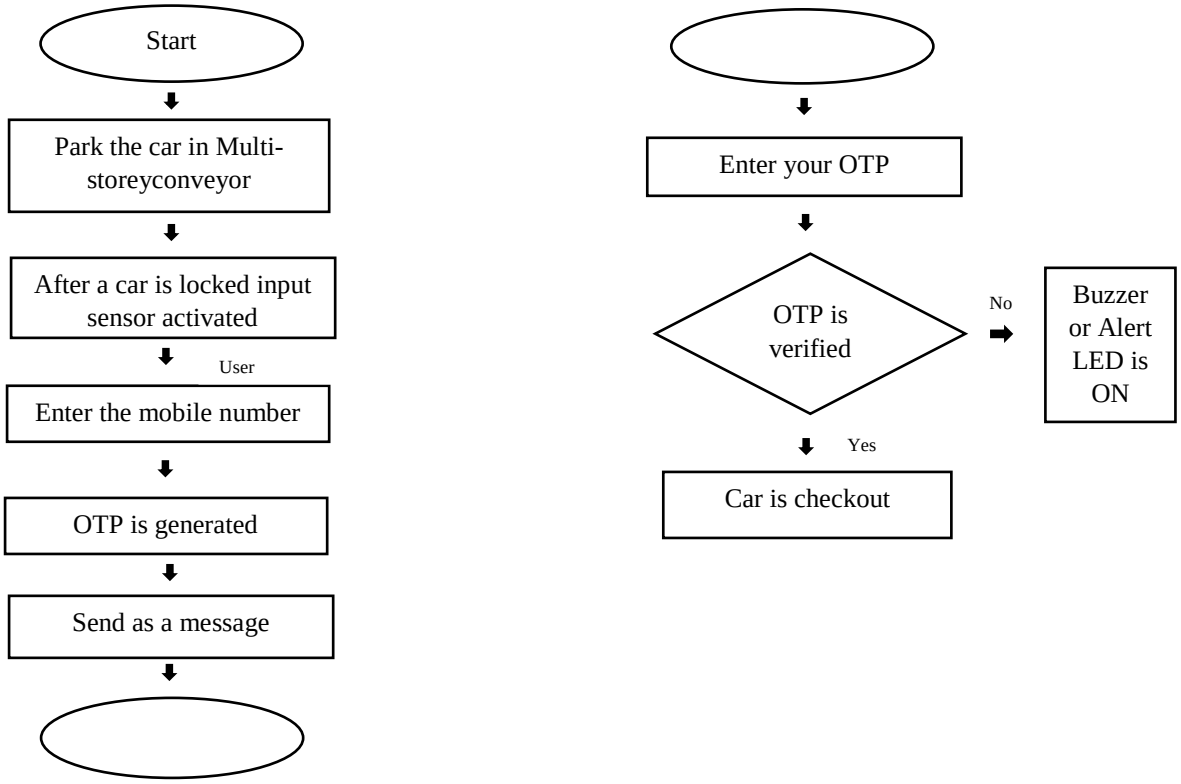
In this parking system slot availability is shown based on above flow chart representation, Transmitter part once the car has been entered in the multi-storey conveyor it will be sensed by the sensor and gets activated. Then the user will request for OTP by entering their Mobile number using keypad and OTP is generated for allocated slot. The OTP will be send to the mobile. Receiver part, for the particular allocated slot the generated OTP has to be re-entered for releasing the car. LED blinks as green colour and car is checkout message will send to the registered mobile number; if the OTP does not match the buzzer alerts and LED blinks as red colour.

Hence the slots will be rearranged after the car checkout. The availability will be changed frequently depending upon slots avail is displayed in the LCD placed at the receiving part. The security will be enhanced by keeping the buzzer and indication of LED.

Finally, it is not a human dependent, cost free, highly efficient and easily handled by everyone.

FLOW CHART

Transmitter **Receiver**



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IV. Simulation Analysis in MPLAB IDE Software

The simulation work of the project is done in MPLAB IDE software. MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC microcontrollers, and is developed by Microchip Technology. The OTP generation software simulation is shown here in Fig.5.

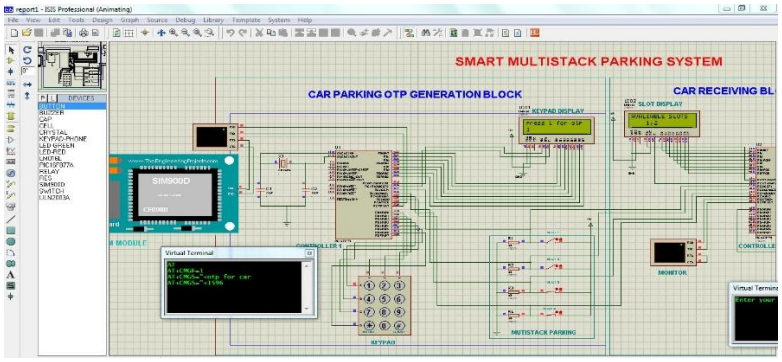

Fig.5. OTP Generation at Transmitting Block

MPLAB X is the latest edition of MPLAB, and is developed on the Net Beans platform. MPLAB and MPLAB X support project management, code editing, debugging and programming of Microchip 8-bit, 16-bi and 32-bit PIC microcontrollers. MPLAB is designed to work with MPLAB-certified devices such as the MPLAB ICD 3 and MPLAB REAL ICE, for programming and debugging PIC microcontrollers using a personal computer. PICK it programmers are also supported by MPLAB. The car checkout from parking area at receiving side in Fig.6.

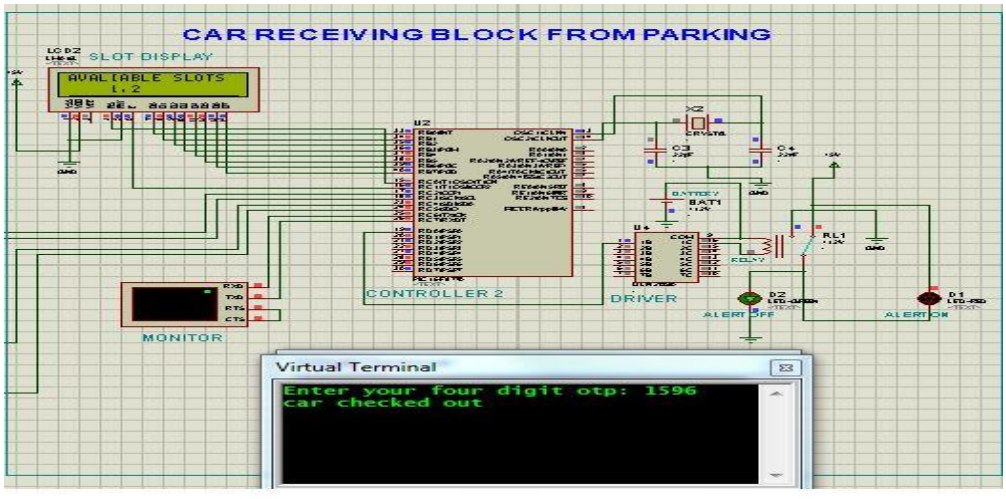

Fig.6. Car Check Out Receiving Block

V. Conclusion and Future Work

Smart Parking involves the use of low cost sensors, real-time data and applications that allow users to monitor available and unavailable parking spots. The goal is to automate and decrease time spent manually searching for the optimal parking floor, spot and even lot. In Future expansion, we can be implementing bydatabase creationand biometric recognition or voice command can be used instead of OTP.

VI. Acknowledgement

We are really grateful because we managed to complete our Intelligent Parking Slot Prediction Using GSM Messenger project within the time given by our professor Dr.P. Ramesh Kumar. This project cannot be completed without the effort and co-operation from our group members. We also sincerely thank our professor for the guidance and encouragement in finishing the project and spend sometimes with us to fill in the questionnaires.

VII. Literature Survey

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