

# EMI DUE AND ALCOHOL DETECTION BASED AUTOMATIC VEHICLE LOCKING SYSTEM

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**ABSTRACT-** The system is designed to lock the vehicle automatically when it exceeds the due date till the borrower settles EMI using GSM technology. People who purchase their vehicles in loan are lethargic in paying their EMI. Conflict between the creditors and lenders is resolved by tracking the vehicle when it exceeds the due date and then locking the vehicle system till the borrower settles the monthly EMI. Here, an warning message is sent by EMI department through GSM module to the lender about the due date. The microcontroller receives this message and the voice IC reminds the user. In case, if he fails to pay the EMI, the module receives a command from the EMI department to lock vehicle engine. This system is also designed to avoid "drunk and drive" accidents using an alcohol detector.

**Keywords:** EMI, ALCOHOL DETECTION, GSM, VOICE IC, CREDITORS, TRACKING.

## 1. INTRODUCTION

Creditors are faced with an obligation to prevent or minimize payment losses in loan relationship. Our system helps creditors to reduce the amount of damage and exposure to payment losses caused by a defaulted loan relationship. Here we mainly focus on car loan creditors, to minimize this risk; tracking and locking system are used.

Also, the Accident rates due to drunken drive are increasing day by day. The risk of the driver under the influence of alcohol being killed is eleven times that of a person with no alcohol.

### 1.1 BLOCK DIAGRAM:

The PIC consists of 40 pin. The operating voltage is (2V to 5V) and its Operating frequency is 20MHz. Global system for mobile communication (GSM) is used with operating frequency of 900MHz. The GSM is connected to PIC microcontroller through Universal asynchronous receiver transmitter (UART). Voice IC (APR9600) is a single chip IC and playback device. The DC motor (car engine) is connected with PIC through a relay circuit. Along with which Alcohol sensor (MQ2) is used for detection of alcohol consumption of driver.

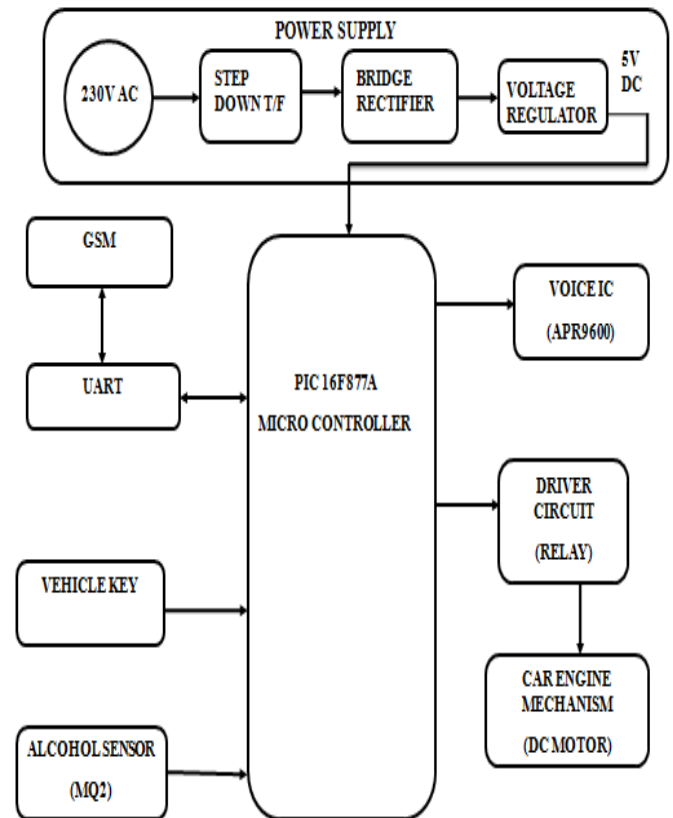


Fig-1: Block Diagram

The software requirements are Embedded C, MP Lab and Proteus 7.8.

### 1.2 CIRCUIT DIAGRAM:

The Circuit diagram consists of PIC, GSM, VOICE IC, UART, DC MOTOR, RELAY CIRCUIT, ALCOHOL SENSOR, LCD, VEHICLE KEY. The PIC used is PIC16F877A. It consists of 40 pins with 4 ports (Port A, Port B, Port C, Port D). The port A (RA0) is connected to alcohol detector, port B (RB0 and RB3 to RB7), is connected to relay, DC motor and voice IC respectively. Port C (RC6, RC7) is connected to GSM modem. Port D (RD0 to RD7) is connected to LCD.

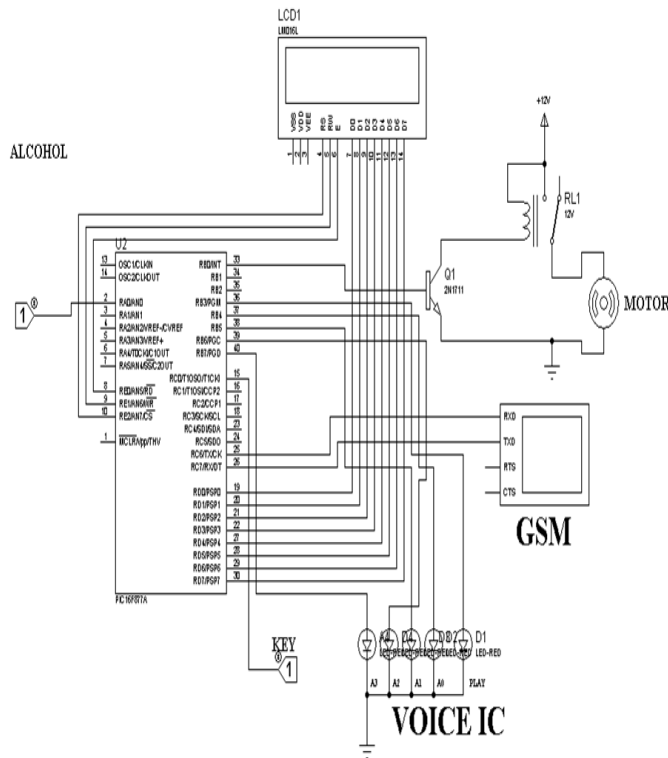


Fig-2: Circuit Diagram

## 2. METHODOLOGY:

If a person failed to pay his EMI, an intimation message is sent to the particular person. If the EMI is not paid on due date, the vehicle is seized by the bank through his agent. It is a tedious process to the creditor as well as agent, as it consumes time and money. Also the credit score of the lender is reduced. This disadvantage is overcome by our system.

Before the last day of the EMI payment, this system automatically sends the warning message to the person by GSM module. When the intimation is received, the microcontroller will provide the voice message through voice IC. If the person fails to pay the EMI even after the last day, the module receives a message from the EMI department to lock vehicle engine. Along with this an alcohol detector is featured to avoid drunk and drive, which is a major cause for increasing accident rates. The alcohol detector detects the alcohol content then vehicle controlling done by deactivating ignition via relay.

### 2.1 OPERATION DESCRIPTION

Before the due date, this system sends a warning message to the person by GSM. When the intimation is received, the microcontroller intimates the user through voice IC. If the person fails to pay the EMI even after the due date, the module receives a message from the EMI department to lock vehicle engine. Along with which if a person has consumed alcohol, alcohol detector detects it, the PIC microcontroller is

programmed to lock vehicle engine when alcohol is detected. The vehicle engine (DC motor) is locked by operating the relay by connecting transistor, relay, DC motor as shown in circuit diagram.

## 3. HARDWARE DESCRIPTION

The hardware consists of PIC16F877A, GSM900, VOICE IC, UART, ALCOHOL SENSOR, RELAY, DC MOTOR.

### 3.1. PIC16F877A

The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I<sup>2</sup>C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

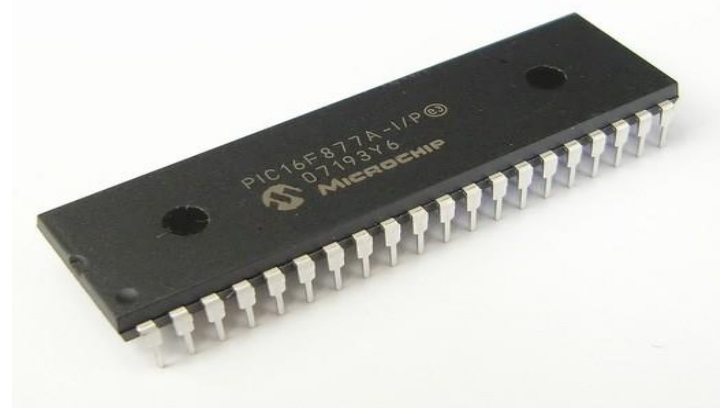


Fig-3: PIC16F877A

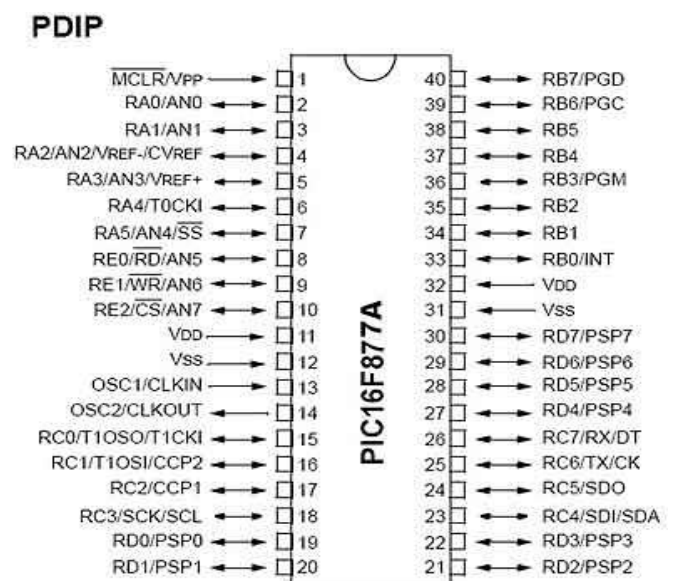


Fig-3: Pin Diagram of PIC16F877A

### 3.2. GSM:

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM differs from first generation wireless systems in that it uses digital technology and Time Division Multiple Access (TDMA) transmission methods. It operates at 900 MHz



Fig-5: GSM900

### 3.3. UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER (UART):



Fig-6: UART

UNIVERSAL ASYNCHRONOUS RECEIVER TRANSMITTER **represents** the hardware - integrated circuit, used for the serial communication through the serial port. UART is a standalone integrated circuit (IC) but also as a part of microcontrollers. UART system provides robust, moderate-speed, full-duplex communication with only three signals: TX (transmitted serial data), Rx (received serial data), and ground.

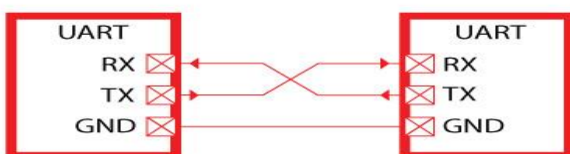


Fig-7: UART CONFIGURATION

### 3.4. VOICE IC (APR9600)

An APR9600 is a single chip voice recorder and playback device from A plus integrated circuits. It has a 28 pin DIP package, operates at 5V. This chip used flash non volatile memory to store up to 256 voltage levels. I.e. for 32 to 60 seconds.



Fig-8: VOICE IC

### 3.5. DRIVER CIRCUIT (RELAY)

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The Darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers.

The ULN2003 has a 2.7kW series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices.



Fig-9: 5 PIN RELAY

### 3.6. ALCOHOL SENSOR (MQ2)

Alcohol Sensor for use in Breathalyzer's or in an alarm unit, to detect the presence of alcohol vapors. This sensor unit offers very high sensitivity, combined with a fast response time. The unit will work with a simple drive circuit and offers excellent stability with long life. When all the acetic acid is cleared out of the FUEL CELL, the instrument is ready to analyze another sample. It detects minimum 100 ppm and the maximum is 10000 ppm.



Fig-10: ALCOHOL SENSOR

### 3.7. DC MOTOR



Fig-11: DC MOTOR

The direct current (DC) motor is one of the first machines devised to convert electrical power into mechanical power. 60RPM 12V DC motor is used. Permanent magnet (PM) direct current converts electrical energy into mechanical energy through the interaction of two magnetic fields. One field is produced by a permanent magnet assembly; the other field is produced by an electrical current flowing in the motor windings. These two fields result in a torque which tends to rotate the rotor.

### 3.8. LIQUID CRYSTAL DISPLAY



Fig-12: LCD

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. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and There are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

### 4. SIMULATION OUTPUT AND HARDWARE MODULE

PROTEUS version of 7.8 is used for simulation.

4.1. When the program starts to run, the PIC begins to operate. LCD displays 'EMI DUE BASED VEHICLE LOCKING SYSTEM' and when the key is ON the DC motor rotates.

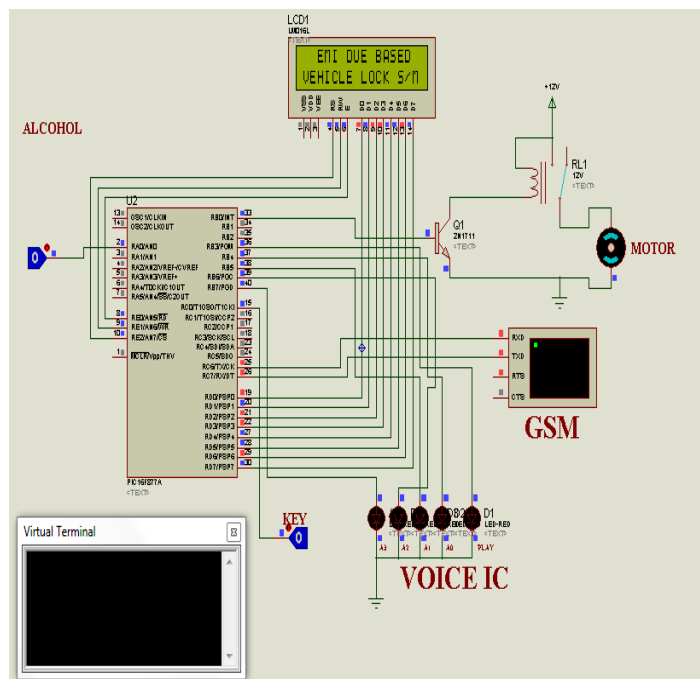


Fig-13: Simulation showing 'EMI DUE BASED VEHICLE LOCKING SYSTEM' and DC motor rotation.

4.2. Before the due date, intimation to remind the user is automatically done by GSM .Thus on receiving command LCD displays 'pay the due' and voice message sent through voice IC.

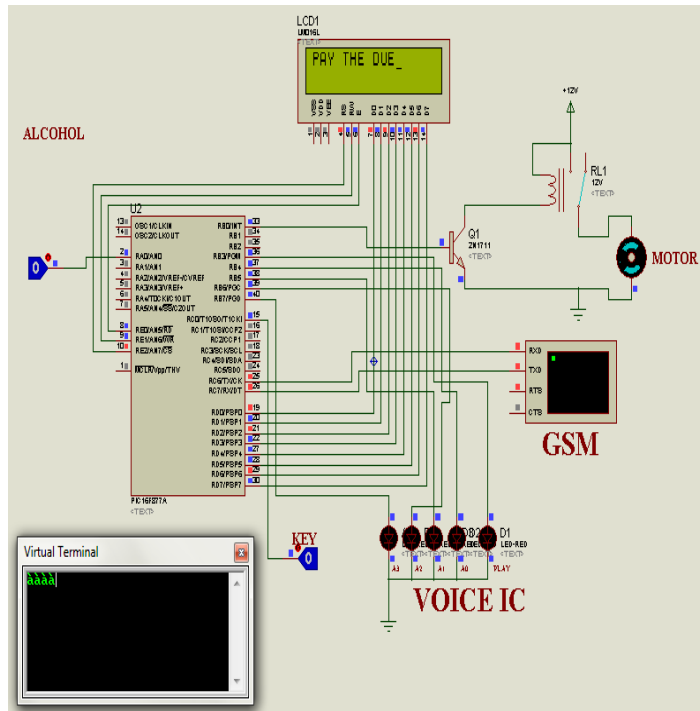


Fig-14: Simulation reminding the due dates to the lender

4.3. When person failed to pay EMI, the DC motor stops displaying 'DUE NOT PAID VEHICLE STOPPED'.

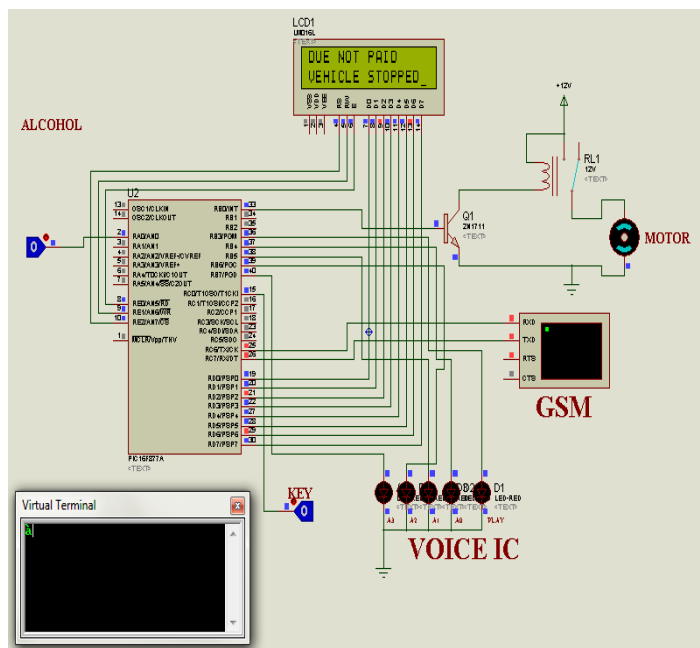


Fig-15: Simulation showing DC motor stopped status as the due not paid

4.4. When person paid EMI, the DC motor starts displaying 'DUE PAID'

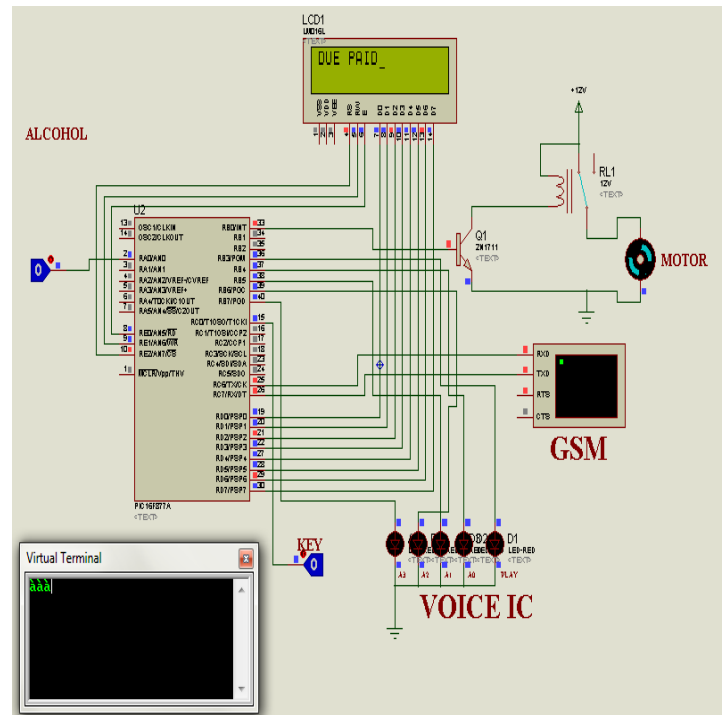


Fig-16: Simulation showing DC motor rotates as the due paid

4.5. When person has consumed alcohol, the DC motor stops displaying 'ALCOHOL DETECTED VEHICLE STOPPED'.

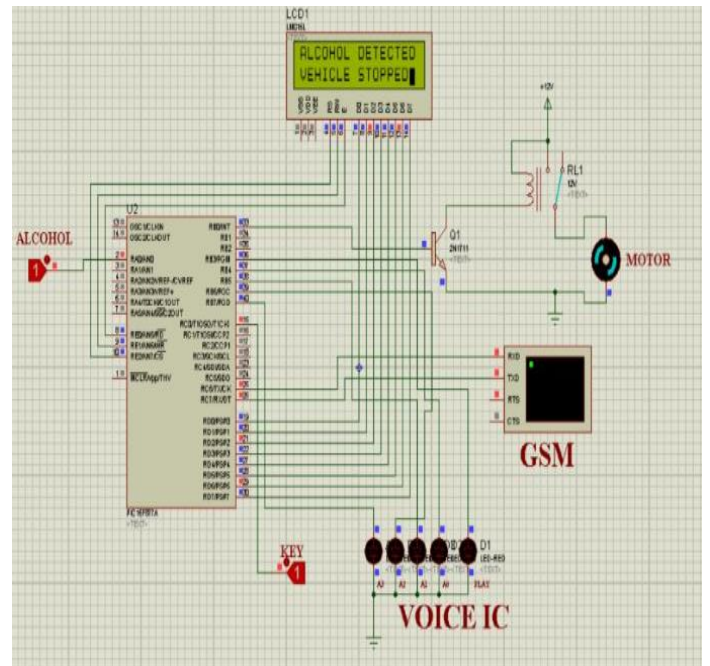


Fig-17: Simulation showing DC motor stopped status as the person has consumed alcohol



**Fig-18:** Figure showing hardware result

## 6. CONCLUSIONS

In this paper, proposed a model for locking vehicle using GSM. It reminds the user automatically about due date and when due date is exceeded then the vehicle is locked till the borrower settle the monthly EMI. GSM module is used to intimate information between a sender and the receiver. This is mainly useful in banking sector. In future work it is going to be a combination circuit. It consist of combination of these three specifications, first it to avoids drunken-drive and second is theft control and third is for defaulters.

## 7. REFERENCES

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