E – Auto

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***Abstract* – A smart electronic Auto, which can help the daily commuters based on the information of the parameters obtained from the circuitry attached to the auto meter, has been designed and developed. The circuitry continuously monitor the entry and leaving of the passengers. According to which the system automatically calculates fare and displays on the meter. It also makes sure of the safety of the commuters by providing a safety switch and buzzer. Upon any malfunction done to the meter or passenger's safety, the system alerts location of the taxi to the control office. For which the signal consisting of the latitude and altitude of the vehicle, is being transmitted from the microcontroller through the RF module. The received signal from the system are displayed on the LCD module. The program was developed for automatic calculations, reception and transmission of the data using Embedded C language. This system has shown good results and proved useful to the society.**

Keywords: Smart system, E-auto meter, Global Positioning System (GPS), microcontroller, RF module, LCD module.

I. INTRODUCTION

Many new researchers have focused on improving quality of human life in terms of safety by designing and fabricating medium which is effective and efficient. This system will also have a positive impact on the annual cost and have least risk involved in operation. The aim of this project is to design a safe and secure system for the public which is capable of recognizing and managing their problems directly without much involvement from the commuter [1]. This project has been progressed by analyzing the black box system set up for automobiles [2].

The design ideas and specification of this system consists of the following features.

- *Affordability*: The system has to be cost effective.
- *USB/Wireless compatibility:* The system should connect to communicate wirelessly or through USB.
- *Reliability*: The system has to be reliable.
- *User friendly*: Both the systems hardware and software has to be user friendly.
- *Upgradeable*: The systems software and hardware should be easily upgradeable and compatible with any changes done to the circuit and latest operating systems respectively.

II. OVERVIEW OF THE SYSTEM

The schematic of transmitter section (E-Auto) and receiver section (Control Office) with their description is given below.

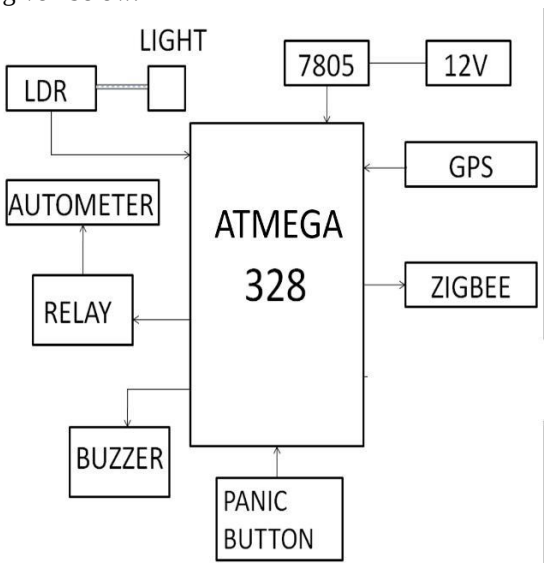

Figure 1: Block diagram of Electronic – Auto.

The block diagram of E-Auto is shown in figure 1. It mainly consists of a microcontroller, LDR system, GPS module and a Zigbee module. When the passenger enters the vehicle, the Laser light is cut and the auto meter is automatically turned on. If any maladjustments to the meter is done or if the passenger feels uncomfortable, the signal from GPS module is transmitted to the receiver section. The working of the system is based on the program fed to the IC Atmega328.

The block diagram of the Control office is shown in the figure 2. It consists of a microcontroller, RF module and LCD module. Upon reception of the data from the GPS by RF module, it is temporarily stored in the microcontroller and further displayed on the LCD.

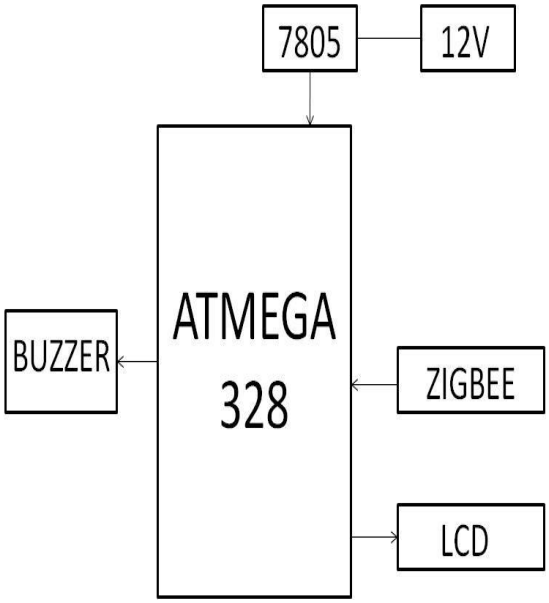

Figure 2: Block diagram of Control office.

III. WORKING

The detailed working of the Electronic-Auto is described using circuits of transmitter and receiver sections.

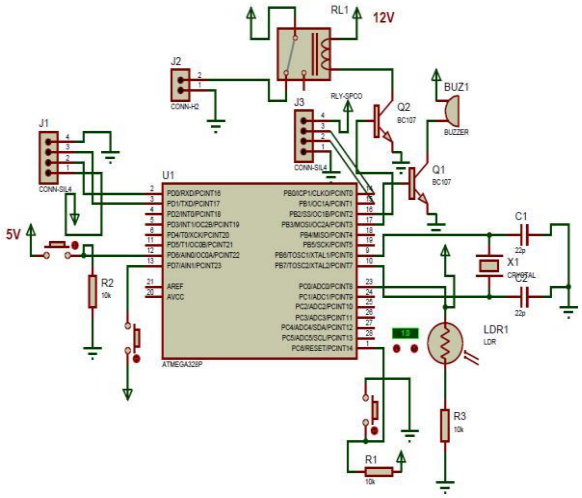

Figure 3: Circuit diagram of transmitter section.

The circuit diagram of the transmitter section is shown in figure 3. The receiver section consists of microcontroller IC Atmega328, LDR system with laser light, emergency switch, malfunction tap wire, buzzer, relay, auto meter, reset switch, GPS module and RF module.

When commuter enters the vehicle, a variation occurs to the resistance of LDR which causes corresponding variation in the voltage at the pin 23. The output voltage at the pin is,

$$V_{out} = V_{in} \cdot \frac{R_1}{R_1 + R_2}$$

where, R1 is the LDR resistance, R2 = 10K and Vin = 5V.

Thus, IC sends a digital 1 to the normally open relay. It turns the normally open phase of the relay to normally closed, connecting the meter to 12V power supply [3]. If the passenger feels unsafe in the cabin, he/she can press the emergency switch connected to the pin 12. Upon pressing the switch, the microcontroller is alerted, which then collects the GPS location (latitude and altitude) of the vehicle from the GPS module [4]. Microcontroller also sends a digital 1 to the pin 17 which in turn causes the buzzer to beep. Also if any malfunction is done to the meter, the tampering switch breaks and gives an output zero voltage at pin 13. Thus microcontroller collects and stores the data temporarily. The stored data is then transmitted to the control office via RF module. RF is a transceiver module capable of transmitting and receiving data.

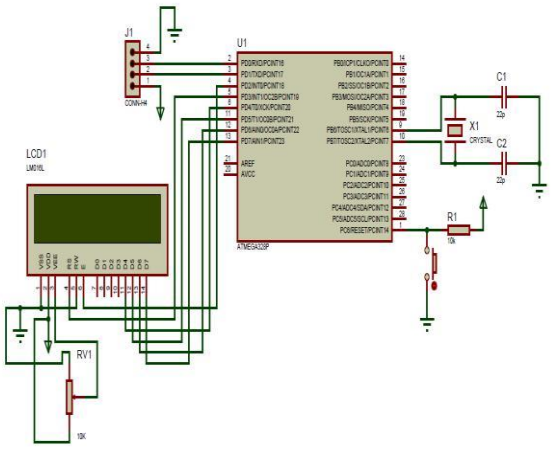

Figure 4: Circuit diagram of receiver section.

The circuit diagram of receiver section is shown in figure 4. The receiver section consists of a microcontroller IC Atmega328, reset switch, RF module and LCD module. The data is received by the RF module. The microcontroller stores the data temporarily and displayed on the 16X2 LCD display module [5].

The reset switch at both section is provided to begin program from start.

IV. METHODOLOGY ADOPTED

The Arduino Integrated Development Environment

(IDE) is utilized for programming the Arduino board. Arduino programs are written in Embedded

C language. The setup () function is made use of at the start of the program to initialize settings like the pinmode of the digital pins, serial baud rate, LCD setup etc. The loop() function runs forever and it has the functions to monitor the various functions of the system like, GPS tracking, automatic ON and OFF control, etc.

The wireless frame transfer is made use to communicate the readings between the two sections. The program is split up into threads for uniform performance of the microcontroller.

The below figure defines the flowchart of the Electronic – Auto. According to threads defined, the thread 1 turns the buzzer ON upon the press of the emergency switch. And thread 2 keep track of the condition of the meter. Both the threads performs similar function of transmitting the GPS co-ordinates to the RF module.

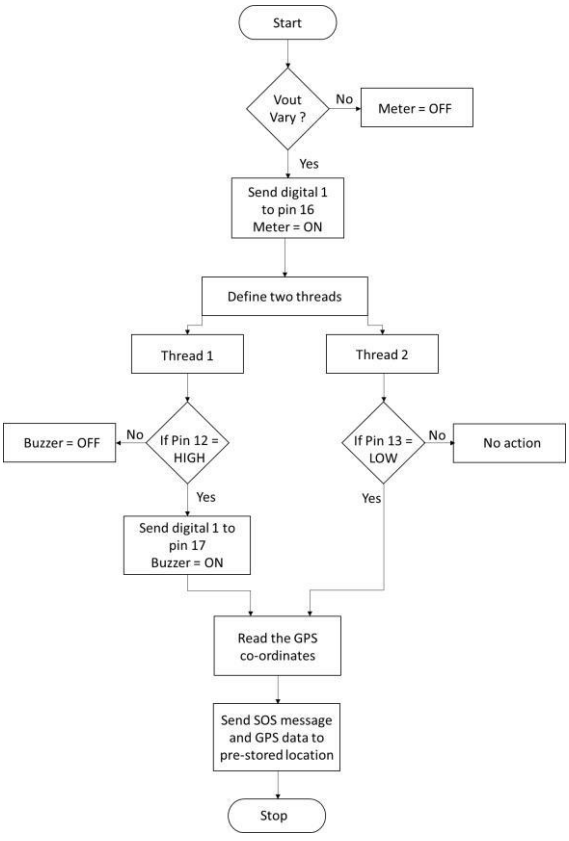

Figure 5: Flowchart of the transmitter section.

The below figure defines the flowchart of the Control office. According to the flowchart, after receiving the data from RF module the LCD is turned ON. Or else it remains in OFF condition. The being displayed on the LCD module

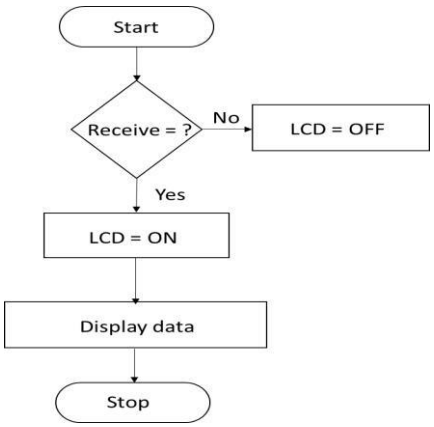

Figure 6: Flowchart of the receiver section

V. CONCLUSION

A prototype of the Electronic-Auto was designed and implemented successfully. The designed system comprises of three switches and modules, which were placed in automobile. Each of the switches and modules were tested and found to give desired output. These outputs were communicated to control office. The RF module and the microcontroller communicate with each other and regulate the outputs successfully. The datas retrieved from the GPS were displayed on the LCD.

The designed system incorporating an emergency help module which automatically alerts the buzzer and office along with GPS co-ordinates were successful and proves useful to the public.

VI. FUTURE SCOPE

The system can be improved by improving the algorithm and also encrypting the data being delivered. The designed system is implemented in a modeled vehicle; the same can be interfaced to a real-time vehicle to gather real-time data. The system can be advanced, by stopping the engine of the vehicle after transmission of the GPS data, upon any alert.

VII. REFERENCES

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