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Design of Smart Vehicle Using IOT

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***Abstract*-Today automobile industry has influenced people to a great extent. Nowadays there's been an increase of accidents because of heavy traffic. Every year around 1.2 million people die mainly because of human errors due to drugs, alcohol and fatigue. These errors are avoided in smart vehicle. In smart vehicle, as the name suggests, the vehicle is capable of motion without any assistance.**

This paper mainly aims at providing a self-efficient smart vehicle that reaches its destination set by the user without any assistance and stops when obstacle is detected in between. The added advantage is that it is connected to the Internet and all the information are sent through messages. All these messages are uploaded in GMAIL server. The added features such as fuel detection, traffic light enhance the market aspects of the module. In this paper we have made use of ARM7 Microcontroller as core of the system.

Keywords: ARM7,GSM ,Smart Vehicle

I.INTRODUCTION

A Smart vehicle is designed to travel between destinations without a human operator. To qualify as fully autonomous, a vehicle must be able to navigate without human intervention to a predetermined destination over roads that have not been adapted for its use.

Smart vehicle has the potential to change consumer habits and choices. The connected vehicle has been the most visible and familiar example of IoT technology. But as vehicles have become increasingly software-driven the real IoT developments in the auto industry are behind the scenes.

Auto makers and Software providers both lay claim to driver's seat. Our smart vehicles have been connected for years. They seamlessly link to our smart phones, register real time traffic alerts and offer emergency roadside at the touch of a button. Indeed, automakers began linking vehicles to information streams back in the early days of the Internet. When it comes to connecting drivers and technology, the auto industry has a longer and richer track record than any other sector.

II. EXISTING SYSTEM

The existing model is installed with computers, cameras, and sensors. It requires continuous assistance throughout the path. Here two vehicles travel in line. The first vehicle uses maps and GPS to drive. The second vehicle uses its cameras and navigation system to follow the first. It visually tracks the lead robot, plans a trajectory in real time, and generates controls for steering and accelerating or braking. If any vehicle gets in between the two robots, the second robot guides itself using GPS instructions received from the leading robot. However they failed as they were guided throughout the path by another vehicle and required human driver most of the time.

III.PROPOSED SYSTEM

This paper aims to incorporate four main purposes. They are: reaching the destination, obstacle detection, traffic lights and fuel level indication. Thus, by incorporating all of these features on to a single system, we aim to create a self-efficient smart vehicle.

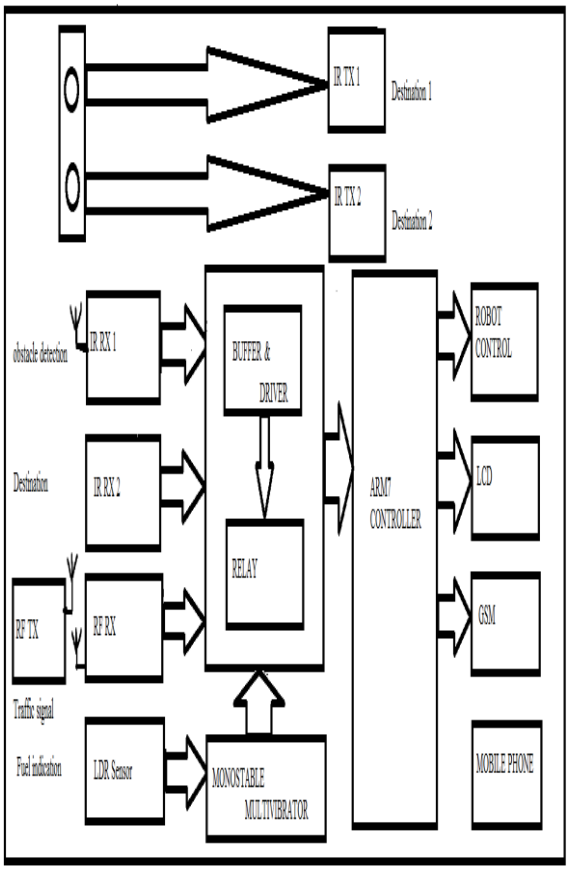

Fig1.1: Block diagram

IV.SYSTEM BLOCK DIAGRAM

1. Obstacle detection: When the IR Transmitter emits IR rays, it hits to obstacle and reflects back, they are received by IR Receiver1.The IR Receiver1 in the smart vehicle receives the IR radiations and through the ARM the vehicle is stopped.

2. Destination: When the person selects the destination by switching on Destination 1 or Destination 2 the vehicle starts moving and reaches the destination. The IR Transmitter placed in the destination emits IR radiations continuously. The IR Receiver 2 in the vehicle receives the IR radiations and through the ARM the vehicle is stopped.

3. Traffic signal: The RF Transmitter is placed in the Traffic signal. When the vehicle moves through a signal, in case if the signal is RED then the RF Receiver in the vehicle receives the signal and stops the vehicle. In case of green signal the vehicle starts moving.

4. Fuel level indication: For fuel indication LDR sensor is used i.e, it senses the light and led glows to indicate fuel is less.

V.METHODOLOGY

1. OBSTACLE DETECTION: In the IR transmitter the IR LED passes current only in one direction and requires forward operation voltage of about 2V and forward operation current in 10 to 20 mA range. Maximum reverse voltage that the IR LED can withstand is typically 3 to 5V, more than this could damage the component. It does not have any current control function, so, when the IR LED is used in a circuit, a resistor must be used in series to limit the current flow through it. Whenever the IR transmitter is activated, it generates an invisible Infra-red light beam signal and hits the obstacle, the reflected IR radiation are sensed by TSOP sensor of IR receiver. The IR Sensor Module has 3 terminals: signal input, supply pin and the ground pin. This module works on regulated +5V, and exceeding this limit may cause the damage of it. So, this Sensor is given Vcc through a biasing resistor R1 and grounded pin is given to negative terminal of the supply. Whenever the Infra-Red ray's falls on this Sensors eye [that black mole on Sensor] it produces varying signal voltages at output pin. This is given to amplifier stage built by PNP transistor through a current limiting resistor R2. The output of this amplifier is fed to a buffer .This buffer enhances the current capacity of the signal and send to driver stage. The relay is triggered by driver which is indicated by LED. The relay is given as input is given to ARM which in turn controls the robot and slows down the motor and car is stopped. This indication in form of message is updated as "OBSTACLE DETECTED, VEHICLE STOPPED" to user through GSM module which is connected to ARM.

2. DESTINATION: When the IR transmitter is placed in destination once the switch for particular destination is pressed the IR transmitter is activated and car starts moving. When the IR receiver receives the IR radiations from the transmitter in destination the vehicle stops as similar to the above procedure and this indication is updated as "SMART VEHICLE REACHED SAFELY" to the user through the GSM module.

3. TRAFFIC SIGNAL: The RF transmitter is placed in traffic signal.RF transmitters are electronic devices that create continuously varying electric current, encode sine waves, and broadcast radio waves. RF transmitters use oscillators to create sine waves, the simplest and smoothest form of continuously varying waves, which contain some information like data, audio, etc. Here, we make use of data as the message signal that is used with carrier to get the FM signal .Modulators encode these sine waves and antennas broadcast them as radio signals.

The circuit works on Very High Frequency band with wide covering range.The Carrier frequency is 147 MHz and Data frequencies are 17 MHz, 19 MHz, 22 MHz & 25 MHz Transmitter IC has four inputs and only one output pin. The four inputs are for the frequency range of 17 KHz, 19 KHz, 22 KHz and 25 KHz and four switches are provided for each range .In our application17Khz is assigned for red and 19 KHz is assigned for green LED. When any one of these switch is selected, that frequency is added to the Transmitter circuit as data frequency and transmitted in the air. RF receiver is used to receive the radio signal and the output from this receiver is given to ARM through the relay. The ARM in turn stops the vehicle if signal is red. This indication is updated as "SMART VEHICLE STOPPED IN TRAFFIC SIGNAL" to the user through the GSM module.

4. FUEL LEVEL INDICATION: For fuel indication LDR sensor is used .since the output of sensor is unstable to make it stable we use of Monostable multivibrator, using a 555 timer is used to produce a stable output. The current through Monostable multivibrator depend on the signal falling on the sensor .The output from Monostable multivibrator is given to ARM which in turn updates as "FUEL IS ABOUT TO DIE" to the user through GSM module.

In the user side we have a mobile phone installed with start up to GMAIL app which is freely available in GOOGLE store. The messages which are received from the module is made to sync with the link created in GMAIL account through the internet [IoT].

POWER SUPPLY

The whole circuit is powered up by the 12V, 1.3A Battery. This section needs two voltages viz., +12 V & +5 V, as working voltages. Hence specially designed power supply is constructed to get regulated power supplies.

VI. SOFTWARE DESCRIPTION

In this paper we have made use of LPC2148 ARM7 microcontroller. Programming is done in embedded-C language. Compiler used is Keil microvision-4 for LPC2148 controller. The compiled program is downloaded onto the microcontroller using JTAG port interface for LPC2148 and JTAG downloader software for ARM7 controller.

VII. RESULTS

The concepts discussed in paper were successfully developed into a working prototype. We were successfully able to implement all four features as follows: The obstacle detection was implemented successfully using IR transmitter, IR receiver, ARM controller, GSM module, two LEDs. When the obstacle is detected the yellow LED glows indicating obstacle is detected .The yellow LED was switched off and red LED 1 was switched on and the vehicle was stopped.

Initially destination was set by switching on the IR Transmitter, the motor control was switched on, and the red LED 2 was turned on as the vehicle reached the destination and the red LED 1 was switched on and the vehicle was stopped.

The traffic signal was implemented successfully using RF Transmitter, RF receiver, ARM controller, GSM module and a LED. When the switch for red signal was switched on in RF Transmitter, the red LED was switched on and the vehicle was stopped. When the switch for green signal was switched on the vehicle was moving.

Fuel indication was successfully implemented using LDR sensor, Monostable Multivibrator, three LEDs, ARM Controller, GSM module. When the LDR sensor was activated the red LED 3 was switched on indicating that input is unstable and red LED 3 was switched off and red LED 1 was switched on indicating messages was sent to the user.

In all the above parameters the information were sent to the user in the form of messages through the GSM module. The messages were seen in the user's mobile phone and also in the Gmail link which was created by the user connected to internet.

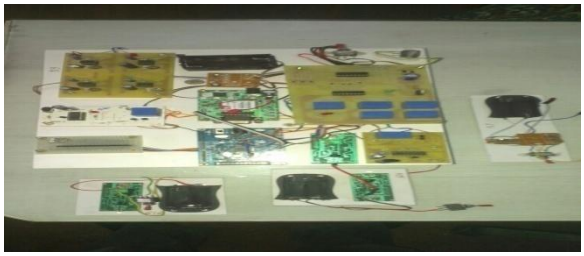

Fig1.2: SMART VEHICLE Module

Fig1.3: Side view of module

VIII. CONCLUSION

In this paper we conclude that we were able to successfully incorporate all the four features mentioned in this paper into our prototype model.

This will be useful for mankind .Accidents that occur due to human errors can be completely avoided. It will be useful for disabled people and people who are not well versed in driving.

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