

# TRACKING ON-SITE WORKING VEHICLES USING RF TRANSCEIVER

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**Abstract**—Tracking and monitoring the activities of the on-site working vehicles, such as in the constructional area and also to manage the lifetime of the operating vehicles to attain high operational availability. The secure way in this proposed methodology is to avoid accidents using automatic breaking system and provide time consumption in the working area. It is more convenient to monitor the operational activities of the vehicles in the administrator section through personal computer with greater accuracy.

**Keywords**—Atmel 89c51; MAX 232; Transceiver; Usbot

## 1. INTRODUCTION

Activities of on-site working vehicles (forklifts, aerial work platforms, automatic guided vehicles, etc.) are essential in work site, such as factory. However, it is a problem that an administrator cannot easily monitor the operational activities of all the working vehicles effectively. For example, 1,000 or more work vehicles often operate on a large-scale work site, such as construction of a building. An administrator is not able to answer questions such as how many working vehicles are actually in operation and how long they have been operating. Therefore, the movement of the working vehicles becomes unproductive. In addition, working vehicles equipped with automatic navigation often operate outside the field of view of the administrator. Subsequently, the administrator might not notice if a working vehicle has clogged.

These problems can be solved by using various wireless technologies, but it has few drawbacks monitoring the activities of working vehicles on the basis of positional information. By using GPS, the location of the vehicle is tracked in outdoor environment, but indoor cannot be covered because the signals are blocked by walls and ceilings. By using the RFID / magnetic tapes and Wi-Fi the drawbacks are it was not flexible in the work site, the installation of the access point was needed. On the other hand, in recent years, a wireless technology called ZigBee estimates the comparative positional relation of functioning vehicles on the basis of information on the topic of a ZigBee-configured network. The system then calculates the activity rate of each working vehicle from the time-series change of the positional relation.

Finally, activities of all working vehicle are displayed on a PC so the administrator can monitor them.

This paper provides an overview of the background research related to vehicle tracking and control system using the transceiver. There will be two sections, one is transmitter side that is fixed in the vehicle and another section is the receiver that is with the

administrator. This will control the vehicles and indicates whether they are in out of range of the work-site.

## 2. LITERATURE SURVEY

Number of papers has been published on the development of vehicle tracking system using different wireless technologies. The recent studies on the existing methods for vehicle tracking and monitoring system process were using the GPS, Wi-Fi, Bluetooth, RFID/Magnetic tapes and ZigBee technologies.

In [1], Vehicle Tracking Using RFID. This paper presents about the tracking of vehicles using the Radio frequency. A RF device is fitted with the vehicle. The RF readers are used to read the card details, if any mismatch occurs it informs to the specific departments via SMS and it can also detect the robbery vehicles tracking. The disadvantage of this paper is tag collision. [2], An Efficient Accident Avoidance System Using Wireless Technology in Instrument Cluster. This paper presents about the design of the wireless instrument cluster it includes gauges speedometer, fuel gauge etc., to operate the vehicle in the safe speed at critical zone using the ultrasonic sensor and IEEE 802.15.4 standard.

This system will provide efficient vehicle speed control. The mechanical problems in the vehicle can be detected easily and fix it. [3], GPS based Advanced Vehicle Tracking and Vehicle Control System. This paper presents about the vehicle tracking system that employs a GPS module and a GSM modem to find the location of the vehicle and offers a control features. It will remotely track the vehicle location, remotely switch ON and OFF the ignition system and remotely locks and unlocks the vehicle doors.

A webpage is created to find the location in Google maps. [4], Advanced Vehicle Monitoring and Tracking System based on Raspberry Pi. This paper presents about the advance vehicle monitoring and tracking using Raspberry Pi. It is placed inside the vehicle whose position is determined in the web page and monitored at

real time. There will be a comparison between the current path and the specified path inside the Raspberry Pi.

It also takes care of the safety of the people by using LPG sensors and Temperature sensors. [5], Vehicle Tracking and Locking System based on GSM and GPS. This paper presents about the tracking of the vehicle by GPS. It keeps on updating the current location of the vehicle. The locking system is proposed in this paper to open the door of the vehicle and to start the vehicle. [6], Embedded based Vehicle Speed Control System using Wireless Technology. This paper presents about the GPS with embedded wireless system to control the vehicle in remote location application using ARM. Operating the vehicle in safe speed at critical zones and it is highly reliable. It is designed to avoid the accidents and control the speed.

### 3. EXISTING METHOD

For tracking, monitoring and controlling the working vehicles, various wireless technologies were used like Bluetooth, GPS, GSM, RFID/ Magnetic tapes, Wi-Fi, ZigBee. These technologies had few drawbacks that it cannot cover a whole working area. The administrator cannot easily monitor and control the operational activities of all working vehicles effectively. Therefore, the activity of the working vehicles becomes inefficient.

Consequently, the administrator might not notice if a working vehicle has stopped working. These problems can be solved by monitoring the activities of working vehicles on the basis of the positional information. However, it cannot be used indoors because it utilizes GPS to measure positions of machinery units. Many existing systems using GPS have a similar problem. Other systems use RF-ID or magnetic tape as a method of obtaining positional information without using GPS. These systems, however, cannot shield an extensive area because numerous sensors need to be installed in the field. In addition, they cannot respond flexibly when the worksite changes.

Other methods estimate position by using radio technology such as Wi-Fi and Bluetooth. However, Wi-Fi and Bluetooth require installation of access points for mutual communication. It is thus challenging to cover a wide area in which more than 1,000 automobiles are functioning.

On the other hand, applying ZigBee wireless technology for constructing sensor networks is attracting attention. ZigBee can connect up to 60,000 units or even more devices. But is high cost and need installation of nodes.

### 4. PROPOSED METHOD

For proper maintenance and also to avoid accidents in the large constructional area, a new wireless technology is included which is used to sense the activity rate of each working vehicle that can be analyzed in a time-series manner.

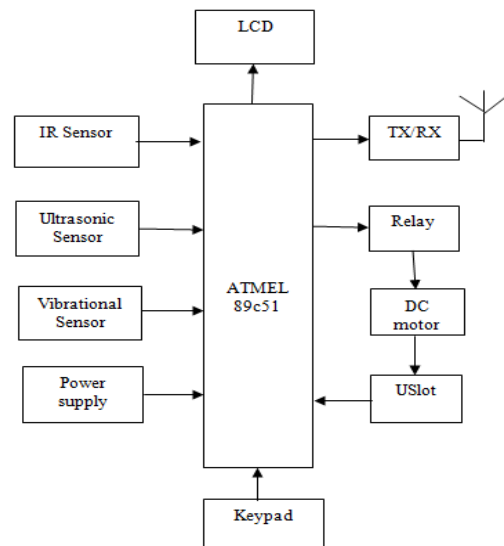


Figure 4.1 Block diagram for Vehicle Transmitter Module

#### A. ATMELEL 80c51:

The power supply is given to the ATMELEL microcontroller is +5v, it will operated in +5v only. Here we are interfacing LCD display with the controller. It is 40 pin controllers. It consists of 4 ports namely port0, port1, port2 and port3. Each ports have 8pins.

#### B. LCD :

For LCD interfacing, LCD data line is taken from the port0 (0-7) for data line given to LCD. For LCD control line is taken from the port1 (0-2). Here we are consuming trim pot variable resistor. This resistor is used for adjustment of LCD brightness. Crystal oscillator is used for generating clock pulse. There is different type of oscillators like RC, LC etc., certain of the oscillator produce clock pulse which is differ with voltage, temperature fluctuations.

#### C. IR Sensor:

The transmitted signal is set to IR transmitter at any time the signal is high, the IR transmitter LED is directing it passes the IR rays to the receiver. The IR receiver is connected with comparator. The comparator is assembled with LM 741 operational amplifier. In the comparator circuit the reference voltage is known to inverting input terminal. The non-inverting input terminal is connected IR receiver. When interrupt the IR rays concerning the IR transmitter and receiver, the IR receiver is not conducting. So the comparator non inverting input terminal voltage is higher than inverting input.

At this instant the comparator output is in the range of +12V. This voltage is given to base of the transistor Q1. Hence the transistor is conducting. Here the transistor is deed as switch so the collector and emitter will be closed. The output is taken from collector terminal, now the output is zero. When IR transmitter passes the rays to receiver, the IR receiver is conducting owing to that non inverting input voltage is lower than inverting input. Now the comparator output is -12V thus the transistor is cutoff region..., this circuit is primarily used for counting application, intruder detector etc.

*D. Ultrasonic Sensor:*

This circuit functions with noiseless (ultrasonic) sound. Sound of frequency up to 20 kHz is noticeable to human beings. The sound of frequency above 20 kHz is called ultrasonic sound. The circuit defined produces (transmits) ultrasonic sound of frequency between 40 and 50 kHz. As with any other remote control system this circuit too consist of a mini transmitter and a receiver circuit.

Transmitter generates ultrasonic sound and the receiver intellects ultrasonic sound from the transmitter and switches on a relay. The ultrasonic transmitter uses a 555 based astable multivibrator. It fluctuates at a frequency of 40-50 kHz. An ultrasonic transmitter transducer is used here to transmit ultrasonic sound very effectually. The transmitter is powered from a 9-volt PP3 single cell.

*E. Vibration Sensor:*

The signals are amplified by transistors. The amplified signals are then rectified and filtered. The relay can be used to control any electrical or electronic equipment.

1. Frequency of ultrasonic sound produced can be diverse from 40 to 50 kHz range by adjusting VR1.
2. Ultrasonic sounds are vastly guiding. Thus when you are functioning the switch the ultrasonic transmitter transducer of transmitter should be located towards ultrasonic receiver transducer of receiver circuit for proper functioning.
3. Use a 9-volt PP3 battery for transmitter. The receiver can be powered from a battery eliminator and is constantly kept in switched-on-position.
4. For latch facility use a DPDT relay if you want to switch on and switch off the load. A flip-flop can be injected amongst IC2 and relay. If you want only an 'ON-time delay' use a 555 only at output of IC2. The relay will be strengthened for the required period firm by the timing components of 555 monostable-multivibrator.
5. Ultrasonic waves are discharged by many natural sources. Therefore, sometimes, the circuit might get deceptively triggered, especially when a flip-flop is used with the circuit, and there is no therapy for that.

*F. Relay:*

A relay is a switch functioned by an electromagnet. It is useful if we want a small current in one circuit to switch alternative circuit containing a device such as a lamp or electric motor which involves a large current, or if we demand several diverse switch contacts to be activated concurrently. When the regulating current flows through the coil, the soft iron core is magnetized and fascinates the L-shaped soft iron armature. This rocks on its pivot and opens, closes or deviances over, the electrical contacts in the circuit being controlled it closes the connections.

*G. DC Motor:*

The DC Motor is used to run the vehicle transmitter module. It converts the electrical energy into the mechanical energy. 12V DC Motor is used in this module. Instead of the vehicle engine the DC Motor is replaced.

*H. USLOT:*

The GL5 miniature slot sensor associates a high optical performance in a small housing and is enhanced to the requirements in semiconductors industry for small part recognition. A wide voltage range of 5 - 24 V DC and the fastest swapping frequency of 5 kHz in its class stands for the quality of this sensor. The integrated aperture allows the small part detection with a minimum object size of 0.8 x 1.8 mm. The sensor proposals outputs. Due to a variety of different housings and an optimized housing concept offers the sensor a maximum of autonomy in a crowded swelling environment.

*I. Power Supply:*

Power supply is an orientation to a source of electrical power. A scheme or method that supplies electrical or other sorts of energy to an output load or collection of loads is called a power supply unit. The term is most usually applied to electrical energy supplies, less frequently to mechanical ones, and hardly to others. This typically involves converting 240 volt AC.

The ac voltage, usually 220V rms, is connected to a transformer, which steps that ac voltage down to the equal of the preferred dc output. A diode rectifier then delivers a full-wave rectified voltage that is originally filtered by a simple capacitor filter to produce a dc voltage. This resultant dc voltage usually has some ripple or ac voltage variation.

A regulator circuit eliminates the ripples and also remains the same dc value even if the input dc voltage differs, or the load connected to the output dc voltage modifications. This voltage regulation is commonly obtained using one of the popular voltage regulator IC units.

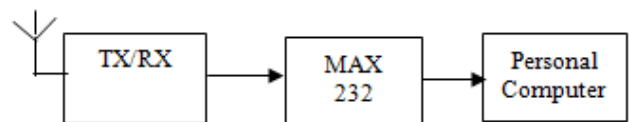


Figure 4.2 Block diagram of Administrator section

*J. Transceiver:*

Transceiver is a small size electronic device which has the combination of both the transmitter and receiver. It is a two-way communication. It can be used to transmit and receive the information of the operating vehicles whether they are in-range or out-of-range. By using RF transceiver, it can be used to transmit and receive the information.

While transmitter block is functioning, the receiver block will be in silent mode. It has both the half-duplex and full-duplex communication. Its operating voltage is 3V to 12V. The intension of the transceiver is to alter the IF frequency. RF transceiver has up-converter and down-converter. It uses micro strip technology.

*K. MAX 232:*

In telecommunications, MAX-232 is a standard for serial binary data interconnection between a DTE (Data terminal equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports. The MAX232 is a dual driver/receiver that includes a

capacitive voltage generator to supply EIA 232 voltage levels from a single 5v supply.

Each receiver translates EIA-232 to 5v TTL/CMOS levels. Each driver transfigures TLL/CMOS input levels into EIA-232 levels. The microcontroller transmitter pin is connected in the MAX232 T2IN pin which modifies input 5v TTL/CMOS level to RS232 level. Then T2OUT pin is linked to revive pin of 9 pin D sort serial connector which is directly attached to PC.

#### L. Personal Computer:

In PC the transmitting data is given to R2IN of MAX232 through transmitting pin of 9 pin D type connector.

The R2OUT pin is related to receiver pin of the microcontroller. Similarly the data is transmitted and received concerning the microcontroller and PC or other device vice versa. Communication as distinct in the RS232 standard is an asynchronous serial communication method. The word serial resources, that the information is sent one bit at a time. Asynchronous tells us that the information is not sent in predefined time slots. The RS232 standard designates a communication method where information is led bit by bit on a physical channel. The information must be wrecked up in data words. The length of a data word is flexible. On PC's a length concerning 5 and 8 bits can be selected.

### 5. RESULT

Thus the experimental result is based on the vehicle transmitter module and the administrator module. This project shows whether the working vehicles are in the range of work site, if it is out of range the ignition system will automatically get OFF.

It also checks the vehicle distance from the upcoming obstacles (wall, vehicles, etc..) by the sensor and it also protect the vehicle from the accidents manually by the administrator. If the vehicle is going to hit any object the sensor in the vehicle will produce the vibration in the vehicle and the automatic braking system is included. This was fully controlled by ATMEL.

### 6. CONCLUSION

In this paper, we are concluded a novel method of vehicle tracking in the working area and controlling system. Compare to the other wireless technologies this will be very efficient and low cost. No installation of nodes needed. It saves the time of the administrator. Instead of getting into the field and monitoring the vehicles, it is an easy way to monitor and control it in work-site.

### 7. FUTURE WORK

Introducing the new idea IOT , it describes a system where the digital world is connected to the physical world forming the global network .it is used to improve in efficiency ,accuracy and economic benefit in addition to reduced human intervention.

The IOT components interconnected over the network, which are embedded with sensors, software by these they can exchange the data with e administrator. The IOT connected vehicle gives the real time information of

the vehicle like speed, fuel level, route name, latitude and longitude of the vehicle to the administrator.

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