ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

# Automatic and Intelligent System To Detect and Maintain Potholes and Humps On Roads

A.Jasmin, S.Aishwarya and Aneena Aarthi
1,2 UG Scholar,PSN College of Engineering and Technology,Tirunelveli,India.
3 Assistant Professor, PSN College of Engineering and Technology,Tirunelveli,India.

**ABSTRACT**

In order to make roads safer, cleaner and smarter, sensor and communication technologies are increasingly considered in research, standardization and development. While today's vehicles are already able to sense the surrounding environment, we expect that future cars will communicate with a roadside communication infrastructure and with voice assisting unit.

Here we are going to design the auto assistive unit for intelligent vehicles. All this are done with the help of embedded and wireless technology. Our project designed with the following knowledge,

Pothole detection, Sign board identification, Rear side vehicle monitoring, Digital fuels level measurement, voice assistance.

## I INTRODUCTION

India, the second most crowded Country in the World and a fast growing financial system, is known to have a gigantic network of roads. Roads are the leading means of transportation in India today They carry almost 90 percent of country's passenger traffic and 65 percent of its freight. However, most of the roads in India are narrow and crammed with poor surface quality and road maintenance needs are not agreeably met. No matter where you are in India, driving is a breath-holding, multi-mirror involving, potentially life threatening affair Over the last two led to problems such as traffic congestion and increase in the number of road accidents. Pathetic condition of roads is a boosting factor for traffic congestion and accidents. Researchers are working in the area of traffic jamming control , an integral part of vehicular area networks, which is the need of the hour today.

Roads in India normally have speed breakers so that the vehicle's speed can be controlled to avoid accidents. However, these speed breakers are unevenly scattered with uneven and unempirical heights. This techniques are used to Avoid the accident and also manage the road conditions Potholes, formed due to deep rains and movement of heavy vehicles, also become a major reason for traumatic accidents and loss of human lives. To address the above mentioned problems, a cost useful solution is needed that collects the information about the cruelty of potholes and humps and also helps drivers to drive safely. With the proposed system an attempt has been made to approve drivers to ward off the accidents caused due to potholes and raised humps.

## 1 EMBEDDED SYSTEM

An embedded system is a special-purpose computer system designed to perform a dedicated functions often with real time computing constraints. Unlike a general purpose computer, such as a

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

specific requirements. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product .Embedded system is fast growing technology in various fields like industrial automation, home appliances, automobiles, aeronautics etc.

### 1.2 CHARACTERISTICS OF EMBEDDED SYSTEM

Embedded systems are designed to do some specific task, rather than be a general purpose computer for multiple-task. Some also have real time performance constraints that must be met, for the reasons such as safety and usability; others may have low or no performance retirements, allowing the system hardware to be simplified to reduce costs.

### WIRELESS SENSOR NETWORKS(WSN)

A wireless sensor network (WSN) consists of sensor nodes capable of collecting information from the environment and communicating with each other via wireless transceivers. The collected data will be delivered to one or more sinks, generally via multi-hop communication. The sensor nodes are typically expected to operate with batteries and are often deployed to not-easily-accessible or hostile environment, sometimes in large quantities. It can be difficult or impossible to replace the batteries of the sensor nodes. On the other hand, the sink is typically rich in energy. Since the sensor energy is the most precious resource in the WSN, efficient utilization of the energy to prolong the network lifetime has been the focus of much of the research on the WSN. The communications in the WSN has the many-to-one property in that data from a large number of sensor

Since multi-hop routing is generally needed for distant sensor nodes from the sinks to save energy, the nodes near a sink can be burdened with relaying a large amount of traffic from other nodes.

Sensor nodes are resource constrained in term of energy, processor and memory and low range communication and bandwidth. Limited battery power is used to operate the sensor nodes and is very difficult to replace or recharge it, when the nodes die. This will affect the network performance. Energy conservation and harvesting increase lifetime of the network. Optimize the communication range and minimize the energy usage, we need to conserve the energy of sensor nodes .Sensor nodes are deployed to gather information and desired that all the nodes works continuously and transmit information as long as possible. This address the lifetime problem in wireless sensor networks. Sensor nodes spend their energy during transmitting the data, receiving and relaying packets. Hence, designing routing algorithms that maximize the life time until the first battery expires is an important consideration. Designing energy aware algorithms increase the lifetime of sensor nodes. In some applications the network size is larger required scalable architectures. Energy conservation in wireless sensor networks has been the primary objective, but however, this constrain is not the only consideration for efficient working of wireless sensor networks. There are other objectives like scalable architecture, routing and latency. In most of the applications of wireless sensor networks are envisioned to handled critical scenarios where data

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

retrieval time is critical, i.e., delivering information of each individual node as fast as possible to the base station becomes an important issue. It is important to guarantee that information can be successfully received to the base station the first time instead of being retransmitted.. In wireless sensor network data gathering and routing are challenging tasks due to their dynamic and unique properties. Many routing protocols are developed

## II. RELATED WORK

**TITLE:"A RESEARCH OF PAVEMENT POTHOLES DETECTION BASED ON THREE-DIMENSIONAL PROJECTION TRANSFORMATION"**

**AUTHOR:** Wang Jian, QiuHanxing, ZhangWei, XieJianfang

In order to detect the three-dimensional cross-section of pavement pothole more effectively, this paper proposes a method which employs optical imaging principle of three dimensional projection transformation to obtain pictorialinformation of pothole's cross-section in pothole detection. Multiple digital image processing technologies, including: image preprocessing, binarization, thinning, three-dimensional reconstruction, error analysis and compensation are conducted in the series of image analysis and processing. Experimental results indicate that the method is markedly superior to traditional methods in many aspects. For its simple detection principle, low cost and high efficiency, the method suggests great practical and promoting value.

**TITLE:"POTHOLES DETECTION BASED ON SVM IN THE PAVEMENT DISTRESS IMAGE"**

**AUTHOR:**Jin Lin, Yayu Liu

There are much more researches on the recognition of the cracks on the distress pavement, but the research on the potholes is relatively less. In this paper, Texture measure based on the histogram is extracted as the features of the image region, and the non-linear support vector machine is built up to identify whether a target region is a pothole. Based on this, an algorithm for recognizing the potholes of the pavement is proposed. The experimental results show that the algorithm can achieve a high recognition rate.

**TITLE:"AN EFFICIENT ALGORITHM FOR POTHOLE DETECTION USING STEREO VISION"**

**AUTHOR**: Zhen Zhang, Xiao Ai, C. K. Chan and NaimDahnoun

Stereo vision based pothole detection system is proposed. Using the disparity map generated from an efficient disparity calculation algorithm, potholes can be detected by their distance from the fitted quadratic road surface. The system produces the size, volume and position of the potholes which allows the pothole repair to be prioritized according to its severity. The quadratic road surface model allows for camera orientation variation, road drainage and up/down hill gradients. Experimental results show robust detection in various scenarios.

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

## III PROPOSED SYSTEM

### Ultrasonic Sensor

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water.

To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing.

Systems typically use a transducer which generates sound waves in the ultrasonic range, above 20,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed.

The technology is limited by the shapes of surfaces and the density or consistency of the material. For example foam on the surface of a fluid in a tank

### OBJECT SENSOR

A photoelectric sensor, or photo eye, is a device used to detect the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are used extensively in industrial manufacturing. There are three different functional types: opposed (a.k.a. through beam), retro reflective, and proximity-sensing (a.k.a. diffused).

#### *Types of photoelectric sensors*

A self-contained photoelectric sensor contains the optics, along with the electronics. It requires only a power source. The sensor performs its own modulation, demodulation, amplification, and output switching. Some self-contained sensors provide such options as built-in control timers or counters. Because of technological progress, self-contained photoelectric sensors have become increasingly smaller.

Remote photoelectric sensors used for remote sensing contain only the optical components of a sensor. The circuitry for power input, amplification, and output switching are located elsewhere, typically in a control panel. This allows the sensor, itself, to be very small. Also, the controls for the sensor are more accessible, since they may be bigger.

#### *2 Sensing Modes*

An opposed (through beam) arrangement consists of a receiver located within the line-of-sight of the transmitter. In this mode, an object is detected when the light beam is blocked from getting to the receiver from the transmitter.

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

A retro reflective arrangement places the transmitter and receiver at the same location and uses a reflector to bounce the light beam back from the transmitter to the receiver. An object is sensed when the beam is interrupted and fails to reach the receiver.

A proximity-sensing (diffused) arrangement is one in which the transmitted radiation must reflect off the object in order to reach the receiver. In this mode, an object is detected when the receiver sees the transmitted source rather than when it fails to see it.

Some photo eyes have two different operational types, light operate and dark operate. Light operate photo eyes become operational when the receiver "receives" the transmitter signal. Dark operate photo eyes become operational when the receiver "does not receive" the transmitter signal.

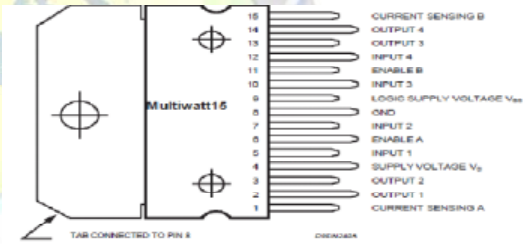
The detecting range of a photoelectric sensor is its "field of view", or the maximum distance the sensor can retrieve information from, minus the minimum distance. A minimum detectable object is the smallest object the sensor can detect. More accurate sensors can often have minimum detectable objects of minuscule size.

**L298**

**Features:**

.OPERATINGSUPPLY VOLTAGEUP TO 46 V
.TOTAL DC CURRENT UP TO 4 A
.LOWSATURATION VOLTAGE
.OVERTEMPERATURE PROTECTION LOGICAL ”0” INPUT VOLTAGE UP TO 1.5 V (HIGHNOISE IMMUNITY)

The L298 is an integrated monolithic circuit in a 15- lead Multi watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable r disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.




**APPLICATION INFORMATION**

**Power output stage**

The L298 integrates two power output stages (A; B). The power output stage is a bridge configuration and its outputs can drive an inductive load in common or differential mode, depending on the state of the inputs. The current that flows through the load comes out from the bridge at the sense output : an external resistor (RSA ;RSB.) allows to detect the intensity of this current.

**Input stage**

Each bridge is driven by means of four gates the input of which are In1; In2; En A and In3; In4 ; En B. The In inputs set the bridge state when The En input

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

is high; a low state of the bridge. All the inputs are TTL compatible.

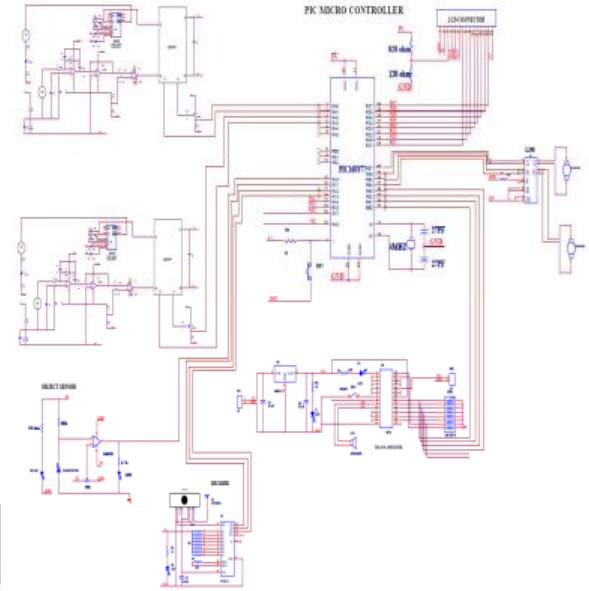
**Suggestions**

A non inductive capacitor, usually of 100 nF, must be foreseen between both Vs and Vss, to ground, as near as possible to GND pin. When the large capacitor of the power supply is too far from the IC, a second smaller one must be foreseen near the L298. The sense resistor, not of a wire wound type, must be grounded near the negative pole of Vs that must be near the GND pin of the I.C. Each input must be connected to the **source** of the driving signals by means of a very short path.

Turn-On and Turn-Off : Before to Turn-ON the Supply Voltage and before to Turn it OFF, the Enable input must be driven to the Low state.

**OVERALL CIRCUIT DIAGRAM**

**In this diagram inbuilt of Encoder with RF Transmitter, Decoder with RF Receiver,Ultrsonic Sensor, Probe Sensor and Voice IC.This Sensors are controlled by Signal Conditioning Unit(SCU).Ultra Sonic sensor are used to detect the potholes continuously by using crystal oscillator**




**POWER SUPPLY**

Battery, here we use 12v 7.5Ah lead acid rechargeable battery. This battery output is given to the regulator 7805 through one resistor, fuse and capacitor. Resistor is used to limit the current value from battery. Then this output is given to the fuse, this fuse act as a safety circuit for our board. Capacitor act as a filter, it is used to give the pure dc. To get constant 5v output here we use a 7805 IC voltage regulator. 7805 regulator output we get a constant 5v. but that output have some spikes with it so only again we use a capacitor for filter purpose

**ENCODER WITH RF TRANSMITTER**

**Encoder:**

In this circuit HT 640 is used as encoder. The $3^{18}$ encoders are a series of CMOS LSIs for remote control system application. They are capable of encoding 18 bits of information which consists of N address bit and 18-N data bits. Each address/data input is externally trinary programmable if bonded out.

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

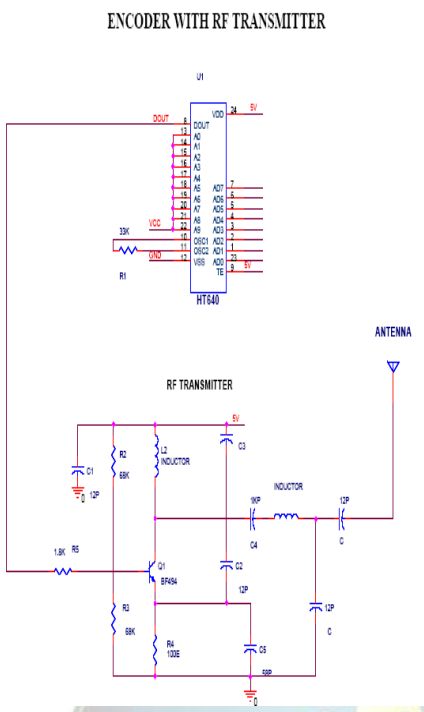



**Fig : Encoder with RF Transmitter**

It is otherwise set floating internally. Various packages of the $3^{18}$ encoders offer flexible combination of programmable address/data is transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger type further enhances the application flexibility of the $3^{18}$ series of encoders.

In this circuit the input signal to be encoded is given to AD7-AD0 input pins of encoder. Here the input signal may be from key board, parallel port, microcontroller or any interfacing device. The encoder output address pins are shorted so the output encoded signal is the combinationof (A0-A9) address signal and (D0-D7) data signal.

The output encoded signal is taken from $8^{th}$ which is connected to RF transmitter section.

**RF Transmitter:**

Whenever the high output pulse is given to base of the transistor BF 494, the transistor is conducting so tank circuit is oscillated. The tank circuit is consists of L2 and C4 generating 433 MHz carrier signal. Then the modulated signal is given LC filter section. After the filtration the RF modulated signal is transmitted through antenna.

**ULTRASONIC SENSOR CIRCUIT**

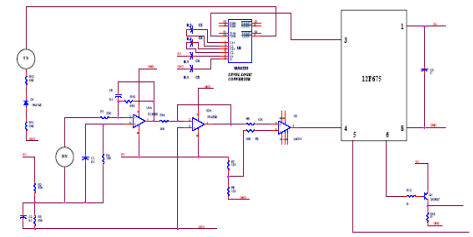


**Fig: Ultrasonic Sensor Circuit**

**CIRCUIT DESCRIPTION:**

This circuit is designed to measure the distance of the object with the help of ultrasonic waves. The 12F675 microcontroller is used to generate the 40 KHz frequency signal. This signal is given to level logic converter (MAX232) in order to convert to TTL output pulse to +12v and -12v pulse. Then this pulse is transmitted through ultrasonic transmitter.

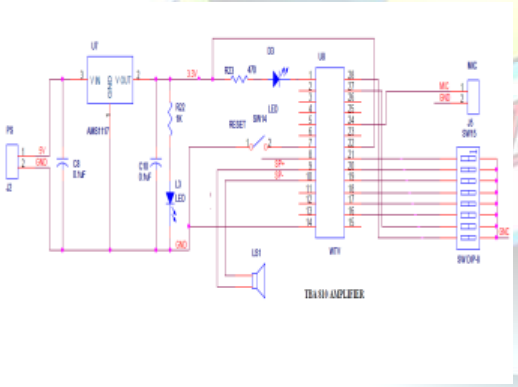
The ultrasonic wave is spread in the air and hit the nearest object and reflected from the object which is received by the ultrasonic receiver. The received wave is given to amplifier in order to amplify the

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

received weak signal. After the amplification the amplified wave is given to zero adjustment amplifier because the amplified wave is in the range of above 6v level. Then the output is given to comparator in which the wave signal is converted into corresponding square wave signal. Then the square wave signal is given to input of the microcontroller.

Now the microcontroller compares the time between the transmitted signal and received signal and generates the corresponding pulse output which is equal to distance of the object. Then the pulse signal is given to input of BC547 transistor.

## VOICE IC CONNECTION DESCRIPTION



**Expected Output**

## CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on PIC microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology used this project is fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The principle of the development of science is that “nothing is impossible”. So we shall look forward to a bright & sophistical

ISSN 2394-3777 (Print)
ISSN 2394-3785 (Online)
Available online at www.ijartet.com
International Journal of Advanced Research Trends in Engineering and Technology (IJARTET)
Vol. 3, Special Issue 13, March 2016

**REFERENCE**

1. Rajeshwari S., Santhosh Hebbar, Varaprasad G., "Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance and Stolen Vehicle Detection", IEEE Sensors Journal, Vol.15, No.2, pp.1109-1113, 2015

2. Moazzam, K. Kamal, S. Mathavan, S. Usman, M. Rahman, "Metrology and Visualization of Potholes using the Microsoft Kinect Sensor", In Proceedingsof IEEE Conference on Intelligent Transport System, pp.1284-1291, 2013.

3. Sudarshan S. Rode, Shonil Vijay, Prakhar Goyal, Purushottam Kulkarni, "Pothole Detecting and Warning".

He Youquan, Wang Jian, QiuHanxing, Zhang Wei, XieJianfang, "A Research of Pavement Potholes Detection Based on Three-Dimensional Project Transformation", In Proceedings of InternationalCongress on Image and Signal Processing, pp.1805-1808, 2011.

Jin Lin, Yayu Liu, "Potholes Detection Based on SVM in the Pavement Distress Image", InProceedings of International Symposium on Distributed Computing and Applications to Business, Engineering and Science, pp.544-547,2010

Faith Orhan, P. ErhanEren, "RoadHazard Detection and Sharing with Multimodal Sensor Analysis on Smartphones", In Proceedings ofInternational Conference on Next Generation Mobile Apps, Services and Technologies, pp. 56-61,2013.

ArtisMednis, Girts Strazdins, ReinholdsZviedris, GeorgijsKanonirs, Leo Selavo, "Real Time Pothole Detection using Android Smartphones with MILL MAN J and HAWKIES C.C.

"INTEGRATED ELECTRONICS" MCGRAW HILL, 1972ROY CHOUDHURY D, SHAIL JAIN, " LINEAR INTEGRATED CIRCUIT", New Age International Publishers, New Delhi,2000

"THE 8051 MICROCONTROLLER AND EMBEDDED SYSTEM" by Mohammad Ali Mazidi.ted world.