Railway Track Crack Detection

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***Abstract*- the paper aims in designing robust railway crack detection scheme (RRCDS) using IR sensor which avoids the train accidents. And also capable of controlling the whole system by using the GPS based GSM modem. The GPS is the acronym for Global positioning system. This GPS receiver is capable of identifying the location in which it was present in the form of latitude and longitudes. This information is very useful and can be processed for alerting the boat drivers. The GPS gives the data received from the satellites. For this information the GPS communicates with at least three satellites in the space**

***Index Terms* - Robust Railway Crack Detection Scheme (RRCDS), Global positioning system (GPS), Global system for mobile (GSM).**

I. INTRODUCTION

The paper aims in designing robust railway crack detection scheme (RRCDS) using IR sensor which avoids the train accidents. And also capable of controlling the whole system by using the GPS based GSM modem.

The GPS is the acronym for Global positioning system. This GPS receiver is capable of identifying the location in which it was present in the form of latitude and longitudes. This information is very useful and can be processed for alerting the boat drivers. The GPS gives the data received from the satellites. For this information the GPS communicates with at least three satellites in the space

This Paper presents an automotive localization system using GPS and GSM-SMS services. The system permits localization of the automobile and transmitting the position to the authorities on their mobile phone as a short message (SMS) at his request. Also, this system automatically sends alert messages to predefined numbers when accident takes place.

In this paper, let us consider the two tracks; each track will have one IR sensor. Like this two tracks have 2 IR sensors. Whenever there is a crack on the track, then the IR sensor senses that and gives its output to the microcontroller. This tracking system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude. The Microcontroller processes this information and this processed information is sent SMS to the authorities using GSM mode.

The "Robust Railway Crack Detection Scheme (RRCDS) using IR OBSTACLE Assembly" is studied using PIC16F877A microcontroller which is used to find the cracks on track and also capable of controlling the whole system by using the GPS based GSM modem.

An embedded system is a combination of software and hardware to perform a dedicated task. A modern example of embedded system is shown in figure 1.

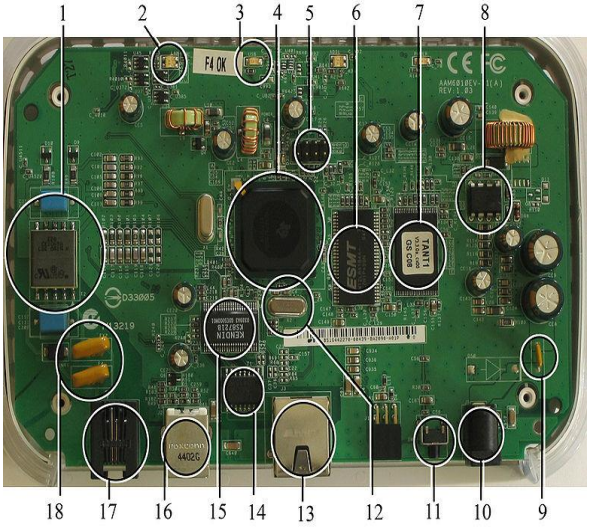


Figure 1:A modern example of embedded system

Labeled parts include microprocessor (4), RAM (6), flash memory (7).Embedded systems programming is not like normal PC programming. In many ways, programming for an embedded system is like programming PC 15 years ago. The hardware for the system is usually chosen to make the device as cheap as possible. Spending an extra dollar a unit in order to

make things easier to program can cost millions. Hiring a programmer for an extra month is cheap in comparison. This means the programmer must make do with slow processors and low memory, while at the same time battling a need for efficiency not seen in most PC applications. Below is a list of issues specific to the embedded field.

II. BLOCK DIAGRAM

In this chapter the block diagram of the project and design aspect of independent modules are considered. Block diagram is shown in figure 2.

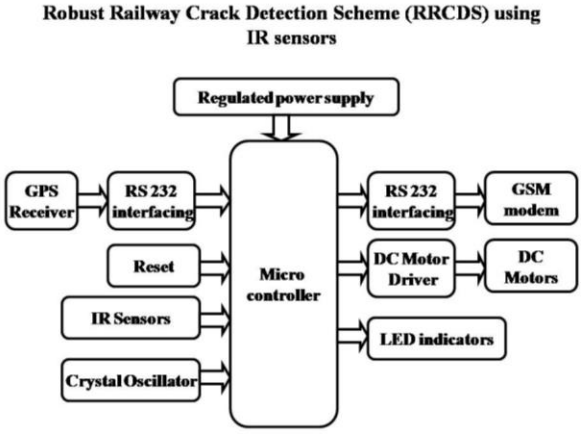


Figure 2: Block diagram of Robust Railway Crack Detection Scheme (RRCDS) using IR OBSTACLE Assembly

The main blocks of this are:

1. Micro controller (16F877A)
2. Reset button
3. Crystal oscillator
4. Regulated power supply (RPS)
5. LED indicator.
6. GPS module.
7. GSM modem.
8. RS232 cable.
9. IR obstacle sensor
10. DC motor

GPS MODULE Global Positioning System

The Global Positioning System (GPS) is a burgeoning technology, which provides unequalled accuracy and flexibility of positioning for navigation, surveying and GIS data capture. The GPS NAVSTAR (Navigation Satellite timing and Ranging Global Positioning System) is a satellite-based navigation, timing and positioning system. The GPS provides continuous three-dimensional positioning 24 hrs a day throughout the world. The technology seems to be beneficiary to the GPS user community in terms of obtaining accurate data up to about100 meters for navigation, meter-level for mapping, and down to millimeter level for geodetic positioning. The GPS technology has tremendous amount of applications in GIS data collection, surveying, and mapping.

The Global Positioning System (GPS) is a U.S. space-based radio navigation system that provides reliable positioning, navigation, and timing services to civilian users on a continuous worldwide basis -- freely available to all. For anyone with a GPS receiver, the system will provide location and time. The GPS is made up of three parts: satellites orbiting the Earth; control and monitoring stations on Earth; and the GPS receivers owned by users. GPS satellites broadcast signals from space that are picked up and identified by GPS receivers. Each GPS receiver then provides three-dimensional location (latitude, longitude, and altitude) plus the time.

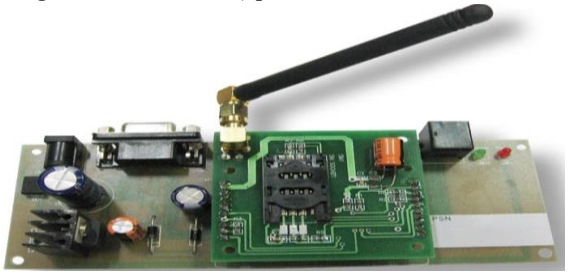


Figure 3: MODEM SIM300 Tri-band GSM

DC Motor Driver:

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN.When an enable input is high, the associated drivers are enabled and their outputs are active and in phase with their inputs.

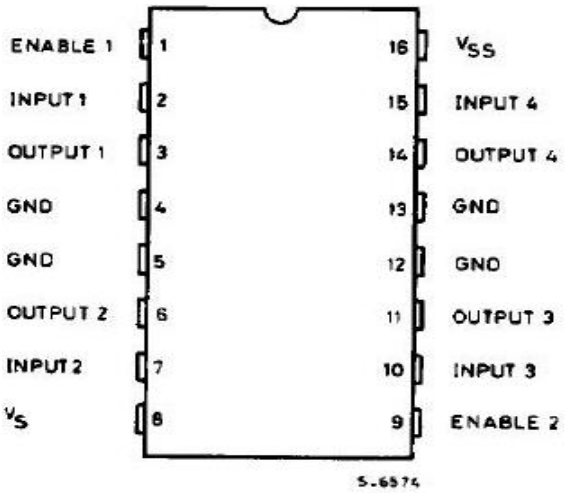


Figure 4: L293D pin diagram

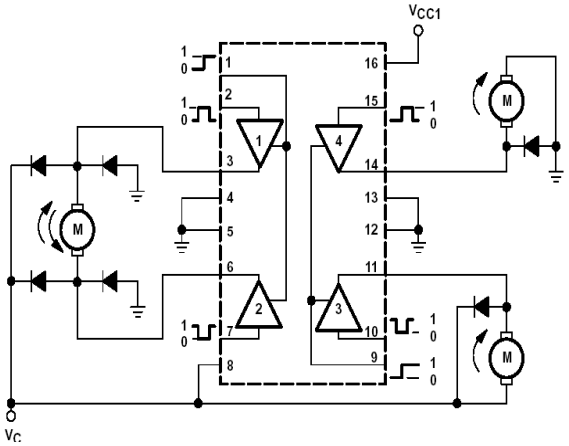


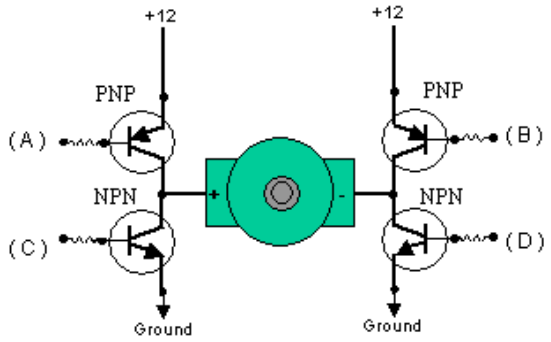
Figure 5: Internal structure of L293D.

Features of L293D:

- 600mA Output current capability per channel
- 1.2A Peak output current (non repetitive) per channel
- Enable facility
- Over temperature protection
- Logical "0"input voltage up to 1.5 v
- High noise immunity
- Internal clamp diodes

DC Motor Driver: H Bridge With transistors:

We can better control our motor by using transistors or Field Effect Transistors (FETs).Most of what we have discussed about the relays H-Bridge is true of these circuits. You don't need diodes that were across the relay coils now. You should use diodes across your transistors though. See the following diagram showing how they are connected.These solid state circuits provide power and ground connections to the motor, as did the relay circuits. The high side drivers need to be current "sources" which is what PNP transistors and P-channel FETs are good at. The low side drivers need to be current "sinks" which is what NPN transistors and N-channel FETs are good at.



A	B	C	D	Function
-	-	-	-	----------
1	0	0	1	Forward
0	1	1	0	Reverse
1	1	0	0	Brake
0	0	1	1	Brake
1	0	1	0	Fuse test :-)
0	1	0	1	Fuse test :-)
Don't do the fuse tests				

Figure 6: DC Motor Driver H Bridge with transistors

III. ADVANTAGES AND DISADVANTAGES

3.1 ADVANTAGES

1. Highly efficient and user friendly design.
2. Easy to operate.
3. Low power consumption.
4. Location of the vehicle can be known using GPS.
5. To detect the crack using IR obstacle sensors
6. GPS and GSM based tracking details sending SMS
7. To avoid the accidents at a single track.
8. Efficient design.
9. Works anywhere in the world (GSM availability).
10. In case of emergency intimation (accident) can be sent to predefined numbers.

3.2 DISADVANTAGES

1. Modem should be properly installed for proper working of the system.

2. Poor network signal can decrease the performance of system.
3. GPS takes time to get the signal from satellite, when the system is switched ON.

IV. APPLICATIONS

1. VIP vehicle tracking.
2. Child and animal tracking.
3. Vehicle Security Applications.
4. Ambulance tracking.

V. RESULTS

The paper "Robust Railway Crack Detection Scheme (RRCDS) using IR OBSTACLE Assembly" was designed such that to detect robust railway crack detection scheme (RRCDS) using IR OBSTACLE assembly system which avoids the train accidents. And also capable of alerting using GPS based GSM modem.

VI. CONCLUSION

"Robust Railway Crack Detection Scheme (RRCDS) using IR OBSTACLE Assembly" is mainly intended to detect the robust railway crack detection scheme (RRCDS) using IR OBSTACLE assembly system.Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, this has been successfully implemented.

This paper can be extended using high efficiency GPS receiver and a GPRS module. The GPRS module gives the intimation of the person to the predefined web link. By interfacing MMC/SD card we can log the path of the crack detected traveled on Google earth in the computer.

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