Journal of Engineering Sciences
Vol 11, Issue 4 ,April/2020
ISSN NO:0377-9254

FAULT DETECTION USING GSM AND GPS IN RAILWAY TRACKS

T.Sowmya[1], P.Pushpa[2], T.Srilakshmi[3]

[1,2&3]AssistantProfessor, Dept. of ECE, St.Martins Engineering college, Dhulapally(v), kompally,Secunderabad-500100 Telangana state, India

Abstract -The Transportation of train always depends on railway tracks (rails) only. If there is any fault in these rails, it creates a major problem. Most of the accidents in the train are caused due to faults in the railway tracks, which cannot be easily identified. Also it takes more time to rectify this problem. In order to avoid this problem, we are using the crack detector robot, which detects the crack in the rails and gives an alarm. A robot is an apparently human automation, intelligent and obedient but impersonal machine. It is relatively, that robots have started to employ a degree of Artificial Intelligence (AI) in their work and many robots required human operators, or precise guidance throughout their missions. Slowly, robots are becoming more and more autonomous**.**

Key Words: Artificial Intelligence, Human automation, crack detector robot, fault, and railway tracks.

1. INTRODUCTION

Faults of railway tracks not only cause deterioration in ride quality but also generate noise and have the potential to cause serious accidents. The track faults have conventionally been measured using exclusive track inspection vehicles. However, this method is costly and is therefore not widely employed on local and sub-main lines. It also has a problem in that very frequent inspections cannot be made if schedules are overcrowded, even on priority lines. If faults can be detected by attaching simple sensors such as IR to commercial vehicles, more efficient maintenance of tracks would be possible. Such vehicles are called "probe-vehicles [1].

The finding of cracks in railways tracks takes time consumption due to manual checking. It reduces the accuracy too. This method of design is having limited intelligence this system involves the design of crack finding robot for finding cracks in railway tracks. This system uses controller for interfacing the robotic vehicle and crack detection sensor. The sensing device senses the voltage variations from the crack sensor and then it gives the signal to the microcontroller. The microcontroller checks the voltage variations between measured value and threshold value and controls the robot according to it. The robotic model is interfaced with the microcontroller [2]. If any crack occurs in the rail, the robot will be stopped and then an alarm will be raised using siren and it sends location details using GPS through GSM.

2. PROPOSED METHOD

The following figure shows the independent modules which are considered in this paper

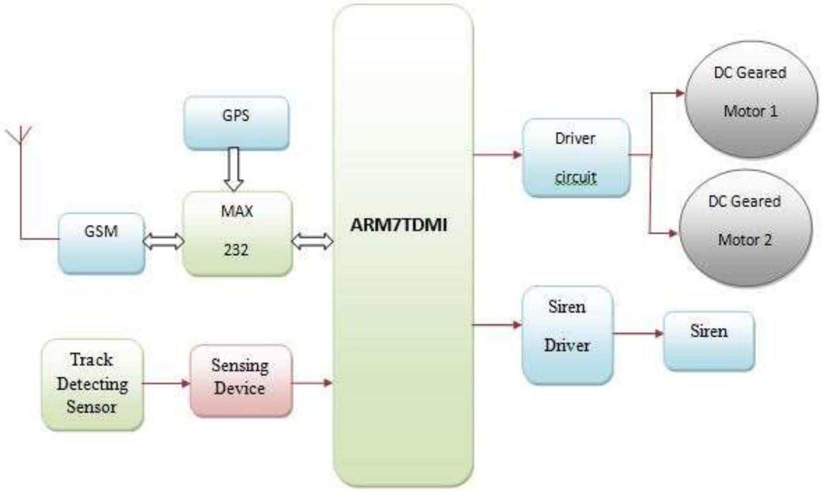

Fig -1: Block Diagram

Hardware components

MICROCONTROLLER (ARM7TDMI)

The LPC2141/2/4/6/8 microcontrollers are based on a 32/16 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty [3].
Due to their tiny size and low power consumption, LPC2141/2/4/6/8 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTs, SPI, SSP to I2Cs, and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.

Vol 11, Issue 4 ,April/2020
ISSN NO:0377-9254

MOTOR DRIVER L293D

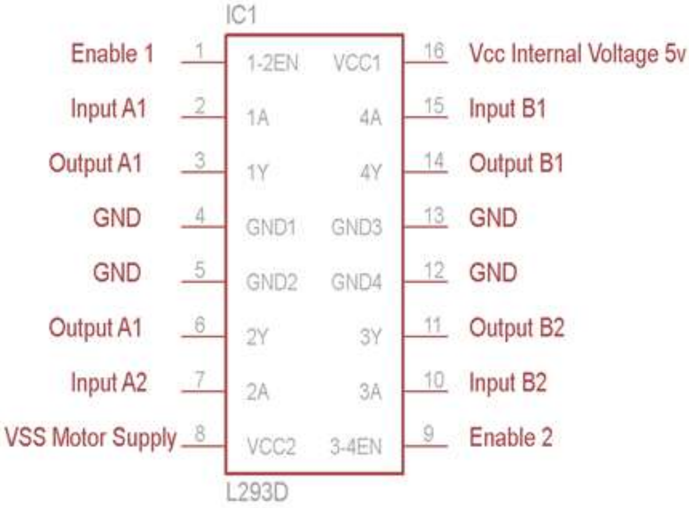

Fig -2: Pin diagram of L293D

The 4 input pins for this L293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1. In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.The pin diagram is shown in fig: 2

SIREN

A siren (also referred to as an air raid siren, tornado siren, tsunami siren, fire siren/whistle, flood siren, weather siren, time/curfew siren, or other outdoor warning siren) is a mechanical or electronic device (modern-day sirens are electrically powered whether they are electronic or mechanical) for generating sound to provide warning of approaching danger and sometimes to indicate when the danger has passed. In some areas in the United States, civil defense sirens may sound in the late morning and early afternoon on a regular basis.

In a mechanical siren, sound is generated by a motor driving a shaft with a special fan (known as a rotor or chopper) on one or both ends. It will have only one fan if it is a single-toned siren, while if it is a dual-toned siren, it will have either one fan on each end or two fans in a stack on one end, with one fan having a few more blades than the other. Around each fan—or chopper or rotor—is a housing with a number of rectangular holes to match the number of fan blades [4]. This housing is known as a stator. The end of each blade has a plate whose shape is matched with the rectangular holes and circular curve of the stator.

The blades draw air in at the end and force it out through the slots in the housing in rapid pulses, as the plates on the end of the blades interrupts that flow, which is what produces the sound. Some mechanical sirens, such as the Federal Signal Thunderbolt series, also employ compressed air that is blown at the rotor to supercharge the sound from the siren, which causes the sound to be sharper and much louder than it would be with the chopper and stator alone. Modern sirens can reach up to, but not commonly, 135 decibels when measured 100 feet (30 m) away from the siren; the loudest confirmed siren ever produced was the Chrysler Air Raid Siren, producing 138 dB at 100 feet.

The Chrysler Air Raid Siren used a 180 HP V-8 Hemi engine to drive the siren and weighed 5543 LB. Most sirens are mounted on poles that are usually around 30 to 50 feet off the ground, but some older sirens can be found mounted on buildings.

MAX232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA-232 voltage levels from a single 5-V supply. Each receiver converts EIA-232 inputs to 5-V TTL/CMOS level. These receivers have a typical threshold of 1.3 V and a typical hysteresis of 0.5 V, and can accept ±30-V inputs. Each driver converts TTL/CMOS input levels into EIA-232 levels. The driver, receiver, and voltage-generator functions are available as cells in the Texas Instruments Lin ASIC library.

JES Journal of Engineering Sciences
Vol 11, Issue 4 ,April/2020
ISSN NO:0377-9254

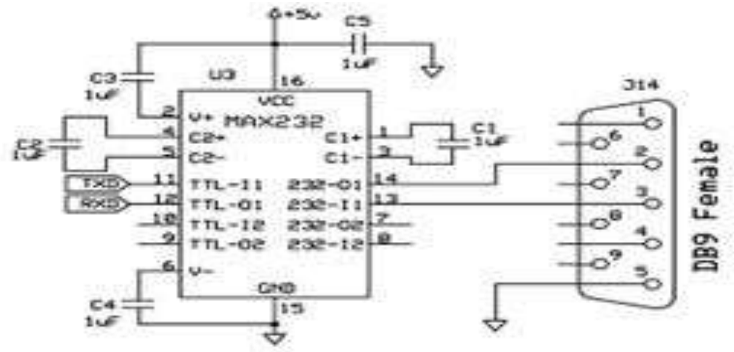

Fig -3: Schematic diagram of MAX-232

Global Positioning System

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits messages which include

- The time the message was transmitted
- Precise orbital information (the ephemeris)
- The general system health and rough orbits of all GPS satellites (the almanac).

The receiver utilizes the messages it receives to determine the transit time of each message and computes the distances to each satellite. These distances along with the satellites' locations are used with the possible aid of trilateration to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included.

The GPS signal allows to repeat this calculation every 6 seconds. Many GPS units show derived information such as direction and speed, calculated from position changes. Three satellites might seem enough to solve for position, since space has three dimensions and a position on the Earth's surface can be assumed. However, even a very small clock error multiplied by the very large speed of light the speed at which satellite signals propagate results in a large positional error. Therefore receivers use four or more satellites to solve for the receiver's location and time. The very accurately computed time is effectively hidden by most GPS applications, which use only the location. A few specialized GPS applications do however use the time; these include time transfer, traffic signal timing, and synchronization of cell phone base stations [5].

Although four satellites are required for normal operation, fewer apply in special cases. If one variable is already known, a receiver can determine its position using only three satellites.

GSM (Global System for Mobile)

It is a globally accepted standard for digital cellular communication. GSM is the name of standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900MHZ. Throughout the evolution of cellular telecommunications, various systems have been developed without the benefit of standardized specification [6]. This presented many problems directly related to compatibility, especially with the development of digital radio technology. The GSM standard is intended to address these problems. The operation is explained in fig:4

Fig -4: Operation of GSM

3. RESULTS:

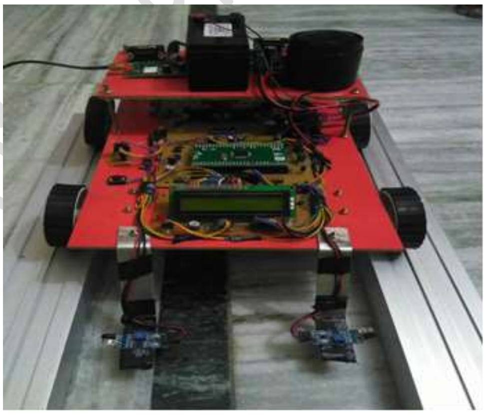

Fig -5: Initial Setup of Prototype

Vol 11, Issue 4 ,April/2020
ISSN NO:0377-9254

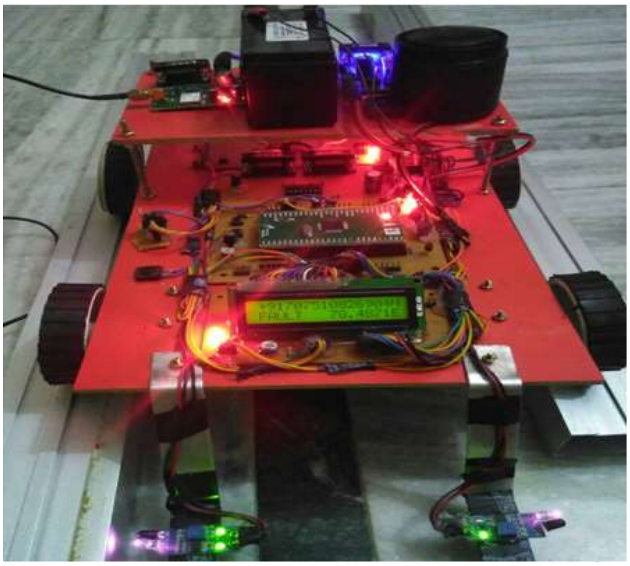

Fig -6: Enrolling Number

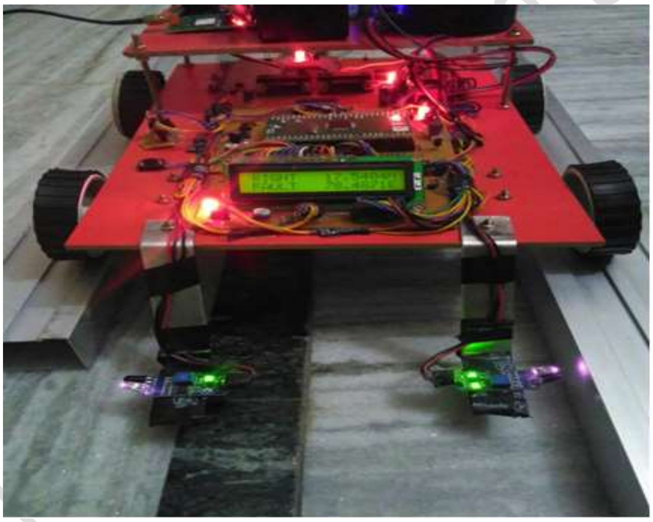

Fig -7: Detecting the fault and displaying message on LCD

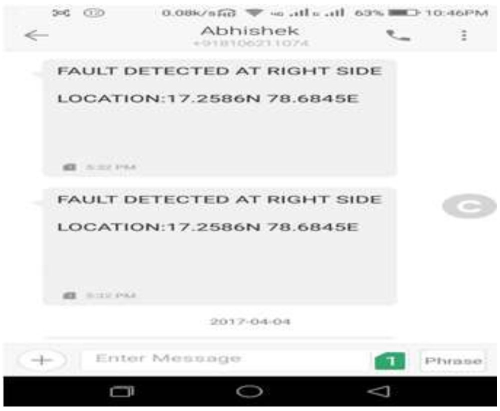

Fig -8: Message is received by the

Enrolled number when fault is identified

4. CONCLUSION

In this paper fault track detection system using Gps, Gsm and robot for detecting faults in the railway track.is implemented such that we can avoid train accidents in real time applications.

.

REFERENCES

[1] Mark D. Sen Gupta, CSIA Executive Conference San Diego, April 2014

[2] M. Kim and K. Kim, AUTOMATED RFID-BASED IDENTIFICATION SYSTEM FOR STEEL COILS, Progress In Electromagnetics Research, Vol. 131, 1–17, 2012

[3]. Ayman Sleman and Reinhard Moeller ``Integration of Wireless Sensor Network Services into other Home and Industrial networks "IEEE paper

[4]. Sadeque Reza Khan Professor Dr. M. S. Bhat “GUI Based Industrial Monitoring and Control System ``IEEE paper, 2014

[5]. Li Da Zu” Internet of Things in Industries: A Survey” IEEE Transactions on Industrial Informatics, vol. 10, no. 4, November 2014

[6].Jinsung Byun, Insung Hong, Byoungjoo Lee, and Sehyun Park, Member Intelligent Household LED Lighting System Considering Energy Efficiency and User Satisfaction,IEEE paper February 2013