IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016

Railway Track Monitoring and Accident Avoidance Using Smart Sensor Network

Prof.Anap.S.D. [1], Ronge Prasanna L. [2], Bhalerao Lalit P. [3], Dharme Sandip P. [4]

Assistant Professor, Dept. of Electronics Engg, P.R.E.C., Loni, India [1]

Dept. of Electronics Engg, P.R.E.C., Loni, India [2, 3, 4]

Abstract: The expanded development in the railroad area has brought about an expansion in the train activity thickness over the world. This has brought about the expansion in the quantity of mischances including trains. In this paper, the proposed framework incorporates a few elements which forestall train mishaps. It incorporates flame recognition, water level identification, Railway track split discovery, This framework makes utilization of IR sensors, fire sensor, GSM and other inserted frameworks Rail mischances have been expanded because of the surge streaming over the Railway tracks. We are proposing a surge identification framework to overcome such mischances. Here, at whatever point we distinguish that there is a flood over tracks, we will send a sign to the train through GSM which will stop the train furthermore send messages to higher powers of south focal railroad.

Keywords: ARM7 Microcontroller, Display, GSM Module, Sensors.

I. INTRODUCTION

Human negligence and human error have become the primary cause for train accidents in India. A train accident also occurs due to natural crises. Currently major train accident occurs in Madhya Pradesh harda in 6 august 2015. Second train accident occurs in Mumbai local train overshoots platform at churchgate in 28 June 2015.[1]

First train accident occurred due to natural crises& human negligence. Second train accident occurred due to human error. To overcome all these limitation we develop new system such as ‘‘Railway Track Monitoring and Accident Avoidance Using Smart Sensor Network (SSN).’’

An implanted framework can be characterized as a registering gadget that makes a particular centered showing with regards to. Apparatuses, for example, the aeration and cooling system, VCD player, DVD player, printer, fax machine, cellular telephone and so on are cases of installed systems.[5] Each of these apparatuses will have a processor and uncommon equipment to inserted frameworks do a certain errand, they can't be customized to do diverse things. Installed frameworks have exceptionally restricted assets, especially the memory [7].

Embedded systems are constrained for power [6]. As many embedded systems operate through battery, the power consumption has to be very low. Some embedded systems have to operate in extreme environmental conditions such as very high temperatures and humidity.[9]

II. BLOCK DIAGRAM AND DESCRIPTION

Description for block diagram

The system consists of ARM controller which is LPC2148 from Philips Company. In this project we are going to develop the Railway Track Monitoring And Accident Avoidance Using Smart Sensor Network

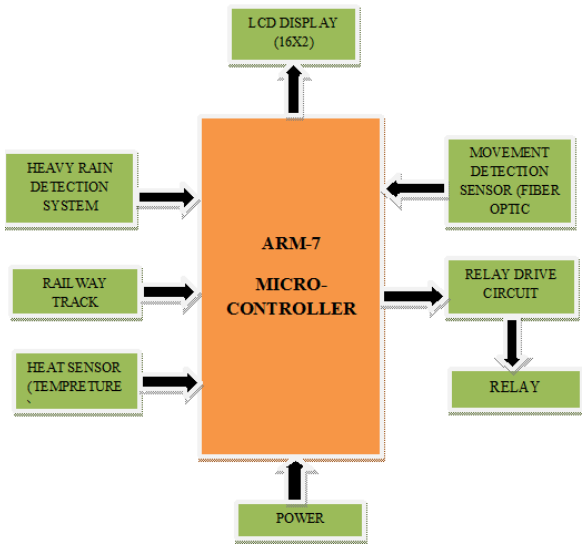

Figure. 1. Railway Security System

The whole system is consisting of microcontroller, sensors, display. In this system we are using GSM technology to send the information to operator. The sensors are connecting to the microcontroller and it will operate the appropriate operation and send to the output device. The sensors consist of fire sensor, visibility detection sensor, heavy rain fall detection sensors, and movement detection sensors[8]. In this the fire sensor is basically temperature sensor which can sense the temperature of the engine and when the temperature is over the particular range which is set by us then the sensor will sense this temperature and send the message to controller. Heavy rain fall detection sensor is basically

Copyright to IJARCCE

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016

used at the station. The SMS is send to the station control room and railway driver when rain fall is excide or over the safety level which is predefined .the rail fall is detected by the device named level sensor or heavy rain fall detection sensor. This sensor senses the level of water at station and immediately inform to station master and railway driver [7]. Railway track system this is another safety purpose system which is mainly used to control the railway from distract. This sensors is basically sense the track is correctly or not if the track is cut anywhere then it will and send the info to the railway driver. With used of this we can reduce accident which can happen because of track cut. Moment detection sensor also plays an important role. If any obstacle is present on the range of this sensor so it will sense that obstacle and it will send the message to railway driver [4].

A. *ARM-7*

The ARM7TDMI™ inserted microcontroller centre is an individual from the Advanced RISC Machines (ARM®) group of universally useful 32-bit microchips, which offer elite and extremely lower force utilization. Its exceptional component is the 16-bit Thumb® subset of the most usually utilized 32-bit directions. These are extended at run time with no debasement of framework execution. This gives 16-bitcode thickness (sparing memory range and cost) combined with 32-bit processor Performance [2].

The ARM engineering depends on Reduced Instruction Set Computer (RISC) standards, and the direction set and related unravel system are much less complex than those of smaller scale modified Complex Instruction Set Computers.

This effortlessness results in a high guideline throughput and noteworthy continuous intrude on reaction from a little and practical chip. Pipelining is utilized so all parts of the preparing and memory frameworks can work consistently. Ordinarily, while one direction is being executed, its successor is being decoded, and a third guideline is being brought from memory.

The ARM memory interface has been intended to permit the execution potential to be acknowledged without bringing about high expenses in the memory framework. Speed-basic control signs are pipelined to permit framework control capacities to be executed in standard low-control rationale, and these control signals encourage the abuse of the quick nearby get to modes offered by industry standard element RAMs[1].

B. *IR SENSOR*

Infrared transmitter is one kind of LED which emanates infrared beams by and large called as IR Transmitter. So also IR Receiver is utilized to get the IR beams transmitted by the IR transmitter.

One imperative point is both IR transmitter and recipient ought to be set straight line to each other. This sensor is fitted before train motor to distinguish any obstruction present on track with in the observable pathway. It sends fitting sign to prepare control framework, which thus Stops prepare promptly if a hindrance is recognized [9].

Figure. 2. IR Sensor

C. *TEMPERATURE SENSORS*

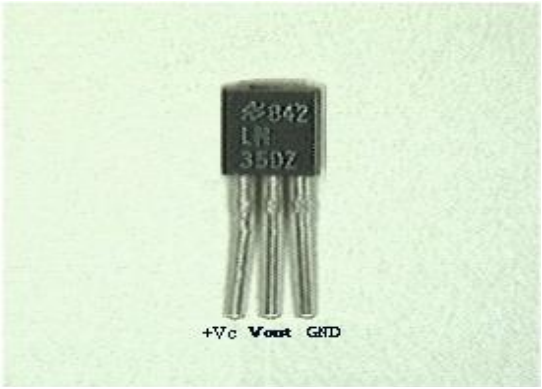

Figure. 3. LM 35

Temperature is the most measured procedure variable in mechanical robotization. Most ordinarily, a temperature sensor is utilized the believer temperature worth to an electrical quality. Temperature are the way to peruse temperatures accurately and to control temperature in industrials applications. The LM35 are exactness coordinated circuit temperature sensors, whose yield voltage is directly relative to Celsius (Centigrade) temperature. The LM35 accordingly has leeway over direct temperature sensors aligned in degrees Kelvin, as the client is not required to subtract a huge steady voltage from its yield to get helpful Fahrenheit scaling [7].

LM35 does not require any outer adjustment or trimming to give run of the mill exactnesses of +1/4 degree Celsius or - 1/4 degree Celsius at room temperature and +3/4 degree Celsius or - 3/4 degree Celsius over a full - 55 to +150 degree Celsius temperature range. The LM35 is evaluated to work over a - 55 degree Celsius to +150 degree Celsius temperature range.

D. *LIQUID CRYSTAL DISPLAY (LCD)*

Alphanumeric showcases are utilized as a part of an extensive variety of utilizations, including palmtop PCs, word processors, scanners, purpose of offer terminals, medicinal Instruments, mobile phones, and so on. The 16 x 2 shrewd alphanumeric speck network presentation is fit for showing 224 unique characters and images. A full rundown of the characters and images is imprinted on pages 7/8 (take note of these images can shift between

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016

brand of LCD utilized). This booklet gives all the specialized particulars to associating the unit, which requires a solitary force supply (+5V) [3].

Figure. 4. 16x2 LCD

E. *RELAY*

The detecting component utilized as a part of the PASCO CI-6628 Infrared Sensor is a thermopile. Thermopile locators are voltage-creating gadgets that can be considered as a smaller than normal exhibit of thermocouples. The thermopile is a high yield, slight film, silicon based gadget which has 48 thermopile intersections. The dynamic or "Hot" intersections are darkened to productively assimilate radiation [6]. The reference or "Cool" intersections are kept up at the encompassing temperature of the indicator.

DPDT transfer: We utilize two hand-off in train control square. One is utilized for controlling the velocity of train when bend or snag is recognized and when love seat bursts into flames. Another hand-off is utilized for turn on/off wire loop which helps in disconnecting lounge chairs if there should be an occurrence of flame mischances [9]. The darkening material utilized on the "Hot" intersections is fit for retaining brilliant vitality from ultra violet to the far infrared. To restrain the ghastly affectability, optical channels and windows might be put before the finder. The window introduced in the locator is a ruby-based material which has a ghostly reaction from noticeable light to the far infrared (around 40,000 nano-meters). The hermetically fixed locator is warmth treated and loaded with argon gas to enhance long haul strength [2].

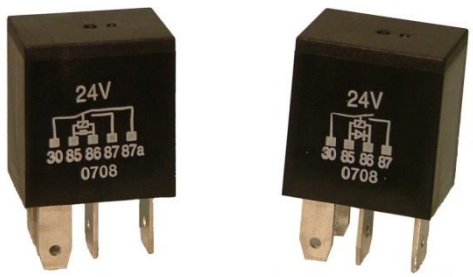

Figure. 5. Relays

The assimilation of radiation by the darkened region causes an ascent in temperature in the "hot" intersections when contrasted with the "frosty" intersections of the thermopile. This distinction in temperature over the thermocouple intersection causes the indicator to produce a positive voltage. On the off chance that the dynamic or "hot" intersection were to cool to a temperature not exactly the reference or "frosty" intersection the voltage yield would be negative. The yield of the thermopile indicator is introduced to an addition selectable speaker. The GAIN switch situated on the highest point of the sensor is utilized to conform the yield of the sensor to a level proper for the trial being performed [5].

F. *GLOBAL SYSTEM FOR MOBILE COMMUNICATION (GSM)*

GSM- a computerized portable telephony framework, which is all inclusive got to by more than 212 nations and regions. Worldwide framework for portable correspondence is totally streamlined for full duplex voice telephony[1]. A GSM modem is a remote modem that works with a GSM remote system. A remote modem acts like a dial-up modem. The primary contrast between them is that a dial-up modem sends and gets information through a settled phone line while a remote modem sends and gets information through radio waves [2]. Like a GSM cellular telephone, a GSM modem requires a SIM card from a remote transporter.

GSM system is made out of a few useful elements, whose capacities and interfaces are determined. Figure demonstrates the design of a non specific GSM system. The GSM system can be isolated into three wide parts. The Mobile Station is conveyed by the endorser; the Base Station Subsystem controls the radio connection with the Mobile Station. The Network Subsystem, the fundamental piece of which is the Mobile administrations Switching Center, performs the exchanging of calls between the portable and other settled or versatile system clients, and additionally portability management.[4]

III. SOFTWARE REQUIREMENT

The drawing of our printed circuit board has been finished with EAGLE. Falcon programming is an entire electronic outline computerization plan for PC agreeable PC. It incorporates outline and PCB module. The µVision IDE as of Keil consolidate arrangement administration, make courtesies, source code altering, program troubleshooting, and finish reenactment in one powerful environment.

IV. ALGORITHM

1. Start.
2. Initialize the system.
3. Sense the crack on railway track.
   - If crack detected send message to control room and railway driver.
   - If not detected the continue detection.
4. Sense water level on the track.
   - If water level exceed prefixed level then send message to control room and railway driver.
   - If water level not exceeding or no water present then continue detection.
5. Sense motion or movement or track.
   - If movement detected then send message to control room or railway driver.
   - If movement not detected then continue detection.
6. Sense fire in engine.

Copyright to IJARCCE
DOI 10.17148/IJARCCE.2016.54242

IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319 5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 5, Issue 4, April 2016

- If temperature level increases beyond certain level than send message.
- If no harm detected than continue process.

7. Continue the whole process.

V.FLOWCHART

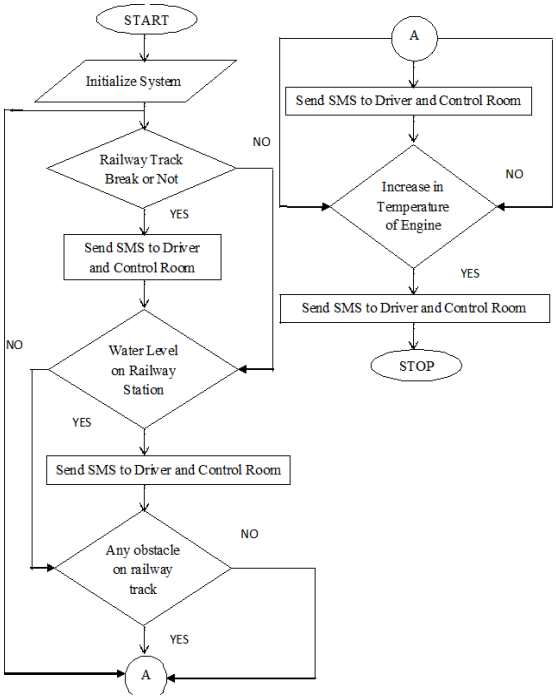

Figure. 6. System Flow chart

VI. CONCLUSION

We emphatically trust that the right blend of most recent data and correspondence advancements can give a viable and doable answer for the prerequisite of a dependable and precise train following framework to enhance the effectiveness and efficiency of Indian Railways. The arrangement we propose includes an intense mix of portable figuring, Global System for Mobile Communication (GSM).

Advances and programming to give a shrewd train following and administration framework to enhance the current railroad transport administration. It can stick point the area and different characteristics of an operational train in a prudent exact way. The accessibility of this data permits the Train Controller to take exact choices with respect to the train area. Situating information alongside train speed offers the organization to recognize the conceivable wellbeing some assistance with issueing and respond to them viably utilizing the specialized method gave by the framework.

ACKNOWLEDGMENT

The authors of this paper would like to address their highest appreciations to the college P.R.E.C. Loni, Pune University in support of this research.

REFERENCES

[1] B. K. Konstantinos Domdouzis and C. Anuba., "An experimental study of the effects of different medium on the performance of advance system," vol. 21. Advanced Engineering Informatics, 2011.

[2] K. M. R. SudeepDogra, "Radio frequency identification (RFID) applications: A brief introduction, advanced engineering in-formatics." The IUP journal of Electrical and Electronics Engineering, 2011, p. 3.

[3] J. Trehag, P. Handel, and M. Ögren, ―Onboard estimation and classification of a railroad curvature,‖ IEEE Trans. Instrum. Meas., vol. 59, no. 3,pp. 653-660, Mar. 2010.

[4] B.Akpinar, ―A new measurement system design for determining al changes on railways,Ph.D. dissertation, Yildiz Technical Univ., Istanbul, Turkey, 2009

[5] NASA. "National Eronauticsand Space Administration." Zervas, E., O. Sekkas, et al. (2007).

[6] Fire Detection in the Urban Rural Interface through Fusion Techniques.Mobile Adhoc and Sensor Systems (MASS 2007)

[7] L. Beales, ―Track system requirements,‖ Railway Group Standards, GC/RT5021, Railway Safety, London, Oct. 2003.

[8] Ember Corporation, EmberZNet Application Developer's Reference Manual,2008

BIOGRAPHIES

Prof. Sachin D Anap,has completed his M.E. (Electronics and Telecommunication) & B.E. (Electronics and Telecommunication). He is working as a Assistant Professor in Electronics Department, Pravara Rural Engineering College, Loni, Dist. Ahmednagar, Maharashtra, India. Prof. S.D.Anap has teaching experience of 08 years to Graduate Students. Prof. S.D.Anap has Published 07 papers in International Journal, 01 paper in National Journal & presented 03 papers in National Conference.

Mr. Prasanna L. Ronge is pursuing his B.E Electronics engineering degree from PRAVARA RURAL ENGG college, loni. Dist. ahmednagar, Maharashtra, India. I presented paper in NATIONAL LEVEL event.

Mr. Lalit P. Bhalerao is pursuing his B.E Electronics engineering degree from PRAVARA RURAL ENGG college, loni Dist. ahmednagar, Maharashtra India. I presented paper in NATIONAL LEVEL event.

Mr. Sandip P. Dharme is pursuing his B.E Electronics engineering degree from PRAVARA RURAL ENGG college, loni. Dist. ahmednagar, Maharashtra ,India. I presented paper in NATIONAL LEVEL event.