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A NOVEL APPROACH OF TRAIN PREVENTION SYSTEM FROM COLLISION USING AVR MICROCONTROLLER

K.Govindaraju[1], F.Parvez Ahmed[2], S.Thulasi Ram[3], T.Devika[4]

PG Student, Embedded System Technologies, Knowledge Institute of Technology, Salem, India[1,2,3]

Assistant professor, Department of EEE, Knowledge Institute of Technology, Salem, India[4]

Abstract: Rail transports are facing major challenges in our day to day life. On other hand, it must meet the needs of citizens for quality of moving easily while, on the other, it must provide a valid alternative to other nodes of transport against a backdrop of rising fuel prices and the increasing importance of the effect of transport on the environment. In conventional system the nodes are activated manually, which could lead to human error. In our proposed idea portrays to avoid accidents in the railway system. In this system to prevent the collision between the trains by using sensors. It may helps to save the human life from accidents by implement this paper in railway transport. By implementing this automatic system which could avoid human error. In this research paper if the train goes in a wrong path, the signal is given to the station node which could immediately stop the train and route it in the correct path. The station node also given the instruction to the next train which is coming in the same path and may avoid accident between the trains The proposed system is used to protect the accidents between the trains automatically which helps for safety purpose by using buzzers, switches, microcontroller, LCD,MAX 232 serial communication, IR Sensors, DC Motor, Motor drive, Zigbee transmitter and receiver. The novel system is implemented with the support of embedded processor and the simulation is achieved through Keil C software and results are discussed.

Keywords: AVR Microcontroller, Zigbee, Motor driver, IR pairs, Buzzer. Keil C Software.

I. INTRODUCTION

One of the most widely used and comfortable nodes of transportation system is train, but occasionally, accidents are occur due to collision as well as other reason. It is very difficult to stop such collisions because of speed of moving trains, which is needs a lead distance to stop. Collisions are happened due to human errors and/or faulty equipments.

Sensor networks become more and more popular such type of more collisions are avoided by using sensors as well as cheap. The sensor network is a wireless network formed by a group of sensors deployed in same region, which can be used to measure the air pressure, temperature, acceleration, etc. Sensors can transmit signals via radio signal. Since sensors are now small and cheap, they can be deployed on a large scale. It become more and more important for applications like security, traffic monitoring, agriculture, battlefield, etc. Most of those sensors are powered by batteries.

A wireless sensor device is a battery-operated device, capable of sensing physical quantities. In addition to sensing, it is capable of sensing wireless communication, data storage, and a limited amount of computation and signal processing. Advances in integrated circuit design are continuously shrinking the size, weight and cost of sensor devices, while simultaneously improving their resolution and accuracy. At the same time, modern wireless networking technologies enable the coordination and networking of a large number of such devices. The additional nodes are added to enhance the detecting capability and if one node fails to sense, the other nodes will sense.

II.LITERATURE SURVEY

In Carey, M. et al[1] developed heuristic algorithms to assist in the task of finding and resolving the conflicts in draft train schedules. We start from algorithms that schedule trains at a single train station, and extend these to handle a series of complex stations linked by multiple one-way lines in each direction, traversed by trains of differing types and speeds. To test the algorithms we applied them to scheduling trains for a busy system of 25 interconnected stations, with each station having up to 30 sub-platforms and several hundred train movements per day. We here report on the results from many hundreds of test runs. To make the tests more challenging, the algorithms start from initial draft timetables that we constructed so as to contain very large numbers of conflicts to be resolved. The algorithms, implemented in C code and run on a Pentium PC, found and resolved all conflicts very quickly.

In Carville, S. et al[2] develop an experiment with a simulation model to predict the probability distributions of these knock-on delays at stations, when faced with typical patterns of on-the-day exogenous delays. These methods can be used to test and compare the reliability of proposed schedules, or schedule changes, before adopting them. They can also be used to explore how schedule reliability may be affected by proposed changes in operating policies, for example, changes in minimum headways or dwell times, or changes in the infrastructure such as, layout of lines, platforms or signals. This model generates a Reliability analysis for each train type, line and platform. We can also use the model to explore some policy issues,

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and to show how punctuality and reliability are affected by changes in the distributions of exogenous delays.

In S. Ramesh et al[3] portrays prevention of service failures in track. As is the case with all modes of high-speed travel, Rail is manufactured in different weights; there are different rail conditions (wear, corrosion etc.) present; there are a significant number of potential defects possible; and the task has to be performed with some speed to reliably inspect the thousands of miles of track stretching across the land failures of an essential component can have serious consequences. The main problem about a railway analysis is detection of cracks in the structure. If these deficiencies are not controlled at early stages they might cause huge economical problems affecting the rail network unexpected requisition of spare parts, handling of incident and/or accidents). The main part of the work was to carry out a feasibility study on two methods for detection of cracks and avoidance of the collision between the rails. The detection of cracks can be done by ultrasonic waves or sensor. Collision avoidance system can be done by the following nodes: Server side node, train side node, track side node and station side node.

In Faria Sultana et al[4] proposed system is to safe guard people's life and government property. This paper will focus on the system that will detect and control the fire accidents on running train. In-house parameters such as temperature and humidity in the each coach can be monitored in real time. From the information collected by the sensor system, decisions for firefighting, alarming, and automatic water sprinkler system can be made more quickly by the relevant system or engine driver. After receiving the signal, the engine driver will stop the train and take necessary action.

In Garcia, G et al[5] described in railways provide a better alternative to other modes of transport by being energy efficient since it can carry large number of people and goods at the same time. In the recent years, number of accident due to trains are more and the losses also heavy. The main reason for these accidents is irresponsibility of driver and signalling problems which results severe damage to life and property. We have proposed a new method called Intelligent Collision Avoidance System (ICAS) for avoiding frontal collision. This system avoids the collision in an efficient way by notifying the status of two trains in the same track when they are separated by three kilo meters. This is done by warning the driver both visually and by giving a sound alert. The ICAS will manage situations efficiently and notify the opposite train which is on the same track. We have designed a new vibration sensor for sensing the train on the track. Analyses of channel model for different geographical area discussed. The prototype is designed using micro controller and tested successfully through wireless communication.

III.PROPOSED HARDWARE SYSTEM

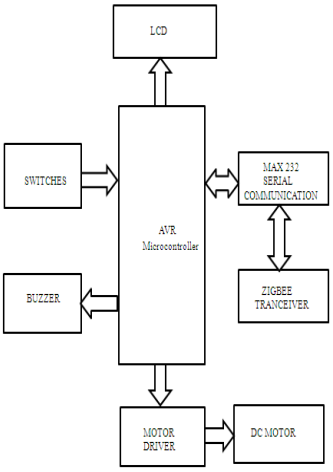

Fig-1Block diagram of unit at train

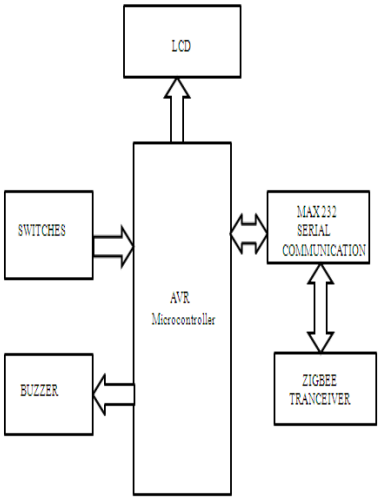

Fig -2.Block diagram of unit at station

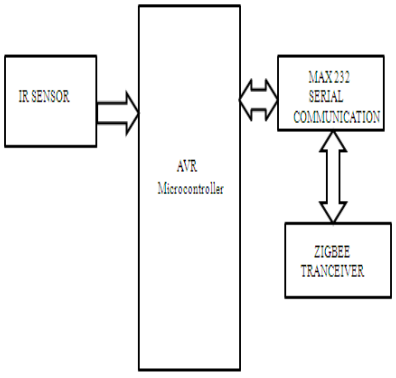

Fig-3. Block diagram of sensor node

WORKING PRINCIPLE

In this research paper is used to prevent the collision between the trains by using sensors. It helps to save the human life from accidents by using automatic system than manually. The Block Diagram consists of unit at train, unit at station and a sensor node. First we generate the

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database for the train and station node. While the train is crossing through the sensor node, the IP address is transmitted between train and sensor node. Then it checks IP address for corresponding database. If the IP address is same, it allows the train to travel in the same path. Incase if the IP address is mismatched the sensor node does not allow the train to move forward in the same path.IR sensor sense the distance between the trains, then it passes the information to motor driver unit. The motor drive is used to control the speed of the train.

The LCD at train node is used to display the IP addresses of the train and the sensor. Additionally, the block diagram consists of buzzer unit which is to used to create the sound and to alert the driver. Then the driver stop the train at certain distance by manually. Using this procedure, we can avoid collisions between the trains and save the human life.

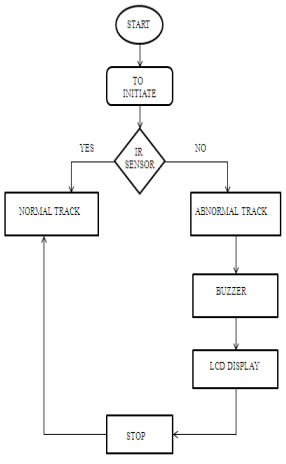
IV.SOFTWARE IMPLEMENTATION

The proposed system has implemented Keil C development tools for the microcontroller family to support every level of developer from the Professional applications engineer to the student just learning about embedded software development. The industry standard Keil C compilers, Macro assemblers, Debuggers, Real time kernels, and single board computers support all compatible derivatives and help you to get your projects completed on schedule. With the Keil tools, we can generate embedded applications for virtually every microcontroller process applications. Keil C vision 4 help provide the variation simulation output.

A. ALGORITHM:

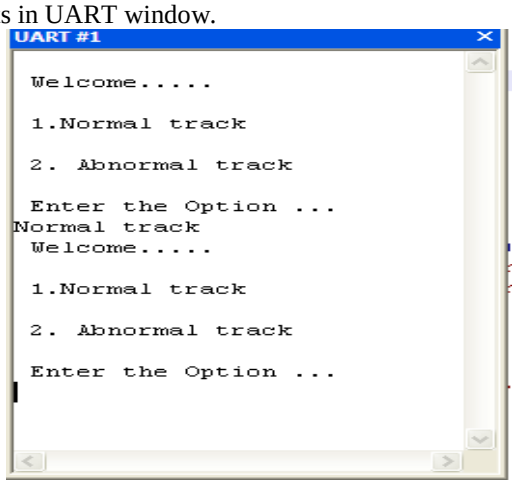
Step1: Start the process.
Step2: initialize power is supplied to IR sensor.
Step3: Two areas are normal track and abnormal track.
Step5: The GPS ready to track the location and buzzer raising and display the message by using LCD.
Step6: Automatically indicate to the driver when abnormal track.
Step7: After the process completed it getting move to normal track.
Step8: Stop the process.

B. FLOWCHART:

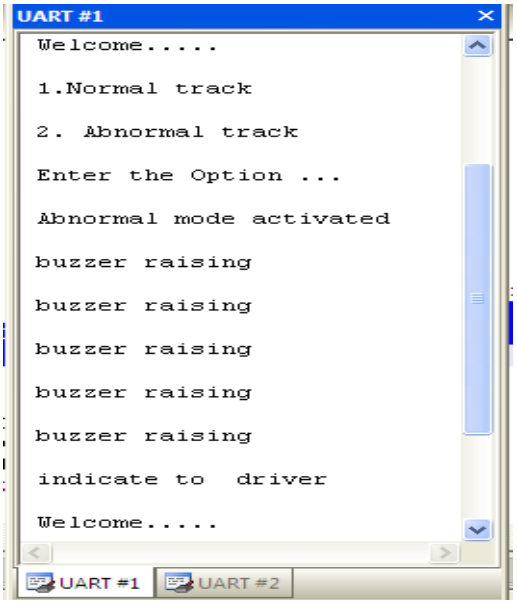


C. SIMULATION RESULT:

In our research we use the microcontroller board for [porting our ideas. Since after the debugging, we get the results in UART window.



MODE 1 is selected, UART displays to select the desired track 1 or 2(for displaying normal or abnormal track).then the UART display when normal track activated no indication is occur.



MODE 2 is selected ,UART displays to select the desired track1 or 2(for displaying normal or abnormal track).then the UART display when abnormal mode is activated buzzer become raising and indicate to the driver.

V. CONCLUSION

In this research paper is mainly designed in order to avoid accidents between the trains and to alert the drivers about the track for travel safely. Our idea portrays by using three different nodes and sensor pairs, we identifying the database of train and and gives the information between the station and train by using serial port communication.If the IP addresses are mismatched it alert the driver by using Buzzer to stop the train manually as well as automatically by using sensors to avoid collision between the trains and save the human life. Future scope of this paper is used to control the accidents and positioning the accidental Rail. Many existing systems has discussed about the safety's

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and many methods are proposed for detecting the abnormal track. Then the result is simulated and achieved by Keil C software.

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REFERENCES

[1] Carey, M. and Carville, S. (2003). Scheduling and platforming trains at busy complex stations,Transportation Research, Part A, Vol. 37, pp. 195-224.
[2] Carey, M. and Carville, S. (2000). Testing schedule performance and reliability for train stations, Journal Operational Research Society, Vol. 51, pp. 666-682.
[3] S. Ramesh "Detection of Cracks and Railway Collision Avoidance System", International Journal of Electronic and Electrical Engineering ISSN 0974 -2174 Volume 4, Number 3 (2011), pp. 321-327
[4] Molla Shahadat Hossain Lipu, Md. Lushanur Rahman, Tahia Fahrin Karim, Faria Sultana, "Wireless Security Control System & Sensor Network for Smoke & Fire Detection" , 2010 IEEE.
[5] Garcia, G. and Zhang, J., Application of ultrasonic phased arrays for rail flaw inspection, U.S.Department of Transportation Report, Federal Railroad Administration, July2006
[6] NWCG (2005). National Fire Danger Rating System Weather Station Standards
[7] Shurmer, H. V. and J. W. Gardner (1992). "Odour Discrimination with an Electronic Nose." Sensors and Actuators B: 1-11.
[8] Yu, L., N. Wang, et al. (2005). Real-time forest fire detection with wireless sensor networks.Wireless Communications, Networking and Mobile Computing.
[9] Zervas, E., O. Sekkas, et al. (2007). Fire Detection in the Urban Rural Interface through Fusion Techniques.Mobile Adhoc and Sensor Systems (MASS 2007).
[10] Lim, Y.-s., S. Lim, et al. (2007). A Fire Detection and Rescue Support Framework with Wireless Sensor Networks.Convergence Information Technology.

BIOGRAPHIES

K. Govindaraju is pursuing, PG in the discipline of Embedded System Technologies at Knowledge Institute of Technology, Salem, under Anna University, Chennai, India. He received his UG degree in the discipline of Electronics and Communication Engineering at KSR College Of Engineering under Anna University, Chennai, India. He has presented a number of technical papers and projects in Technical symposiums. He is the Executive Member of Embedded Club at Knowledge Institute of Technology, Salem. He is doing minor research works on various fields like Embedded systems, Digital image processing ,Renewable Energy systems and ARM Processor. He got best project award for his project in UG.

F.ParvezAhmed is pursuing, PG in the discipline of Embedded System Technologies at Knowledge Institute of Technology, Salem, under Anna University, Chennai, India. He received his UG degree in the discipline of Electronics and Communication Engineering at Mahendra Engineering College under Anna University, Chennai, India. He has presented a number of technical papers and projects in Technical symposiums. He is the president of Embedded Club at Knowledge Institute of Technology, Salem. He is doing minor research works on various fields like Embedded systems, Digital image processing and Renewable Energy systems. He got best project award for his project in UG.

S.Thulasiram is pursuing, PG in the discipline of Embedded System Technologies at Knowledge Institute of Technology, Salem, under Anna University, Chennai, India. He received his UG degree in the discipline of Electronics and Communication Engineering from Technologies at Sengunthar Engineering college, under Anna University, Chennai, India. He has presented a number of technical papers and projects in Technical symposiums. He is the Executive member of Embedded Club at Knowledge Institute of Technology, Salem. He is doing minor research works on various fields like DSP, Embedded Systems, and Digital image processing. He got best project award for his project in UG.

T.Devika is currently working as an Assistant Professor in the Department of Electrical and Electronics Engineering at Knowledge Institute of Technology, Salem. She received his UG degree in the discipline of Electrical and Communication Engineering from Velammal Engineering college under Anna University, Chennai and got PG degree in Applied Electronics discipline from Anna University, Chennai. She has presented papers in National and International level conferences. She has guided number of project for students. Her research interests lie in the field of DSP, Embedded System, Digital System Design and Digital Image Processing.