RAILWAY SAFETY SYSTEM USING MULTI-SENSOR NETWORKS

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Abstract : Safety in the railway system are very necessary compared to road transport system. However, due to high development of railway lines and growth of automation systems it is very important to implement safety elements in the railways in order to avoid accidents and it is very important to maintain safety during the process of liberalization with scientific and technical progress. This paper explains how railway accidents can be avoided and railway safety system can be maintained. Complete system including software and hardware components with ultrasonic sensor, to detect obstacle on the track and it measures at what distance the object is present, Temperature sensor is used for detection of fire and detaching of coaches when fire occurs and detection of the track using track detector.

Index Terms- **Obstacle detection, fire detection, detaching of coach, track detection.**

I. INTRODUCTION

The Indian Railways has the world's fourth largest railway network in the world. The railways traverse the length of 113,617 kilometres (70,598 mi) more than rate 63,974 km and 7,083 stations and carry over 20 million passengers and 2 million tons of freight daily. It is one of the world's largest commercial or utility employers, with more than 1.6 million employees. About 15000 trains work every day. Even when there is well-known and exciting network, the Indian rail is still in the emergent stage. The rail transport of India is developing step by step. Our facilities are not enough when compared to other international standards and as result, there have numerous derailments that have resulted in severe loss of human lives and properties as well.

The Railways has the most complex and involved interdependencies. Safety on the Railways is the end product of the cohesive fusion of its myriad parts. A single flaw in the 64,600 route km of track that criss-cross the country, a defect in over 9,500 locos, 55,000 coaches that haul about 23 million passengers an incorrect indication on one of the thousands of signals that dot the rail landscape, a mistake or an act of negligence by one of its staff directly associated with train running.

To reveal the violence problem many statistics say that there have many accidents occurred through these unidentified tracks and due to huge object appearance on the tracks. On further analysis these factors cause rail accidents, current data reveal that around 60% of the rail accidents have derailments as cause, of which 90% are because of breakages on the track either due to usual causes(like extreme growth due to heat) or due to antisocial elements.

II. LITERATURE SURVEY

Each time there is a train accidents, the issue of safety in Indian Railways comes to the fore. The recent train accident in Uttar Pradesh has again triggered a debate on Safety. There were a total of 803 accidents in Indian Railways killing 620 people and injuring 1855 people during the period 2009 to 2015. Majority of the accidents were due to derailments of trains and firing in the train. More work has to be done with different techniques to avoid accidents and provide safety in Indian railway.

The framework that will identify and control the fire accidents on running train. In-house parameters, for example, temperature and dampness in the each mentor can be observed in genuine time[1]. From the data gathered by the sensor framework, choices for firefighting, disturbing, and programmed water sprinkler framework can be made all the more rapidly by the applicable framework or motor driver. In the wake of accepting the flag, the motor driver will stop the prepare and make vital move.

Under the radar surface defect collision driving quality and provide protection of the rail system. Many of these defects can be impact in vision inspection system. Due to illumination dissimilarity and variant of mirror image property of rail exterior. First of all VIS acquires rail image depending on image acquisition approach but it will surely be cut into sub-image of railway track by track extracting algorithms. enhances difference of train image using LM method and this is low linear VIS it picks up and defect using problem localization based on protrusion profile, it is strenuous to noise and fast[2].

Rail inspection is an essential task in railway maintenance. It is periodically needed for preventing dangerous situations and ensuring safety in railways. At present this task is operated manually by a trained human operator who periodically walks along the track searching for visual anomalies. The manual inspection is lengthy, laborious and subjective. This papers presents a new vision based technique to automatically detect the presence or absence of parts of interest in rail tracks[3].
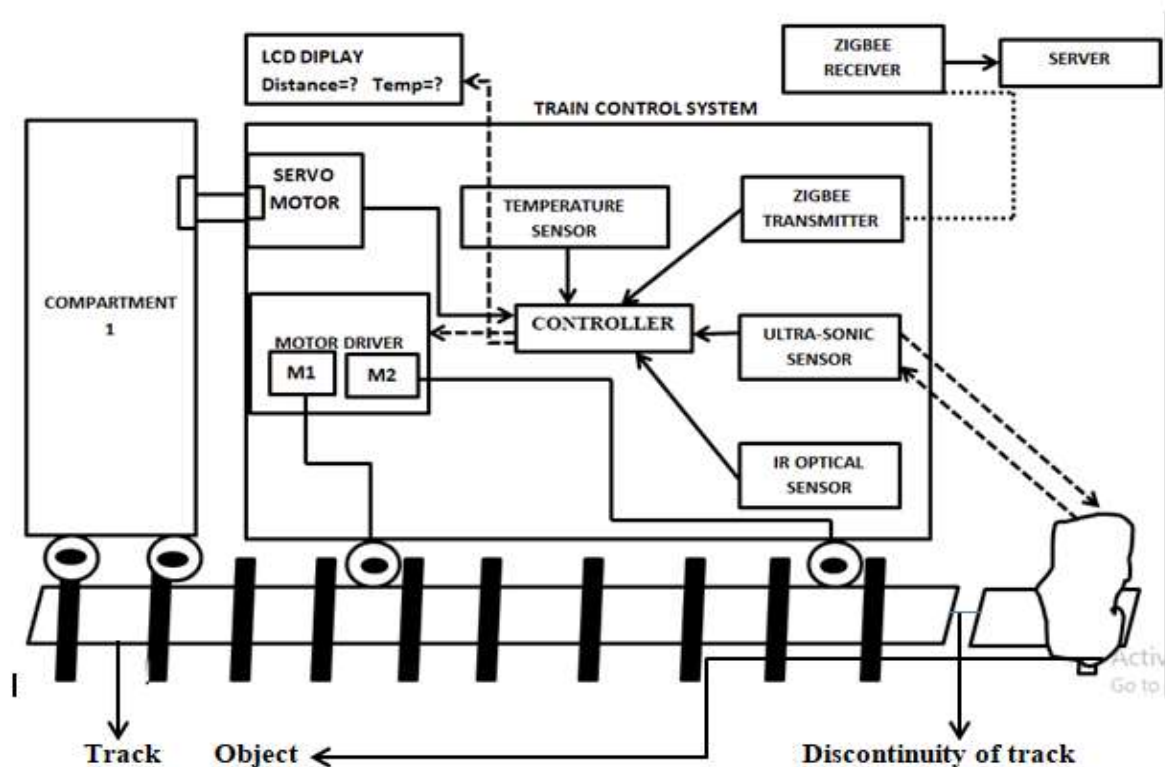
III. METHODOLOGY

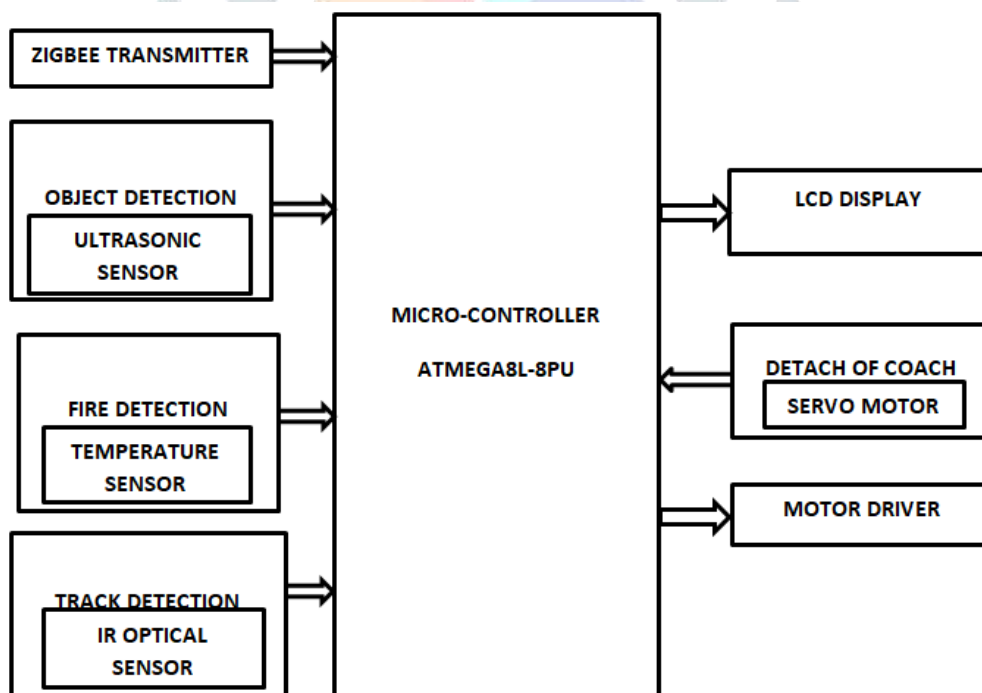

Fig.1 System Architecture

Fig.2 Train Control System

Train control block consists of track detector consisting of IR optical sensor, ultrasonic sensor and temperature sensor. When vehicle is powered on, it moves on the track with the help of wheels. Track detector is placed below the train model it continuously monitors the track to check continuity of the track. Suppose there is discontinuity on the track then signal will be send to train control block to slow down the speed of train .

Ultrasonic sensor is placed in front of the train control block it acts obstacle detector. When object appears on the track, sensor will sense the object and signal will be sent to the train control block through zigbee transmitter to stop the train. Here distance of the object will be obtained in-terms of Cm which will be displayed on LCD which is placed in train control block.

    Temperature sensor is used to detect the fire. When temperature of the compartment increases then signal will be sent to the train control block to detach the fired compartment. Detaching of the compartment is done with the help of relay and servo motor. Temperature of the train will be obtained on LCD screen in-terms of degree Celsius.

    Even in the absence of train suppose if object appears on the track then signal will be sent to server section through zigbee transmitter. zigbee receiver which is connected to the server uses COM3 X-CTU tool which continuously monitors the information about distance of the object, appearance of the object on the track and train temperature.

IV. RESULTS

When object is detected and fire is detected , distance of the object and temperature of the coach is as shown in LCD display

Fig.3Train Data on LCD display

Here ZigBee receiver receives the signal , so that when fire is detected the temperature of the train and when object appears on the track the distance of the object will be displayed in the server which is shown in below fig.

Fig.4 Serial monitoring of the object distance and temperature

Fig.5 Serial monitoring of the track

V.CONCLUSION

ATMEGA8P-8LU Microcontroller is used as hardware platform to design the proposed safety system for railway with Zigbee as a Communications platform of wireless area network, which can transmit, receive and display the track and train information. It has been observed that object has been detected accurately using ultrasonic sensors, fire detection has been done using temperature sensor, which is displayed both in LCD and server section and detaching of coach when fire is detected. The Result shows that this new innovative technology will increase the safety systems in railway transport. By implementing these features in real time application railways can minimise the accidents.

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