ISSN (Online) 2395-2717

International Journal of Engineering Research in Electrical and Electronic Engineering (IJEREEE)
Vol 3, Issue 5, May 2017

ACT System In Railways using Actuator

[1] Shanthosh Dhanajaya, [2]SanthoshKumar B R, [3]Vinod K, [4]PrasannaKumar E, [5] Prof. K V Malini, [6] Prof. Vennila D A
[1] UG Scholar, [2] UG Scholar, [3] UG Scholar, [4] UG Scholar , [5] Asst. Prof/HOD, [6] Asst. Prof.
Dept. of EEE, Sri Sairam College Of Engineering, Bengaluru,

***Abstract*— The main purpose of this paper is to detect the obstacle on the curved railway track and to take preventive step to save the lives. The major problem in the obstacle detection is at the curved portion of the track. So this paper provides the detection process in every case accurately. Our focus is on systems where the sensors are fixed on the railway sleepers of curved portion, were it can detect the obstacle i.e., living and non living objects and communicate with the loco pilot through IOT technology to stop the train automatically. For backup protection actuators are used either it can be pneumatic or hydraulic blowers. The solution to prevent these accidents is to create early warning detection device for locomotive driver before the collision or accident occurred so that locomotive drivers can avoid them.**

***Index Terms*— Sensors, Internet of Things (IoT), Actuators.**

I. INTRODUCTION

This work is concentrated on reducing the railway accidents due to human and animals on railway tracks. The primary goal of this system is to prevent the loss of life.In India alone, 150 elephants have died while crossing the railways tracks. The recent Incident occurred last month when an 18-month-old elephant was found severely injured on the side of the tracks in Belagavi, Karnataka. Published statistics indicate that the number of deaths at rail crossings is the highest among rail-related fatalities. Over the last five years, incidents at rail crossings (including trespassing) have accounted for 93.8% of the deaths and 12% of the injuries in rail operations. Nevertheless, each year, collisions cost the society about 1.8 billion dollars in medical costs, insurance payments, legal fees, and damages to railroad property. So with the help of the sensors, detection of obstacles is done and trying to clear the obstacles for the safe journey of the locomotive.
Improving safety and availability of railway transport service requires detection and triggering of alerting mechanism to avoid possible collision of train with obstacle and other form of adverse incidents.

II. METHODOLOGY

Detection of the obstacle in the straight track is easy as compared on curved track. On the straight track the loco pilot himself can see the object if any on the track.
In case of curved track the vision for the pilot from locomotive side to the opposite side is difficult.
In order to overcome this, proposed system will be very helpful.
The ultrasonic or IR sensors are fixed on the sleeper of the track at all the curved portion of the railway system. In case of any obstacle on the track the sensor detect it by transmitting and receiving the signals. The sensor on the sleepers will be continuously operating condition. As the obstacle is detected it sends the indication to the locomotive and the braking system gets activated to stop the train before reaching the place where the obstacle is present.

III. ADVANTAGES

- This type of device can be used in both day and night.
- The cost of devices used is less hence it is very economic.
- Detection of any type object can be done.

IV. LIMITATIONS

- The sensor must be in continuous operating condition.
- Many sensors are required in case of long curved tracks

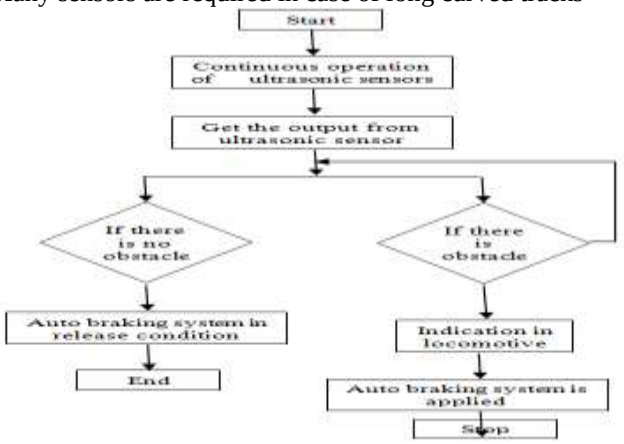

Fig (1) Flowchart of proposed system

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In this flowchart fig (1) we can clearly understand the sequential steps of the system. These sequential steps are automatically processed. This concept makes the system simpler than other.

VI. EQUIPMENT

6.1 THE TRACK SENSING

The demonstration uses ultrasonic or Infra Red (IR) sensors to sense the line tracks; a sensors (Transmitter) and sensors (Receiver), used in detection. The sensors are placed in between the rails as well as on either outside of the rails shown in fig (1). These sensors are placed at a height bit more than the rail and they are adjusted to sense along the track.

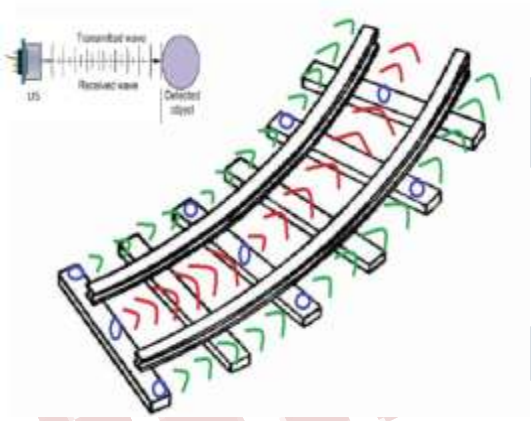

Fig (2) Track Detection setup

6.2 DETECTING OBSTACLE

When the obstacle is on the track or even on the rail portion the sensors detect the object.

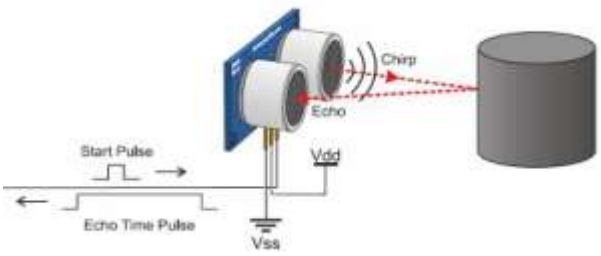

Fig (3) Sensing

The sensor emits the signal and reflected back is received by the receiver that shows the detection part.

6.3 IOT TECHNOLOGY

As the obstacle is detected on the track the signal is transferred to the locomotive and gets displayed. These data is transferred via

Wifi system. As the data get transmitted to the locomotive the locomotive is automatically get stop using the brake system. By using a wireless transmission for data transfer is done using IOT. The IoT allows objects to be sensed or controlled remotely across existing network infrastructure creating opportunities for more direct integration of the physical world into computer based systems and resulting in improved efficiency.

When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber physical systems.

6.4 ACTUATORS

The purpose of the actuator is for backup protection and this actuator is optional to use. Here, in the proposed system mechanical actuator is used. The actuator is fixed at the front portion at the right or left end of the locomotive in parallel. As the motor drive is activated manually through Blynk software it rotates about 90 degree, the small or movable obstacle is pushed out of the track and comes to its initial position. This helps in clearing the obstacle from the track.

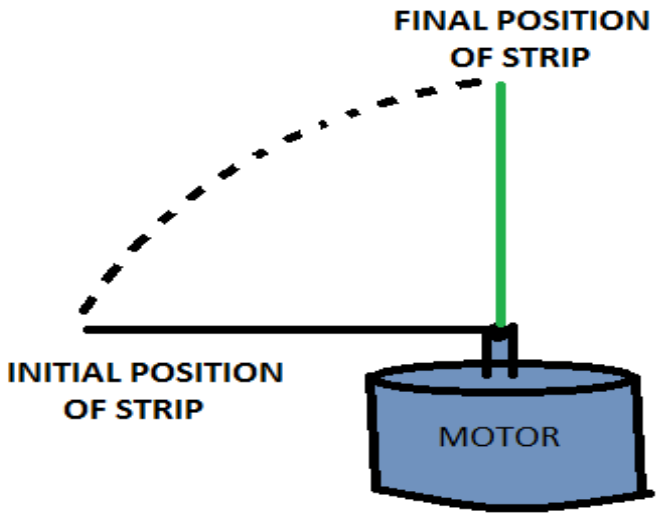

Fig (4) Mechanical Actuator

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VII. CONCLUSION

To avoid the collision of train with obstacle, this may also cause derailment of train. We implemented a sensor detection system. The product was tested and working properly. By using this project many human lives can be saved. This project can work in any atmospheric conditions. Without any human involvement the trains will automatically stops, if any sensors get activated. This project can be used in both day and night, so number of accidents can be reduced.

VIII. FUTURE SCOPE

In order to continue in the pursuit of this objective multiple strategies can be followed to improve the system. Here we list some of them. Use of solar to power the sensors and also use of other appropriate sensor to decrease the number of sensor module used at curved track.