

Eradication of Elephant Mortality and Injuries Due to Railway Accidents Using LOAD CELL and Wireless Technology

Abhishek Roy¹ | Barnali Guha² | Durga Shankar Roy³ | Rhijisha Dutta⁴

^{1,2,3,4} Electronics and Communication Engineering, Guru Nanak Institute of Technology, Kolkata.

To Cite this Article

Abhishek Roy, Barnali Guha, Durga Shankar Roy and Rhijisha Dutta, "Eradication of Elephant Mortality and Injuries Due to Railway Accidents Using LOAD CELL and Wireless Technology", *International Journal for Modern Trends in Science and Technology*, 6(11): 18-20, 2020.

Article Info

Received on 06-October-2020, Revised on 18-October-2020, Accepted on 25-October-2020, Published on 30-October-2020.

ABSTRACT

One of the most recent reasons behind decreasing the population of elephants, is railway accident. This report explains the process to reduce elephant mortality and injuries due to railway accidents by the use of Load cell and Wireless technology. When the threshold weight value of Load cell exceeds, it is detected by a buzzer system connected to the whole set up. After receiving the buzzer signal, position and movements of the elephant with respect to the load cell boundaries around railway track, is tracked by GPS technology and monitored by the nearest forest department and the railway authority. This system is flexible and easy to implement and can be beneficial for saving the wild lives, and to reduce the related complexities like railway accidents, destruction of vegetation and threat to human life in the occasion of straying of elephants out of their habitation zone.

Key Words: reduce elephant mortality and injuries, railway accidents, threshold weight exceeds, load cell, buzzer system, automatic tracking, GPS technology

INTRODUCTION

The earth, its ecosystems and its creatures are all deeply connected. There are many animals we rely on for our benefit. Many animals actually help human beings just by performing their natural roles to the environment. Wildlife plays an essential role to maintain the ecological balance of nature. Elephants are an important part of keeping ecosystems fertile and maintaining plant populations. But the recent increase in the elephant mortality and injuries due to railway accident, need to be controlled. Most of the times when elephants come across the railway track they got severely injured or crushed to death. According to the information of forest department, minimum 50-60 elephants die every year due to railway

accidents. This report will give a solution of this problem and it will be a better solution than only tracking method.

SYSTEM MODEL

Load Cell

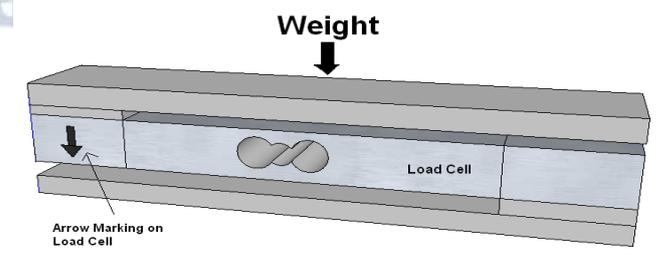


Fig 1: A : Load Cell

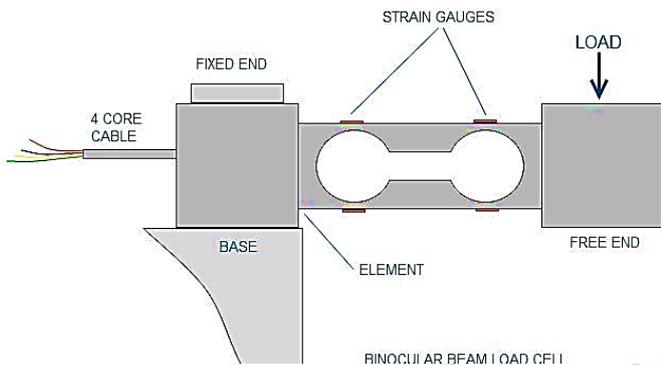


Fig 1: B : Working Diagram of Load Cell

In this set up Load cell is used as a weight sensor to measure the weight of elephants. Load cell is a transducer that converts a load or force acting on it into an electronic signal. This electronic signal can be a voltage change, current change or frequency change depending on the load and circuitry used. Theoretically, this sensor detects changes within a physical stimulus like force, pressure or weight and produces an output that is comparative to the physical stimulus. So, for a specific stable load otherwise weight size, this sensor provides an output value and that is comparative to the weight's magnitude.

GPS Tracker

We all are familiar to the use of GPS tracking devices. It works on the principle of transmitting data to a server over the Internet. That server hosts a platform that users can access to view the device's current and past locations, and often other information.

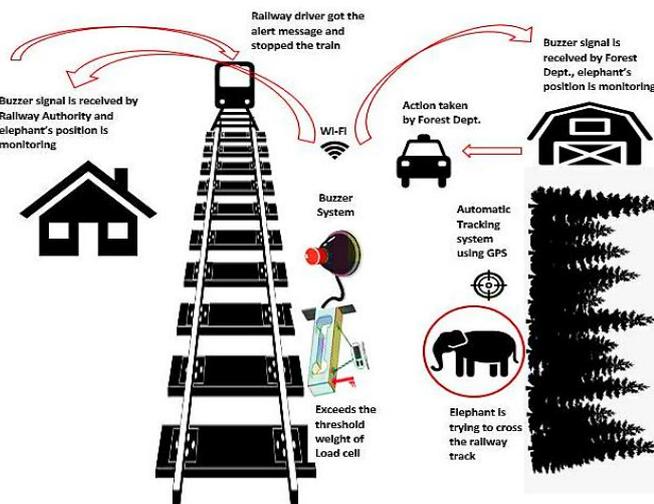


Fig 2: System Diagram

Model Description

distance alongside of the nearest rail track to the forest. Load Cell is connected to a microcontroller. Threshold weight has been specified to the load cell using coding, which is less than the normal weight of an elephant. When elephants try to cross the railway tracks, the threshold value of load cell exceeds, buzzer system gets activated for a few minutes. Buzzer signal is reached to the nearest Railway Authorities and Forest Department by help of a Wi-Fi module. After receiving the buzzer signal, the position of the elephant is tracked by implementation of automatic tracking system. Incorporating GPS tracker is attached to the collar of elephant, and henceforth, the movement of the elephant will be monitored. The railway driver would get an alert message from the railway authority before reaching the spot, where the elephant is tracked, and would stop the train before hitting it. Forest department would take an immediate action to save the elephant.

PROTO- TYPE

We already have tested a proto-type set up and it is working well.

- A 30kg load cell has been used for weight measuring purpose.
- HX711 as load cell Amplifier.
- Arduino Uno as microcontroller (30kg load cell can work on 5v-9v but for higher weight Raspberry pi is preferable).
- 16x2 LCD to display the weight (For Monitoring purpose large device, computer should be used).
- NodeMCU as Wi-Fi device.
- Breadboard and Connection Wires.

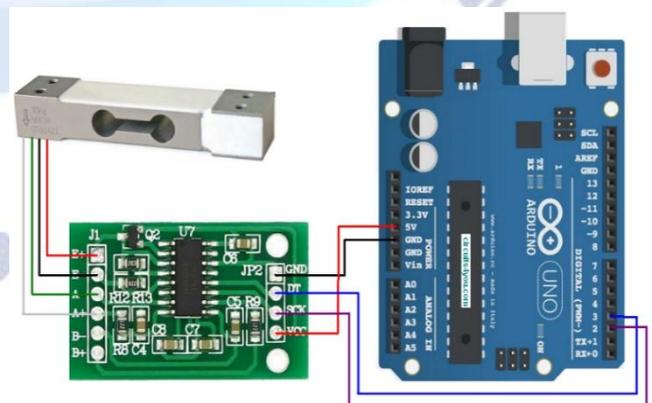


Fig 3: A:Arduino Board

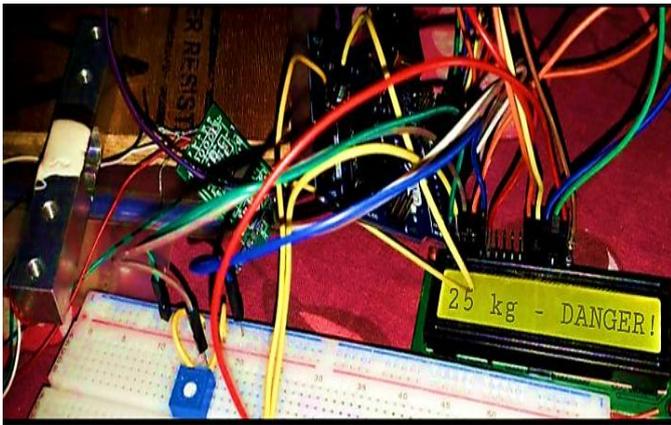


Fig 3: B: Designed Circuit

Proto type set up has been designed only to verify the working of Load cell. Threshold weight of the load cell is set to 20kg, and when a higher weighted substance is placed on it, the buzzer is beeped automatically and weight 25kg is shown on the display along with the DANGER! message. This whole set up will be placed at a distance, alongside the nearest rail track to the forest.

AGPS Tracker is attached to the collar of the elephant for tracking it's location after receiving the alert message. The red line is the detected path of the elephant.



Fig 3: C: Detected Path

CONCLUSIONS:

This paper covers the performance of a Loadcell and Wireless technology to reduce the elephant mortality rate due to railway accident. And it is more accurate than only tracking method. Tracking of elephants is a process, which is almost known to us. In case of using only tracking technology, the position and movement of the elephant would be monitored continuously, but using this technique it's location will be monitored, only when it is in danger.

This same idea can also be implemented to avoid the collapsing of bridges due to passing of heavy weighted vehicles and turning of those vehicles at

high speed in some proper weak points of the bridge.

REFERENCES:

- [1] IEEE Xplore (Browse Conferences >(Spring)International Conference... >2016 International Conference. (Spring) International Conference on Advances in Computing, Communication, & Automation (ICACCA)
- [2] Semantic Scholar [Eradication of Elephant Mortality and Injury Due To Railway Accidents through Automatic Tracking and Alert System] Conference: IEEE International Conference on Advances in Computing, Communication & Automation April 2016, Dehradun, India
- [3] HX711 Load Cell Amplifier Interface with Arduino, November 25, 2016