



# IOT BASED TRACK BREAK DETECTOR USING ARDUINO

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## ABSTRACT:

The light weight electric trolley designed here is intended to detect the track breaks in the running rail. It is a type of track maintenance vehicle that runs on normal railway track generally used by the track maintenance staff. The trolley designed here is automated such that when the system is energized it starts moving over the track and detects broken rail, if it detects any track break, automatically it will be stopped just before the broken rail and information will be transmitted to the concern authority through IOT. To prove the concept practically, one small motorized electric trolley will be constructed for live demonstration. Since it is supposed to be run over a metal track, it must be simulated over a wooden plank and to create fault, at one end of the track, broken rail must be created. When the start button is activated, the trolley starts moving in forward direction, when the trolley reaches near to the broken rail it will be stopped there automatically and alarm will be energized.

**Keywords:** -Track break detector, Arduino, IR Sensor, Buzzer, Wi-Fi ESP 8266, Alert message, Trigger Circuit.

## INTRODUCTION:

The railway track is too long, almost unlimited, maintaining the track manually is almost impossible & therefore sophisticated instruments are essential to detect faults in the track. In this regard, this

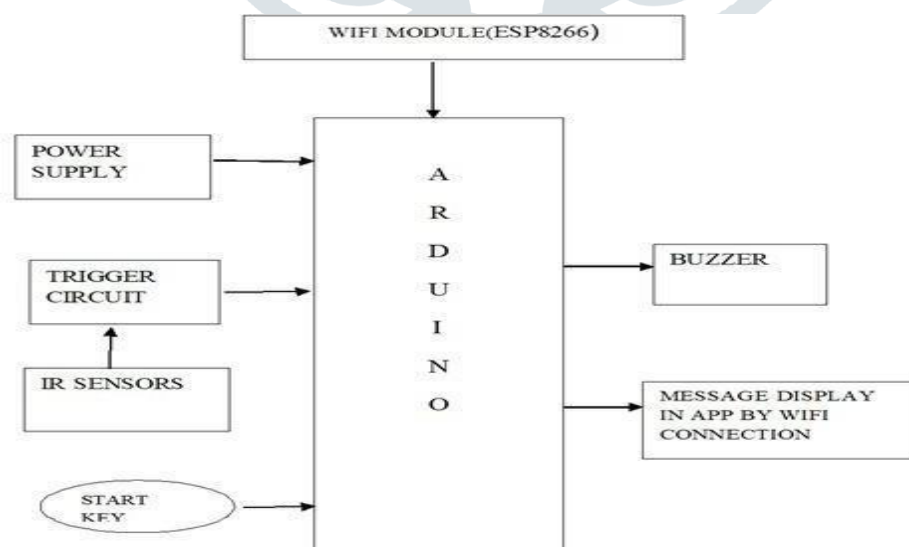
instrument is designed, which can be installed over the trolley that moves over a railway track is aimed to detect the broken or discontinued track automatically. The trolley

that is designed to move over a railway track is aimed to detect the broken track automatically & to prove the concept practically, a prototype module of electric trolley equipped with broken rail detecting circuit by which the trolley will be stopped automatically just before the broken track. To achieve this, little length metal track is essential with broken rail at one end and this track must be arranged over a wooden plank. To create problem, broken track must be simulated & whenever the trolley reaches to this broken point, the trolley will be stopped automatically, alarm will be energized & information will be transmitted to the concern person through IOT.

## WORKING:

The technique for detection of track break detector is much easier using IOT approach. the detection of track break detector is done by the IR sensor and trigger circuit. the proposed system is based on Arduino Uno which is a recognized prototyping board which is interfacing with Trigger circuit and LM567 to detect track break. The device will start and move on the track with the help of the dc motor connected to the wheels with support of spur gear to the relay which is connected Arduino uno. If device found on any Obstacle or any track break it will detect immediately with help of trigger circuit which consist of IR sensors and LM567 which is also connected to the Arduino uno .After detecting the track break it immediately sends the alert to the nearest station by the buzzer sound and also by the Wi-Fi module to the app which is connected to the transmitter and receiver of the arduino uno

## BLOCK DIAGRAM:



## MODULES OF THE PROJECT:

### ARDUINO UNO:

The Arduino Uno is an open-source microcontroller board supported the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is supplied with sets of digital and analog

input/output (I/O) pins which will be interfaced to varied expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a form B USB cable. it should be powered by the USB cable or by an external 9-volt battery though it accepts voltages between 7 and 20 volts. it is the same because the Arduino Nano and Leonardo.



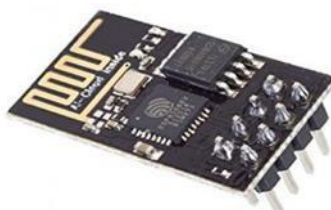
### IR SENSORS:

IR Sensors are also known as the Infrared sensors. It is an electronic component which is used to detect specific characteristics in the surroundings by two ways either by emitting or detecting ir rays. IR sensors includes the remote controlling and sensing. they are of three types. They are near IR, mid-IR, far-IR. this type of sensors is used to detect the human visionary sensor to detect the obstacles.



### ESP8266 WIFI MODULE:

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. Analog sources of Wi-Fi ESP 8266 module can host number of applications and is cheap in terms of cost which can make the task of connecting the Wi-Fi easy through different commands.

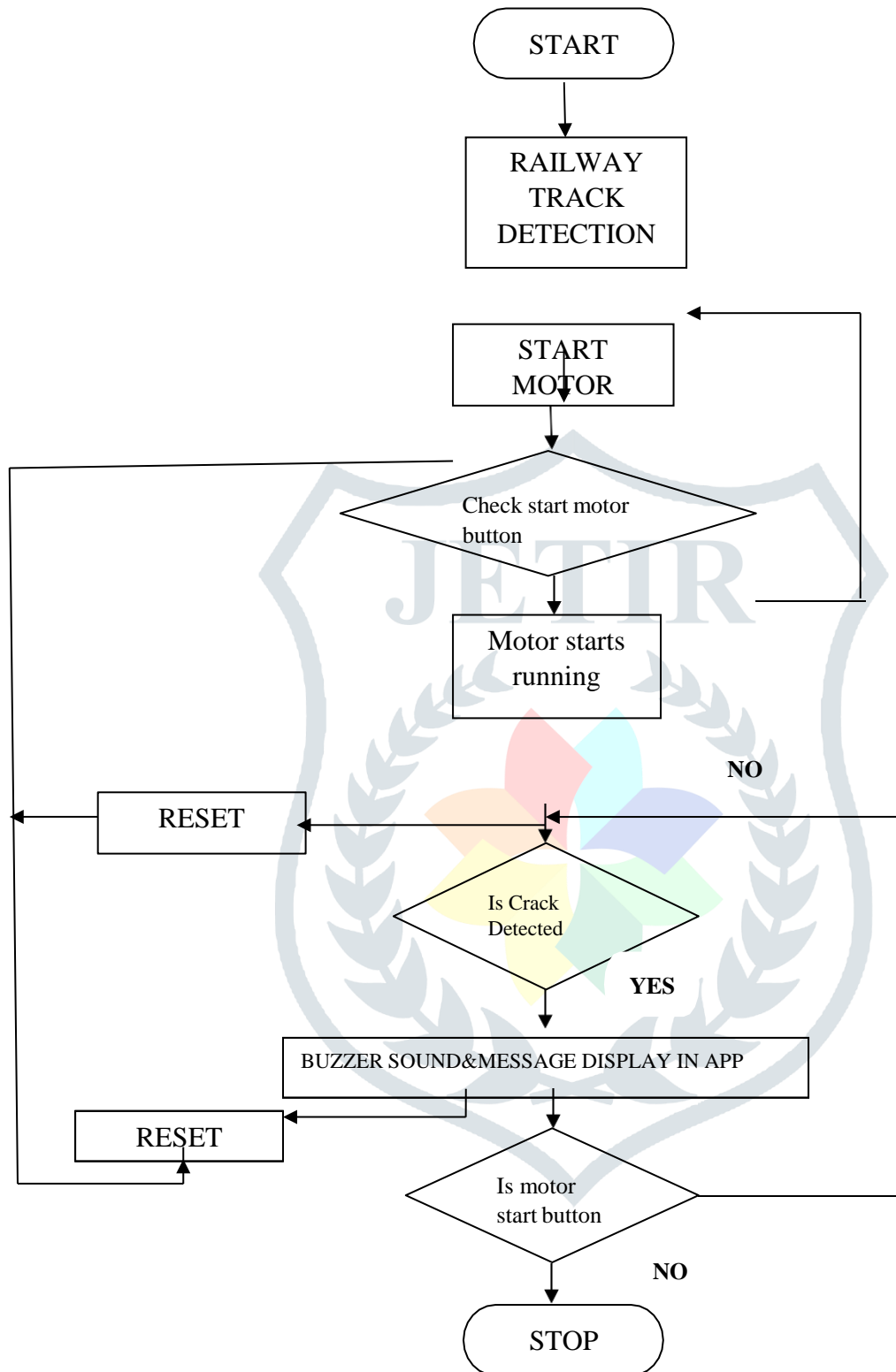


**BUZZER:**

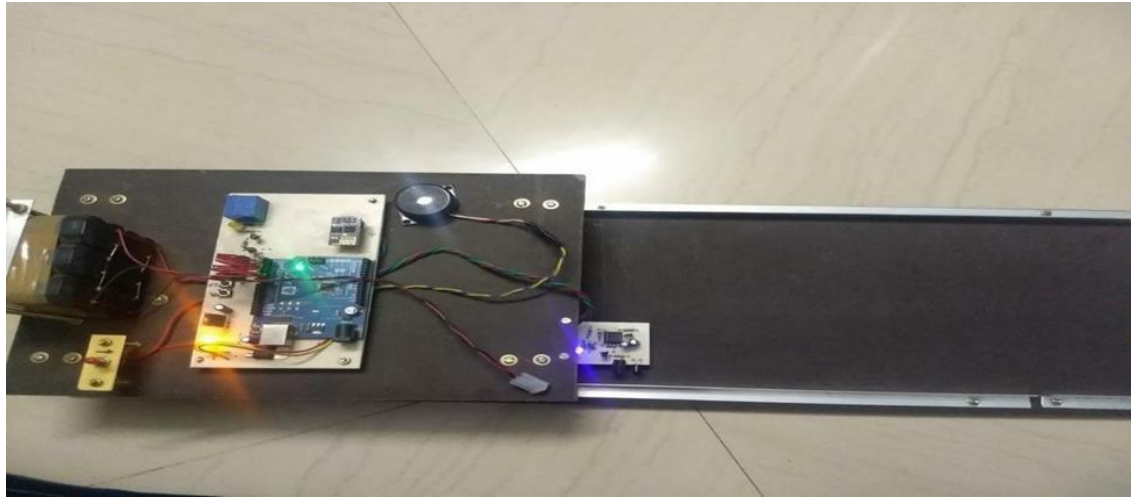
An audio signaling device like a beeper or buzzer main function of this is to convert the signal from audio to sound. It is provided through DC voltage and used in timers, alarm devices, etc. Based on the various design it can generate different sound.



**FLOW CHART:**



### POWER SUPPLY UNIT:

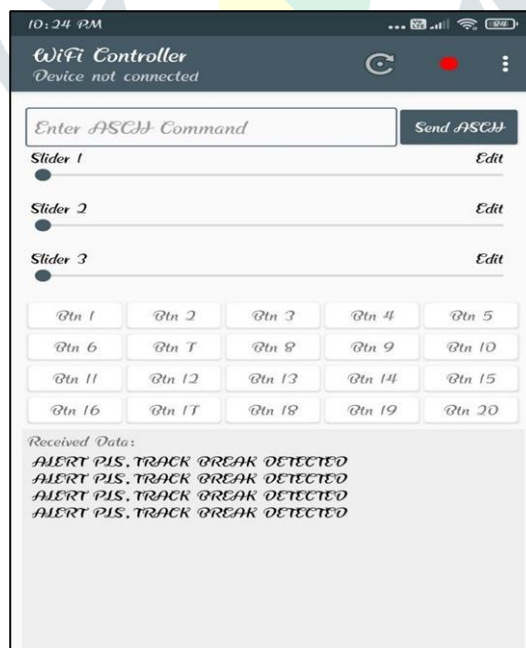


IOT track break detector is the most demanding in the railways. This project is to save the people from the track break accidents and also to find any obstacle on track and gives the alert to the nearest station through buzzer sound and the Wi-Fi server.

### RESULT:

An alert message through the Wi-Fi module and buzzer sound to the nearest station where we find the track break.

Above is the alert message



## CONCLUSION:

The system designed here can be used to detect the broken track, a simple and low-cost method is employed here. The demo module is constructed with a small trolley, as this trolley is having specially designed metal grooved wheels, it can run on metal track laid over the wooden plank. The prototype module assembled here is tested and results are found to be satisfactory. The technology can be enhanced further such that by implementing GSM & GPS technology over the trolley itself, where exactly the track is broken can be identified. By implementing this technology, the location of the trolley information can be passed to the nearest station master through his mobile phone. This part of the project work will be carried over in our future work, i.e., extension of this project work.

## FUTURE SCOPE:

As we have said that this work can be implemented in railways department for the safety purpose of the passenger and to avoid the accidents due to rail collision. Here we identify the fault and send information to the nearest station. Along with the information if we add GPRS in this setup means we can find the exact location of the faulty part or obstacle in the railway path. More effective work can be done in order to provide a better speed to the automated vehicle robot. Also, enhancement can be done to get better accuracy about the location of the place where the fault had occurred. Also, the robot can be made large so that by using its weight track shiftiness i.e. stress and strain parameters of the track can be determined so as to make this system more effective. A better module can also be incorporated for low-cost short distance scrutinizing mechanism in order to provide good connectivity at a low input cost. The battery of 12v can be replaced by the solar panel in order to achieve most out of it. A more efficient prototype can be built with image recognition which will eventually increase the efficiency and accuracy of the vehicle as the vehicle can differentiate between the minor and the major cracks.

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