

# Railway Track Fault Detection and Automatic Train Tracking system to Prevent Same track Accidents

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**Abstract**— The mishaps between trains are expanding because of carelessness of wise systems actualized in the trains and dishonorable control motioning from the Train Traffic Control Station (TTCS). The Train Tracking Chip (TTC) modules and Train Identification Chip (TIC) modules are utilizing to detect the nearness of trains on a similar track. The signs from the moving train are transmitted through the GSM/WIFI system to the stationary prepares on a similar track and to the TTCS. By utilizing this technique one can decide if the trains were setting out toward Rear-end impact or Head on crash. The TTCS transmits control flag to stop or move the trains.

**Index Terms**—Train Collision Avoidance, Wi-Fi, Train Identification Chip, Train Tracking Chip, fire sensor, Bomb Detector.

## I. INTRODUCTION

The Railway system is the world's greatest transport framework. The Indian Railways is one of the biggest railroad arranges on the planet. There have been numerous mishaps happens in the railroad arrange framework. The greater part of the mischance's happened because of the impact between the trains and detains. The proposed framework is utilized to foresee that sort of impact amongst trains and keeps them from happening. By keeping these sorts of mischance's more number of Ivies can be spared. On account of these cases in the railroads we considered crashes are the most feared mischances.

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It is extremely hard to stop such an impact, in light of speed of the prepare, which require a lead separation to stop. Crash happened by two routes because of human mistake.

## II. EXISTING SYSTEM

The Railway network is the world's biggest transport System. The Indian Railways is one of the largest railways Networks in the world.

### 1. Automatic Railway System Using Wireless Sensor Network

This paper is examination for the pivotal circumstance happens in the programmed prepare framework. In the railroad looking over in numerous mischances's because various harm forever and furthermore our property. So this venture to execute in two approach to spare the prepare travel. For the restricted is to decide the malevolent in the prepare track unremittingly, regardless of whether the track stipulation is great or not for utilize the VIBRATION Sensor to check it. Next for them to dodge the hindrance crossing in prepare track, when the prepare is come.

The primary aim in this venture is to assist our railroad office with improving the programmed procedure. Additionally build up the necessity apparatuses required in that protected travel. Yet at the same time the prepare crashes happen in may put not yet diminishing one. To control the fundamental

Area in prepare framework have been the entryway level operation to utilizing STEPPER MOTOR continuously investigation .This is precisely done by utilizing the PROTEUS instrument to show signs of improvement result.

## 2.1 DRAWBACKS IN EXISTING SYSTEM

1. Using Digital image processing, the system can be made to detect suspects whose images are previously accessible in the database is difficult to get results in fast moving train.
2. Simulation based controlling may not be accurate at all time results.
3. Slow in process control.

## 2.2 PROPOSED SYSTEM

In the proposed structure the Train Identification Chip (TIC) inbuilt with Non web WIFI innovation module is used to pass on between the plan and the Train Traffic Control Station. The TIC in the get ready and TTC on track at particular detachments can make the certification of plan prosperity at each check point convergences. In the TTC [Train Tracking Chip] we have settled the scratch pad. This scratch pad is the sensor which will give vital signs to taking after of the get ready.

The scratch pad is done by portraying 9 sticks, this pins are spring sort will get to the moving train. The stick holds the data about the checkpoint; get ready track number and orientation of the moving trains. The total TTC module is set in the railroad track.

The TIC module is a module which is placed in the moving trains which contains a scratch peruser. This Wi-Fi has the association between the plan and the control station and the a different way. This module in the get ready while moving, the scratch peruser will scratch the scratch pad in the track. This will holds at each check focuses. In each checkpoint the purposes of enthusiasm of the trains are passed on to the control station in this way the crash between the trains can be turned away.

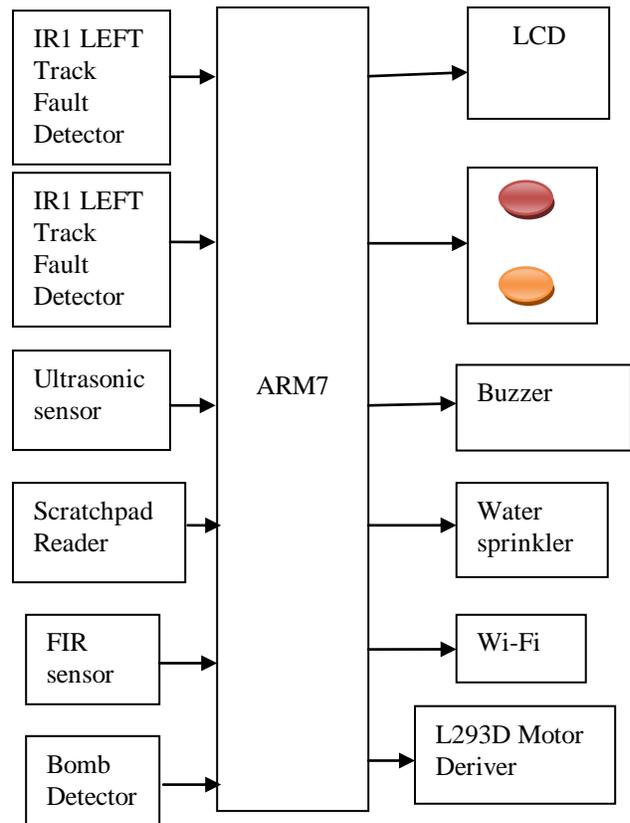
The advising between the Train and TTCS is controlled by ARM. Impediment Cross Detection This is for any protest is over intersection before the prepare that opportunity to recognize this one and programmed prepare will stop. And afterward utilizing the ULTERA SONIC sensor to gauge the separation among protest and prepare. For utilize wifi to send the message for control room. Fire sensor are utilized to distinguish fire happened in prepare and programmed water sprinkler with prepare stop

consequently. Bomb indicator is utilized to distinguish any traveler convey bombs into prepare it recognizes and siren, programmed prepare will stop.

## 2.3 ADVANTAGES

- Reduces train accidents.
- Reduces the timing of braking.

## III. BLOCK DIAGRAM



## 3.1 MICROCONTROLLER

ARM remains for Acorn RISC machine is a group of guideline set models for PC processors in light of a diminished direction set registering (RISC) design. Furthermore, in straightforward word ARM is "Processor Architecture ". A significant number of amateur's and understudies have misconception that ARM is microcontroller or processor, regardless ARM is Architecture which is utilized as a part of numerous processors and microcontrollers.



Figure 1: LPC 2148 Board

**Benefits:**

- 8 to 40 kB of on-chip static RAM
- 32 to 512 kB of on-chip flash program memory.
- 128 bit wide interface/accelerator enables high speed 60 MHz operation.
- In-System/In-Application Programming (ISP/IAP) via on-chip boot-loader software.
- USB 2.0 Full Speed compliant Device Controller with 2 KB of endpoint RAM.
- Two 32-bit timers/external event counters (with four capture and four compare channels each),
- PWM unit (six outputs) and watchdog.

**3.2 METAL DETECTOR**

Metal identifiers take a shot at the guideline of transmitting an attractive field and examining an arrival motion from the objective and condition. The transmitted attractive field changes in time, as a rule at rates of genuinely piercing sound signs. The attractive transmitter is as a transmit loop with a changing electric current flowing through it created by transmit hardware. The beneficiary is as a get curl associated with get and flag preparing hardware. The transmit loop and get curl are at times a similar loop.

The curls are inside a loop lodging which is normally just called "the loop," and all the gadgets are inside the hardware lodging joined to the curl by means of an electric link and usually called the "control box". This changing transmitted attractive field makes electric streams stream in metal targets. These electric streams are called whirlpool ebbs and flows, which thus create a feeble attractive field, yet their produced attractive field is unique in relation to the transmitted attractive field fit as a fiddle and quality.

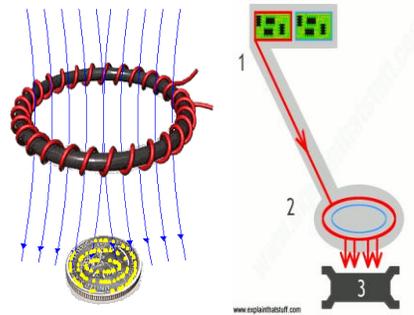


Figure 2: Bomb Detection sensor

It is the changed state of this recovered attractive field that metal finders use to identify metal targets. (The diverse "shape" might be as a period deferral.) The recovered attractive field from the whirlpool streams causes a rotating voltage motion at the get curl. This is increased by the gadgets in light of the fact that generally profoundly covered targets create motions in the get loop which can be a large number of times weaker than the flag in the transmit curl, and therefore should be intensified to a sensible level for the hardware to have the capacity to prepare.

**3.3 FIR SENSORS**

Smoke finders are intended to give early cautioning to a fire, including customary burnable materials, that is relied upon to advance through unmistakable beginning as well as seething stages. The sort, volume, and thickness of smoke delivered amid the fire improvement process will fluctuate significantly relying upon the energizes included and the measure of oxygen accessible. Commonly, the best volume of noticeable smoke is created amid the start (beginning) organize and the seething stage.

Ionization Detectors the ionization smoke finder responds to both obvious and imperceptible results of burning. This spot-sort indicator contains a little radiation source that produces electrically charged air atoms called particles.

The utilization of a long, half-life radioactive source, combined with low vitality utilization, gives the ionization identifier long future with negligible upkeep. Ionization-sort identifiers react better to a blazing flame. Ionization finders are not appropriate for use in applications where high surrounding radioactivity levels are not out of the ordinary. High surrounding radiation decreases the indicator's affectability. Ionization indicators have been known to

respond to non-fire-produced particles of burning and the nearness of ozone, alkali, or creepy crawlies. Single chamber ionization finders introduced in higher elevations ordinarily require an alteration in affectability amid establishment.

Smoke identifiers are intended to give early cautioning to a fire, including standard flammable materials, that is relied upon to advance through particular beginning as well as seething stages. The sort, volume, and thickness of smoke created amid the fire advancement process will fluctuate enormously relying upon the powers included and the measure of oxygen accessible. Normally, the best volume of obvious smoke is created amid the start (early) arrange and the seething stage.



Figure 3: FIR Sensor

### 3.4 TRACKFAULT DETECTION (IR) SENSOR:

An infrared sensor is an electronic gadget, that radiates with a specific end goal to detect a few parts of the environment. An IR sensor can quantify the warmth of a question and in addition distinguishes the movement. These sorts of sensors measures just infrared radiation, instead of producing it that is called as a latent IR sensor. For the most part in the infrared range, every one of the items transmit some type of warm radiations. These sorts of radiations are undetectable to our eyes that can be distinguished by an infrared sensor. The producer is just an IR LED (Light Emitting Diode) and the locator is basically an IR photodiode which is touchy to IR light of an indistinguishable wavelength from that discharged by the IR LED. At the point when IR light falls on the photodiode, the resistances and these yield voltages, change in extent to the size of the IR light got.

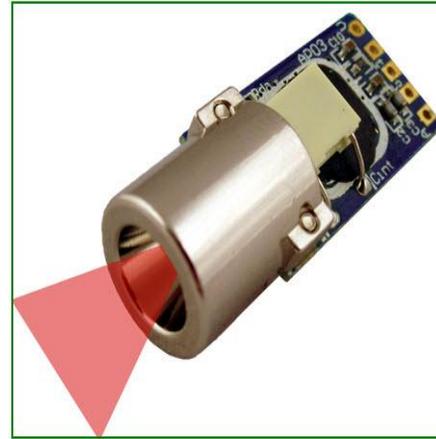


Figure 4: IR Sensor

### 3.5 ULTRASONIC SENSOR:

Ultrasonic sensors are described by their unwavering quality and remarkable flexibility. Ultrasonic sensors can be utilized to comprehend even the most complex undertakings including object recognition or level estimation with millimeter exactness, on the grounds that their measuring technique works dependably under all conditions.

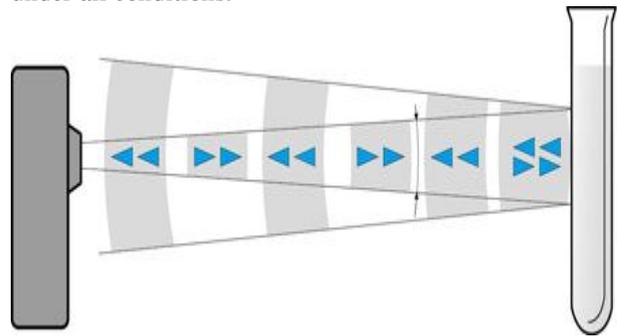


Figure 5: Ultrasonic sensor

A unique sonic transducer is utilized for the ultrasonic closeness sensors, which takes into consideration interchange transmission and gathering of sound waves. The sonic waves transmitted by the transducer are reflected by a question and gotten back in the transducer. Subsequent to having produced the sound waves, the ultrasonic sensor will change to get mode. The time slipped by amongst emanating and getting is relative to the separation of the question from the sensor.

### 3.6 SCRATCHPAD TRACK DETECTION:

Radio-recurrence recognizable proof (RFID) utilizes electromagnetic fields to naturally distinguish and track labels appended to objects. The labels contain electronically put away data. Detached labels gather vitality from an adjacent RFID peruser's grilling radio waves.

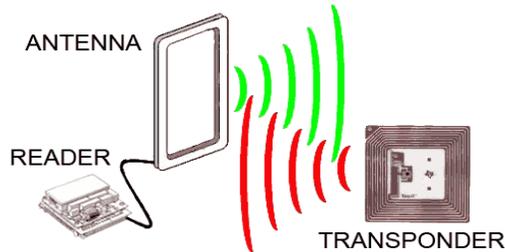


Figure 6: Scratchpad

RFID remains for Radio-Frequency Identification. The acronym alludes to little electronic gadgets that comprise of a little chip and a radio wire. The chip ordinarily is equipped for conveying 2,000 bytes of information or less. The RFID gadget fills an indistinguishable need from a scanner tag or an attractive strip on the back of a Mastercard or ATM card; it gives a special identifier to that protest. What's more, similarly as a standardized tag or attractive strip must be checked to get the data, the RFID gadget must be filtered to recover the distinguishing data.

### 3.7 WIFI TECHNOLOGY

The ESP8266 WiFi Module is an independent SOC with incorporated TCP/IP convention stack that can give any microcontroller access to your WiFi organize. The ESP8266 is prepared to do either facilitating an application or offloading all Wi-Fi organizing capacities from another application processor. Each ESP8266 module comes pre-modified with an AT summon set firmware.

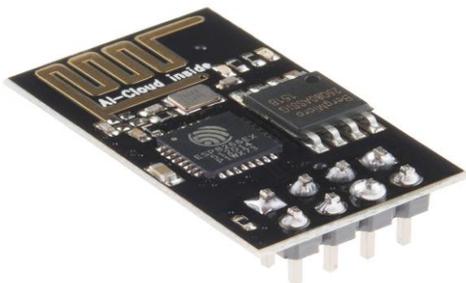


Figure 7: Wi-Fi Technology

This module has a sufficiently intense on-load up preparing and capacity ability that enables it to be coordinated with the sensors and other application particular gadgets through its GPIOs with insignificant improvement in advance and negligible stacking amid runtime. Its high level of on-chip combination takes into account negligible outside hardware, including the front-end module, is intended to possess insignificant PCB region. The ESP8266 bolsters APSD for VoIP applications and Bluetooth coexistence interfaces, it contains a self-aligned RF enabling it to work under every single working condition, and requires no outer RF parts.

### 3.8 WATER SPRINKLER

Sprinklers that shower in a settled example are for the most part called splashes or splash heads. Showers are not typically intended to work at weights, because of clouding issues that may create. Higher weight sprinklers that themselves move around are driven by a ball drive, equip drive, or effect system (affect sprinklers). These can be intended to turn in a full or halfway circle.



Figure 8: Water sprinkler

A fire sprinkler framework is a dynamic fire insurance strategy, comprising of a water supply framework, giving sufficient weight and stream rate to a water dissemination funneling framework, onto which fire sprinklers are associated. Albeit truly just utilized as a part of production lines and expansive business structures, frameworks for homes and little structures are presently accessible at a financially savvy price.[1] Fire sprinkler frameworks are broadly utilized around the world, with more than 40 million sprinkler heads fitted every year. In structures totally ensured by flame sprinkler frameworks, more than 96% of flames were controlled by flame sprinklers alone.

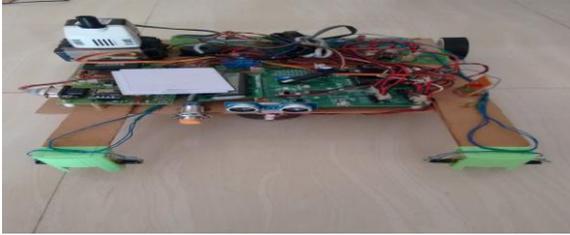


Figure 5: Hardware Design

#### IV. WORKING PROCEDURE

The principle working of this venture, when we begin the framework it checks the WIFI accessibility and match with the accessibility WIFI.

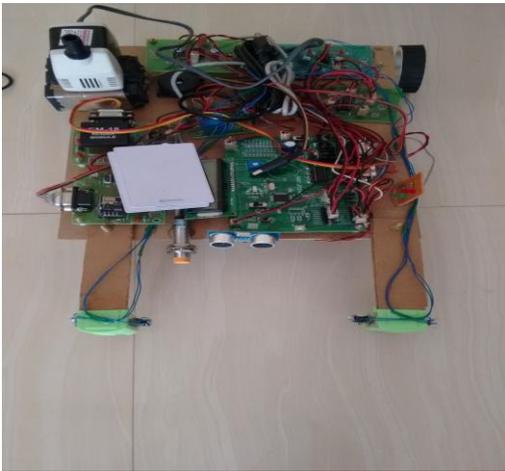


Figure 6: Hardware Implementation

After it checks the status of the sensors, if nobody security sensors dynamic prepare will move else stop naturally. On the off chance that prepare proceeds onward track it identifies the prepare track travel and sends the track data to the close control station , if control station gives the track availability to stop .

On the off chance that IR1, IR2 dynamic as track blame on both sides of the track and consequently prepare will stop and siren. In the event that Ultrasonic sensor dynamic when deterrent is available and consequently stop prepare and siren. On the off chance that Metal sensor dynamic when metal question is available on track and naturally stop prepare and siren.

In the event that Fire sensor dynamic when fire happened in prepare and consequently water sprinkler and stop prepare and siren.

#### V. CONCLUSION

The proposed framework guarantees complex security for the travelers in trains which are accomplished by persistently checking the programmed prepare framework for WSN. Additionally by executing this framework, the prepare incident as in the dynamic is killed, as the subject can be settled on board in the proposed framework and along these lines guarantees maintaining a strategic distance from the prepare crashes.

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