AUTOMATIC RAILWAY CROSSING GATES WITH SELF TRACK SEPARATION AND SUICIDE PREVENTION

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Abstract: The Projection is intended to automatically dominance railway line system gates at the level crossroad, to automatically control the railway track change mechanism. The extent of accidents related with railway is increasing day by day, the higher than automations can roll back these accidents to larger extent. The automated railway gates and track switching is employed to avoid accidents in railway system. The salient causes of accidents are due to improper operation of railway gate, collision with opposite trains and mistakes in track switching.

The main causes of accidents are due to improper operation of railroad line gates, hit with opposite trains and fault in track switching. It employs two pair of Infrared frequency (IR) sensing element these sensors are used to sense the appearance and exit of the train. In the railway stations the same IR transmitter can be situated at short distant tracks to find the existence of another train moving towards stations. To recognize the situation in distinct place is essential to develop a railway safety monitoring system by which accidental fallen of human being on to the track from a platform to save lives and barrier in the level crossing can be detected. The proposed method is used to detecting a stationary or moving obstacle by the technology which employs the IR sensor. The whole system is device controlled fallacy arising because of physical operation square measure intercept as a result of the perfection of machine controlled operation are over the manned operation.

***Keywords*: Accident, Track switching, IR Sensor, obstacle, level crossing.**

I. INTRODUCTION

Indian Railroad is one of the public's largest railways and operates on vast dimension covering over 63,000 route km with daily loading of 1.6 trillion loads of freight and daily transporting of XIV million passengers by work quite a pair of million train km per day. Railway is one of the way of transport with a share of twenty
two percentages within the rider transport. Underneath the comprehension technology vision 2012 proclaimed within the railway financial plan for 2008-09 and 2009-10, the railway ministry plans to produce the railways a contemporary look and feel by implementing trendy communication system like RFID, GPS and Automation.

In currently existing system the station agent informs the gate keeper regarding the arrival of the train out of the telephone, when the train leaves the station. When the gate keeper receives the data, he closes the gate depending on the arrival of the train near the level crossing. Hence, if the train is late because of some certain reasons, then the gate remains closed for a extended time causing traffic problem near the gate. The rate of physical mistake that will occur at these crossing unit of measurement big as a result of they are not safe to work will not current information regarding the train program over forty three point six percentage of railway accidents were command at level crossing in our country. So far they have not taken any single effective steps. Survey of Statistics of percentage of Railway accidents and Accidents, deaths and unmanned level crossing accidents are shown in Fig 1 and 2

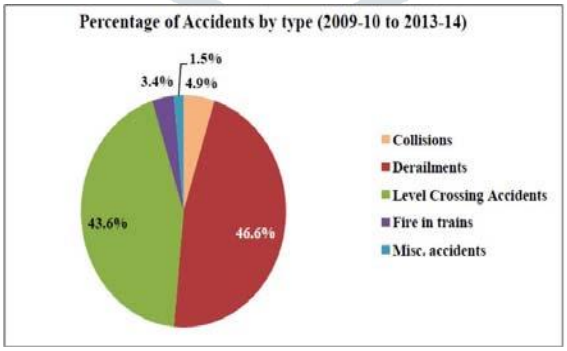

Fig1: Statistics of percentage of railway accident (2009-2014)

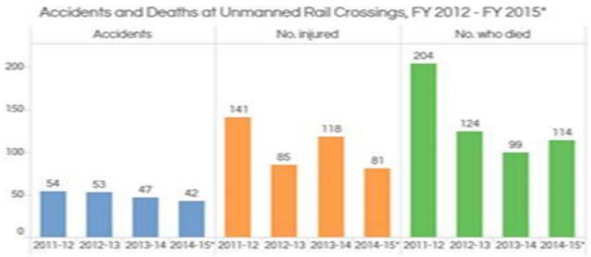

Fig2: Accidents, deaths and unmanned level crossing accidents (2011-2015)

To overcome this problem using the automated railroad track gate mastery at the level crossway, the gate is closed mechanically whenever the gear train comes near the level cross and gate is opened after the train leave the level cross over. It utilizes two twain of IR detector, a pair of IR sensing element is placed close to the level crossing to manage the railway gate, the sensors are placed at a certain distance from one another, by considering the direction of train moving it can be called as the topside sensor and sensing element that detects the departure of the train area unit often called as result of the downside detector. Whenever the upper side recipient is triggered the gate motor rotates in a very particular direction and shuts the railway gate and remains close till the drawback receiver is activated the motor once more rotates and also the gate is opened. The arrival of train in either direction may be known victimization sensors placed on either face of the track. Time is reduced by using this system for which the gate is being kept closed and to provide safety to the road users and the trains by decreasing the accidents in rail road.

A track changing servomotor alongside an IR sensor is additionally included, which helps for picking the correct track for each train. Considering a circumstance where in there is a products conveying train on the primary line track and assume a nearby or an express train is taking a similar course taken by product conveying train, at that point in order to keep away from any postponement to the local train the track is changed to the detour line track for the train to pass.

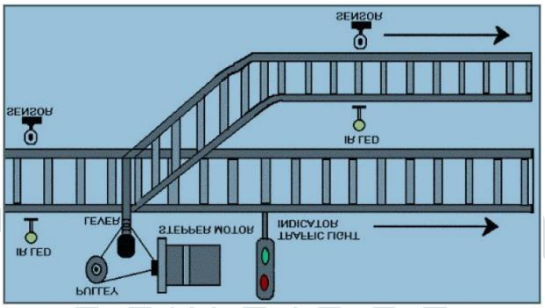

Fig3: Track Switching

The track switching is shown in the fig 3 the track will be switched by using the rotation of stepper motor. An item conveying train on the most line track and assume a neighborhood or partner in nursing explicit train is taking indistinguishable course taken result conveying train at that point to maintain a strategic distance from any deferral to the local train the track is changed to the detour line track for the train to pass. The reed change is utilized to manage the trains development, as the reed switch is a magnet sensor which comprise of an on and off switch, the switch stays on until it detects any magnet once it detects a magnet the turn goes into off state. By embeddings a magnet inside the train and a reed switch at the station the train will be halted at the station and when some second of postpone the train can be permitted to go.

II. RELATED WORK

In "Automatic railway gate control system using 8051microcontroller",C.R.Balamurugan,P.Vijayshankarganth, R.Alagarraja, V.E. Subramanian[1]. It manages the two things initially it manages the decrease of the ideal opportunity for which the entryway is being kept shut. Besides to supply security to the street clients by diminishing the mishaps. By utilizing the robotized railroad door of the sum crossing the entry of the train is identified by the detecting component set near the entryway, along these lines the time that it is shut less contrasted with physically worked entryways and furthermore diminishes the human works. The obstruction is that it'll decrease the mishaps happening at the railroad level intersection, it will expands the precision and lessen blunders happening because of manual tasks. It will decrease the crash of train and can conjointly deal with the course of a chose train to maintain a strategic distance from any deferral in achieving its goal. Sunlight based boards might be wont to produce control for the framework there by expanding the intensity of the framework.

In "Automatic railway gate and crossing control based sensors and microcontroller 8052" Ahmed Salih Maheli, AL-Zuhairi[2]. They expressed that railroad related mishaps are more perilous than other transportation mishaps regarding seriousness and passing rate. There are numerous railroads crossing which are unmanned because of lock of labor expected to satisfy the requests, subsequently numerous mishaps happens at such intersection. The proposed model as microcontroller 8052 to dodge railroad entryways. Whenever implemented location of train moving toward the door is identified by implies that of 2 sensors put on the either part of the entryway. This work uses two ground-breaking attractive gadgets at side and similarly unique attractive sensor is affixed at downside of the train heading. At the point when foreside gets initiated the detected sign is sent to the microcontroller and the entryway is shut and remains shut until train crosses the door and reaches after side sensor. At the point when the contrary angle gadget initiated and in this manner the sign concerning the flight is send to the microcontroller and the entryway is shut and remains shut until the train crosses the door and reaches after side sensor when the contrary viewpoint gadget actuated and along these lines the sign concerning the takeoff is send to the microcontroller engine turns in incorrect manner door opens and engine stops precisely. This methodology ought to have the option to cut down the bringing pattern up in mishaps and train crash mishaps. it gives the supervision and control framework give the intend to continuous assessment audit in information accumulation.

In, "Automatic Railway Barrier System, Railway Tracking and Collision Avoidance using IOT", Ishan Jain, Shubham Malik, Soumya Agarwal[3]. IOT can be utilized to improve the different parts of the railroad framework. Computerization of railroads can change the present inheritance framework and help decline the rail route related mishaps. This exploration paper proposes a framework where sets of infrared sensors (IR sensor) are utilized track the situation of the train and its bearing. This data is utilized to close/open the railroad hindrance naturally by means of an engine associated with a microcontroller unit. It is additionally used to caution the driver about a conceivable impact with a train originating from the other way by means of SMS from the GSM module joined to the microcontroller. The situation of the train is send to a site page through the GSM module for following. The proposed model plans to make railroad an increasingly solid wellspring of transport by supplanting existing manual framework with programmed hindrance control framework. Ongoing train development recognition utilizing IOT makes it simpler for travellers to follow their trains. Additionally, it guarantees railroad stations are informed opportune.

III. METHEDOLOGY

It gives a programmed railroad door control at unmanned dimension crossing supplanting the entryways worked by watchmen and furthermore the semi naturally worked entryways. It manages two things right off the bat, it manages decrease of time for which the entryway is being kept shut and furthermore to give wellbeing to the street clients by diminishing the mishaps that normally happen because of recklessness of street clients and now and again blunder made by the watchman.

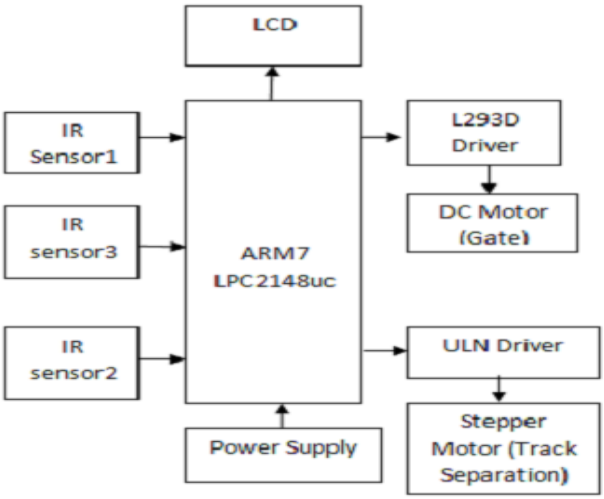

Fig 4: Block Diagram of Railway Crossing Gates with Self Track Separation

It essentially comprises of a Microcontroller ARM7 LPC2148 attachment utilized with LPC2148 Pro Development Board. It is an independent board for LPC2148 microcontroller. It has 12MHZ precious stone for framework clock and 32KHZ gem for RTC. It has control on reset circuit with MCP13OT brownout checking chip and power decoupling capacitors. This board will be utilized for LPC2148 based for the most part nonexclusive improvement.

ARM7 interfaced with two IR sensors separately connected to monitor railway gate and track separation respectively. Processor interfaced with DC motor for demonstrating gate which can be opened and closed automatically whenever DC motor rotates in clockwise direction the gate opens and gate closes when DC motor rotates in anticlockwise direction, whenever the train passes. The ULN2003 is understood for its high-current, high-voltage capacity.

The air conditioner voltage, normally 220Vrms, is associated with a transformer, which steps that air conditioner voltage down to the dimension of the ideal dc yield. A diode rectifier at that point gives a full-wave corrected voltage that is at first separated by a basic capacitor channel to deliver a dc voltage. This subsequent dc voltage generally has some swell or air conditioning voltage variety. A controller circuit evacuates the swells and furthermore continues as before dc esteem regardless of whether the info dc voltage differs, or the heap associated with the yield dc voltage changes. This voltage guideline is typically gotten utilizing one of the prevalent voltage controller IC units

The drivers will be paralleled for even higher current output. Even more, stacking one chip on high of another, each electrically and physically has been done. Generally it can also be used for interfacing with a stepper motor, where the motor require high ratings which cannot be provided other interfacing devices. The processor is interfaced with Stepper motor which demonstrates the separation of tracks as shown in the fig 4. Interfacing stepper motor with LPC2148 controlling a stepper motor LPC2148 development board. It works by turning on and off a four input /output port lines generating at a particular frequency. The ARM7LPC2148 development board has four numbers of input/output port lines, connected with input/output port lines to rotate the stepper motor. ULN2003 is used as a driver for port input/output lines, drivers output connected to stepper motor, connecter provided for external power supply if needed. A LCD is interfaced so as to display the status to user. Whenever a train approaches near railway gate then sensor present at the gate will senses the train and processor gives instruction for the gate to close until train moves and once the train moves the gate will be opened automatically. In the same way whenever two trains approaches at railway crossings the track will get separated automatically and it will be demonstrated with Stepper motor.

Keil gather are utilized for creating microcontroller program in c language, from the flow chart when the train arrival is detected by the IR Sensor1 then it gives the signal to close the gate, if IR Sensor1 is not sensed then it goes back to starting stage. When the train is detected the gates are automatically closed at the railway crossing. After the train departs from the railway crossing IR Sensor2 is activated then gates are automatically opened at the railway crossing.

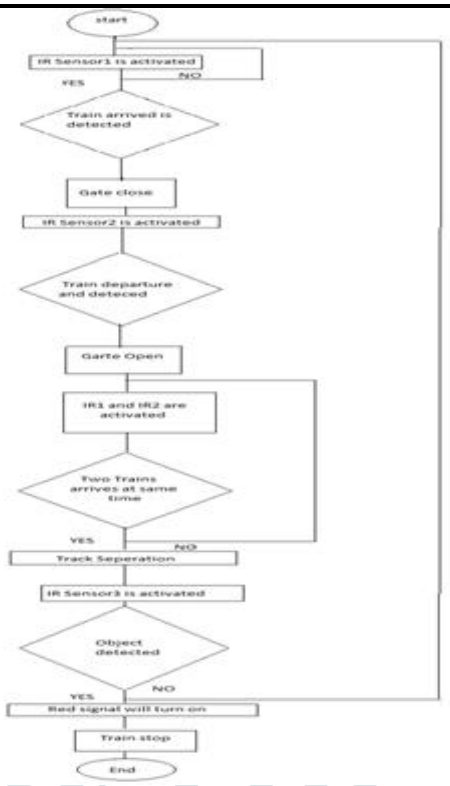

Fig5: Flowchart

If the IR Sensor1 and IR Sensor2 both are activated then it means two trains are arriving in opposite direction at the same time at this time track separation takes place, if two trains are not coming at same time then it goes to IR1 and IR2 to check the condition again.
IR Sensor3 is activated if any objects are detected on the track then red signals will turn on such that if any train is approaching near the place where object is detected then the train can stop for few moments until the object cleared, if no object is detected then process starts from beginning.

IV. RESULT

The Proposed system is tested and the results are verified practically. The Automatic railway crossing gates with self track separation is based on the industrial and human security is verified practically

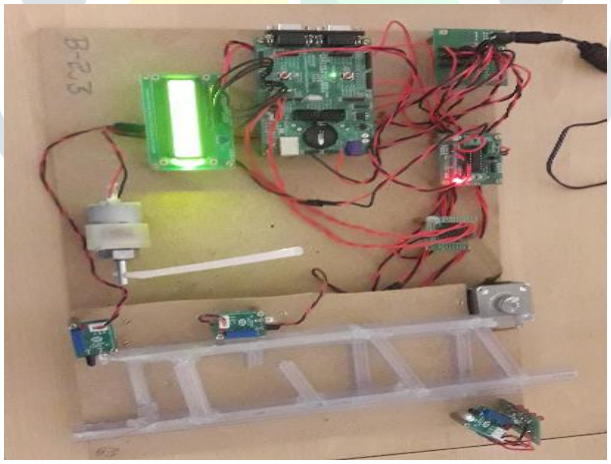

Fig 6: Model of the system

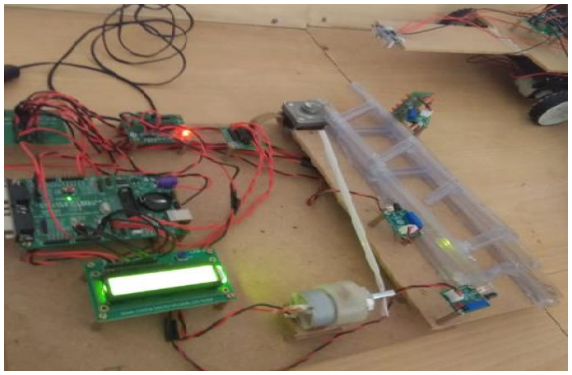

Fig 7(a): Gate closed

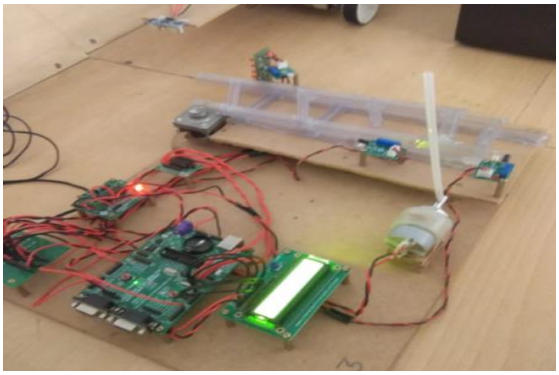

Fig 7(b): Gate opened

By utilizing the programmed railroad door control at the dimension crossing, the train approaches the railroad crossing from either side, the sensor put at a specific separation from the entryway identifies the moving toward train and likewise control the activity of the door.

When the sensor detects the train the gate will be automatically closed in level crossing as shown in fig7(a). After train leaves the level crossing the gate automatically opens as shown in fig7 (b).

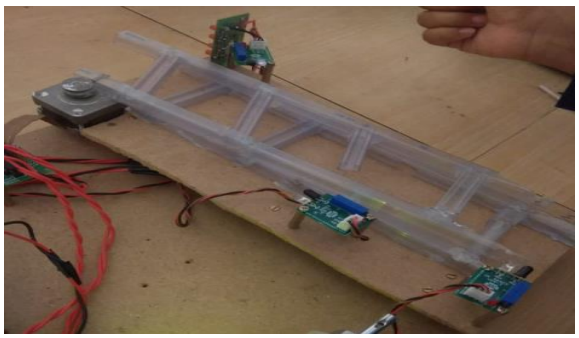

Fig8 (a): Before track switching

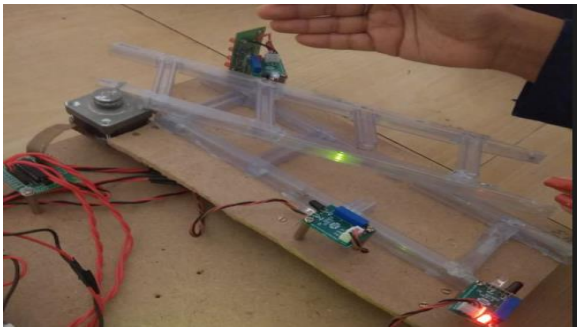

Fig8 (b): After track switching

In the fig8 (a) two sensors are put at the either sides of the intersection where the track switches. On the off chance that there's a train drawing closer from the opposite side, at that point another sensor put along that heading gets enacted and will send a hinders to the controller. The interfere with administration routine switches the track naturally as shown in the fig8 (b).

IR sensor detects somebody's being touring inside around 10m from the sensor. When the IR sensor detects the any obstacle on the track it automatically closes the gate in level crossing and indicates the red light in traffic signal as shown in below fig9 (a) and train will be stopped after the detection of obstacle as shown in fig9 (b).

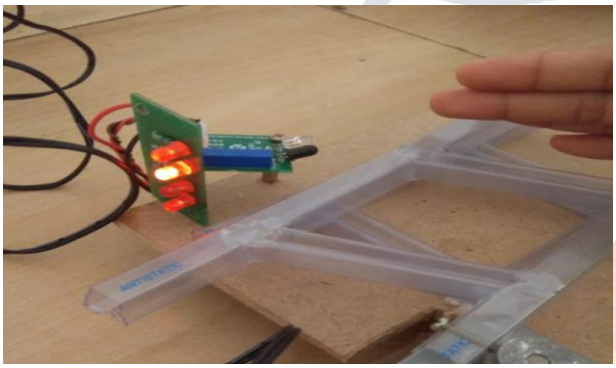

Fig9 (b): Indicates red signal

Fig9 (b): LCD display

V. ADVANTAGES

- Monitors MAN_FREE railway gate monitoring.
- Separates the tracks automatically at railway crossing junctions.
- Accurate working.
- No manual errors involved.
- Cost effective and easy to implement.

VI. CONCLUSION

This framework used to improve the rail street transportation office by decreasing human contribution by shutting and opening railroad door and odds of event of mishaps at unmanned dimension crossing and giving tremendous security. Additionally this procedure has quicker task than more seasoned framework, it spares a great deal of time as it is robotized where as manual frameworks set aside effort for line man to educate the station ace to close and open the door which can devour a generous amount of your time.

The programmed track exchanging decreases the impact of train and will likewise deal with the course of a specific train to maintain a strategic distance from any deferral in achieving its goal. In the obstruction recognition IR Sensor distinguishes the deterrent and the train stops when the message is passed on to the close-by railroad station just as for the train administrator when hindrance is recognized. So through this framework any hindrance can be identified and mishaps can be maintained a strategic distance from and furthermore the message has been passed on to concern.

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