

## Unmanned Automated Railway Level Crossing System Using Zigbee

**M.Siva Ramkumar**

*Assistant Professor,*

*Department of Electrical and Electronics Engineering  
Karpagam University, Coimbatore, Tamil Nadu, India.*

### Abstract

This venture is to work and control the unmanned railway gate in the best possible way with a specific end goal to maintain a strategic distance from the mishances in the unmanned railway crossing. The prepare mishances because of the nonappearance of human power in the railway intersection are the significant issues confronted by the general population. To beat the mishaps because of the above issue this venture is planned. It manages two things. To start with, it manages the lessening of time for which the entryway is being kept shut. And afterward, to give security to the street clients by lessening the mishaps that for the most part happen because of lack of regard of street clients. This venture tackles the issue happening in the unmanned railway level intersection in a scholarly path; by utilizing a ZigBee indicate point correspondence. This technique is utilized to recognize the prepare before/after specific km from the gate to alarm the street clients. The prepare module is settled in the front bit of a prepare and it has a ZigBee transmitter that consistently sends a remarkable coded information. A ZigBee beneficiary is put at the gate module. The gate module sits tight for the code number to be gotten. Once the flag from the prepare transmitter coordinates the put away information, the gate module realizes that a prepare is drawing nearer and it enacts the speaker and the status is known through the LCD show, after that engine driver sits tight for some time(ex:30sec) then it drives the engine to close the entryway . After the prepare crosses the correspondence run gate module stops the alarming speaker and entryway come back to its underlying state. The venture utilizes a 8 bit PIC microcontroller for control and a couple of ZigBee modem for correspondence.

**Keywords:** Automated Railway Level , Zigbee PWM , DTE - Data Terminal Equipment, RTS - Request To Send , CTS - Clear To Send , RISC - Reduced

## Instruction Set Computer , SRAM - Static Random Access Memory RI -Ring Indicator

### 1. INTRODUCTION

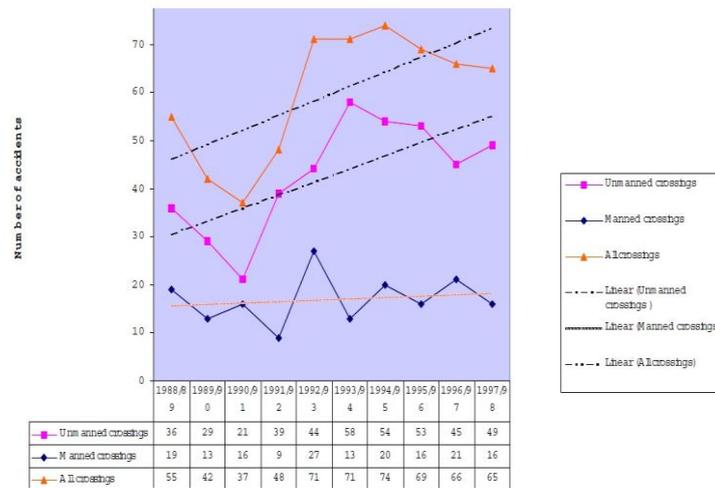
India is the nation which has the world's biggest railroad organizes. More than several rails running on track each day. As all realize that it is doubtlessly difficult to stop the running train at moment. So railroads have given rail line gates to well-being at the level intersections. These entryways are shut for street movement when a prepare is required to land on the track. The entryways are opened for street clients once the prepare leaves the intersection.[2]

Level intersection in India can be isolated into two classifications.

- Manned
- Unmanned

Kept an eye on level intersections are those which are protected by a gatemen as representative of Railways. The gate restrains the street activity by shutting the entryway on the receipt of drawing nearer; prepare data from control lodge through a phone line. Likewise in this framework the motor driver acquires a green flag just when the railroad entryways shut. A large portion of the level intersections closer to Railway station or in country zones are kept an eye on. Unmanned level intersections are spots which are un-protected. In this way a slight measure of carelessness with respect to street clients prompts mishances at such places. The greater parts of the intersections in remote territories or towns with low populace thickness are unmanned sort. It might be worth saying here that the vast majority of prepare mishaps prompting loss of property and life happened at unmanned level intersections. To caution at all level intersections in the immeasurable system of Indian Railways is for all intents and purposes inconceivable .Accidents occurred even at kept an eye on level intersections because of the blunders submitted by gateman .The Indian Railway systems with a course length of 62,495km has a sum of 40,445 length crossing, or a normal of one each 1.5km of this aggregate, 16, 1332 intersections are kept an eye on with some type of boundary security confronting street utilizes 20,528 are open intersections with settled street cautioning sign, 948 are street intersections nearby trenches without obstruction insurance, however with street notices signs, and 2,837 are basic open intersections with neither hindrance assurance nor settled street cautioning signs.

## 2. RAILWAY ACCIDENTS



**Fig 1** Railway accidents

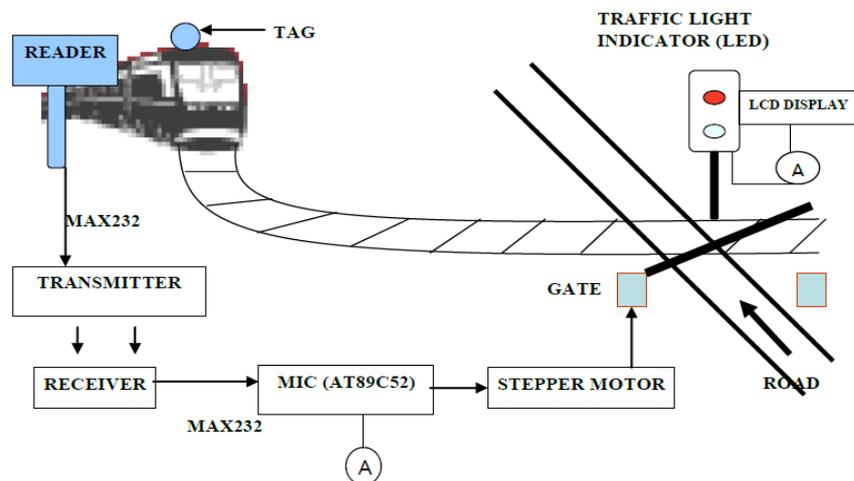
This chart demonstrates the mishaps in the railroad entryways. For instance in 2008-2009 railroad mishaps are around 580, in that 22% of mishaps are happening in the level intersection. In that 22%, 68% of mishaps are happening in the unmanned level intersection. This demonstrates the real mishaps are happening at the unmanned level intersections. To defeat those issues in the unmanned railroad level intersection, this venture has been planned. It manages two things. In the first place, it manages the decrease of time for which the entryway is being kept shut. And after that, to give wellbeing to the street clients by decreasing the mishaps that as a rule happens because of heedlessness of street clients. By this framework the human blunder is wiped out. The issue of mishap dangers, at un-kept an eye on level intersections is along these lines tackled.

## 3. LITERATURE SURVEY

This paper [1] planned by utilizing 8051 microcontroller to keep away from mishaps happening at unattended railroad entryways. This framework uses two effective IR transmitters and two beneficiaries; one sets of transmitter and recipient is settled at upside (from where the prepare comes) at a level higher than a person in correct arrangement and correspondingly the other combine is settled at drawback of the prepare heading. Sensor initiation time is so balanced by computing the time taken at a specific speed to cross no less than one compartment of standard least size of the Indian railroad. For this framework [1] 5seconds can be considered. Sensors are settled at 1km on both sides of the gate. The sensor will be called along the prepare heading as 'foreside sensor' and alternate as 'toward the back side sensor'. At the point when foreside beneficiary gets enacted, the gate engine is turned on in one heading

and the entryway is shut and remains shut until the prepare crosses the gate and achieves rearward side sensors. At the point when behind side collector gets actuated engine hands over inverse bearing and entryway opens and engine stops. Signal will quickly stable at the fore side beneficiary enactment and gate will be shut following 5 seconds, with the goal that time will be given to drivers to clear entryway range so as to abstain from catching between the gates and stops the sound after the prepare has crossed. Railroads have given rail line entryways to security at the level intersections. These entryways are shut for street activity when a prepare is required to land on the track. The gates are opened for street clients once the prepare leaves the intersection. The IR sensor will detect every one of the articles crossing the track, not just prepare and furthermore sends the data to the gate. For the most part prepares are running at rapid, in this framework they are settling the sensor only 1Km preceding so that the prepare achieves the level shutting before the gate shut To beat those issues in the unmanned railroad level intersection, this venture has been outlined. , to give wellbeing to the street clients by decreasing the mishances that generally happens because of recklessness of street clients. By this framework the human mistake is wiped out .The issue of mishap dangers, at un-kept an eye on level intersections is therefore explained.

#### 4. PROPOSED SYSTEM

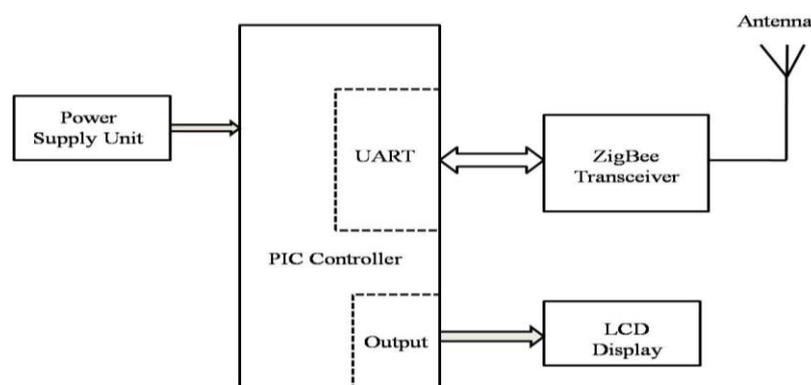


**Fig 2:** Railway Crossing

To defeat the issues in the unmanned railroad level intersection, this venture has been planned. It manages two things. To start with, it manages the lessening of time for which the gate is being kept shut. And afterward, to give wellbeing to the street

clients by diminishing the mischances that for the most part happen because of thoughtlessness of street clients.

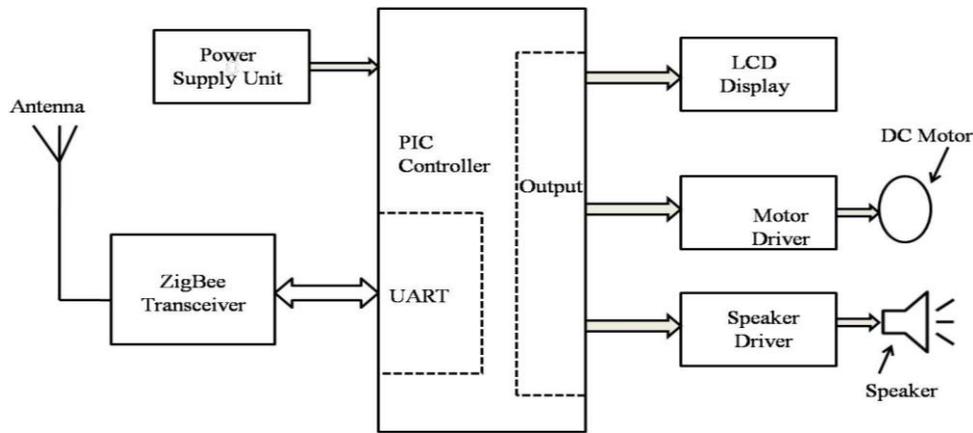
This venture takes care of the issue happening in the unmanned railroad level intersection in a canny path, by utilizing a ZigBee indicate point correspondence. This strategy is utilized to recognize the prepare before/after specific km from the gate to caution the street clients. The prepare module is settled in the front part of a prepare and it has a ZigBee transmitter that constantly sends an extraordinary coded information. A ZigBee beneficiary is put at the gate module. The gate module sits tight for the code number to be gotten. Once the flag from the prepare transmitter coordinates the put away information, the gate module realizes that a prepare is drawing nearer and it enacts the speaker and the status is known through the LCD show, after that engine driver sits tight for some time(ex:30sec) then it drives the engine to close the entryway. After the prepare crosses the correspondence run gate module stops the alarming speaker and entryway come back to its underlying state. By this framework the human blunder is disposed of .The issue of mishap dangers, at un-kept an eye on level intersections is subsequently tackled.



**Fig 3** Train Module

Square graph comprise of two sections i.e. prepare module and entryway module. Prepare module has diverse units like power supply, PIC microcontroller, ZigBee Transceiver and LCD show. At that point it clarifies how the information transmitted from the prepare module to entryway module. Next one is gate module. Gate modules have distinctive units like power supply, PIC microcontroller, ZigBee Transceiver, engine driver L293D, Speaker driver APR9600 and LCD show. This square graph demonstrates the prepare module of this venture. This uses a 8 bit PIC microcontroller, ZigBee handset and a LCD show. ZigBee Transceiver associated in the UART port of the microcontroller. ZigBee Transceiver will do both the operations, transmit and get. The ZigBee transmitter transmits the flag to the collector

continuously. LCD is associate with the yield of the PIC controller, which is utilized to educate the prepare administrator whether the gate is shut or not.



**Fig 4** Gate Module

This piece outline demonstrates the gate module. It comprise of 8 bit PIC microcontroller, ZigBee handset, LCD show, speaker and speaker driver, DC Motor, DC engine driver. ZigBee Transceiver associated with the UART port of the microcontroller. ZigBee Transceiver will do both the operations, transmit and also get. The gate module sits tight for the code number to be gotten. Once the flag from the prepare transmitter coordinates the put away information, the entryway module realizes that a prepare is drawn nearer or not. What's more, it initiates the speaker and the status is known through the LCD show. After that it empowers the engine driver then the engine will close the entryway. The speaker reports the status of the prepare; in the LCD show additionally show the prepare's position. After that it empower the engine driver then the engine close the entryway. After when the prepare crosses the correspondence run the gate module stops the alarming speaker and the entryway come back to its underlying state.

#### 4.1 LCD Display

A fluid gem show (LCD) is a thin, level electronic visual show that uses the light tweaking properties of fluid precious stones (LCs). LCs does not produce light directly. LCDs are little ease shows. They are anything but difficult to interface with a small scale controller due to an inserted controller (the dark blob on the back of the board). This controller is standard crosswise over many showcases (HD 44780) which implies numerous miniaturized scale controllers have libraries that make showing messages as simple as a solitary line of code.

## **4.2 ZigBee**

The ZigBee indicate point specialized technique is utilized. By utilizing the ZigBee specialized strategy two way interchanges is conceivable. Additionally it is utilized for long correspondence purposes and the information transmission. It works on the 802.15.4 systems administration standard. As per Max stream, the ZigBee has a scope of 30m inside and up to 100m outside with line of sight. 2km continuously applications. Information enters the module UART through the DIN (stick 3) as a nonconcurrent serial flag. The flag ought to sit without moving high when no information is being transmitted. Every information byte comprises of a begin bit (low), 8 information bits (minimum critical piece first) and a stop bit (high). The ZigBee indicate point specialized technique is utilized. By utilizing the ZigBee specialized technique two way interchanges is conceivable. Likewise it is utilized for long correspondence purposes. OEM RF module is a ZigBee/IEEE 802.15.4 agreeable remote systems administration gadget made by Max stream. It works on the 802.15.4 systems administration standard. As indicated by Max stream, the ZigBee has a scope of 30m inside and up to 100m outside with line of sight. 2km continuously applications. Max Stream's x-sliced programming is useful to pick up a speedy review of what the settings are. ZigBee begins in the default straightforward mode. XCTU programming permits downloading new firmware to ZigBee effortlessly. The ZigBee Series 2 OEM RF Modules interface to a host gadget through a rationale level nonconcurrent serial port. Through its serial port, the module can speak with any rationale and voltage good UART; or through a level interpreter to any serial gadget

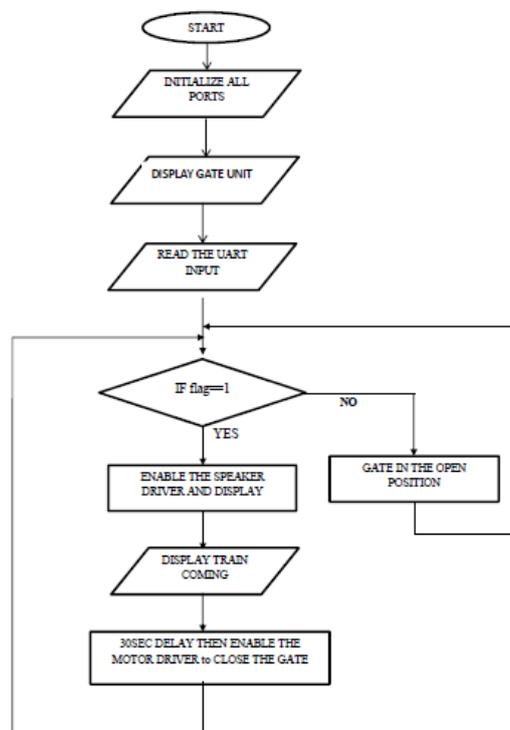
## **4.3 Motor Driver**

The L293D is intended to give bidirectional drive streams of up to 600-mA at voltages from 4.5 V to 36 V gadgets are intended to drive inductive loads, for example, transfers, solenoids, dc and bipolar venturing engines, and also other high-present/high-voltage stacks in positive-supply applications. All information sources are TTL perfect. Each yield is an entire chain of command drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are empowered in sets, with drivers 1 and 2 empowered by 1,2EN and drivers 3 and 4 empowered by 3,4EN. At the point when an empower information is high, the related drivers are empowered, and their yields are dynamic and in stage with their sources of info. At the point when the empower info is low, those drivers are incapacitated, and their yields are off and in the high-impedance state. With the best possible information inputs, each combine of drivers structures a full-H (or extension) reversible drive appropriate for engine applications. Information enters the module UART through the DIN (stick 3) as a nonconcurrent serial flag. The flag ought to be sit without moving

high when no information is being transmitted. Every information byte comprises of a begin bit (low), 8 information bits (slightest huge piece first) and a stop bit (high). The accompanying figure delineates the serial piece example of information going through the module. The module UART performs errands, for example, timing and equality checking, that are required for information interchanges. Serial correspondences rely on upon the two UARTs to be arranged with good settings (baud rate, equality, begin bits, stop bits, information bits).

#### 4.4 Apr9600 Speaker Driver:

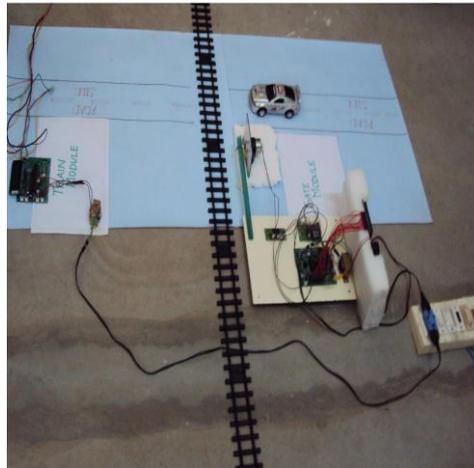
The APR9600 gadget offers genuine single-chip voice recording, non-unstable capacity, and Play back ability for 40 to 60 seconds. The gadget bolsters both arbitrary and successive access of different messages. Test rates are client selectable, permitting creators to modify their outline for remarkable quality and capacity time needs. Incorporated yield intensifier, mouthpiece enhancer, and AGC circuits significantly streamline framework outline. The gadget is perfect for use in versatile voice recorders, toys, and numerous other shopper and mechanical applications.



**Fig 5** Flow Chart

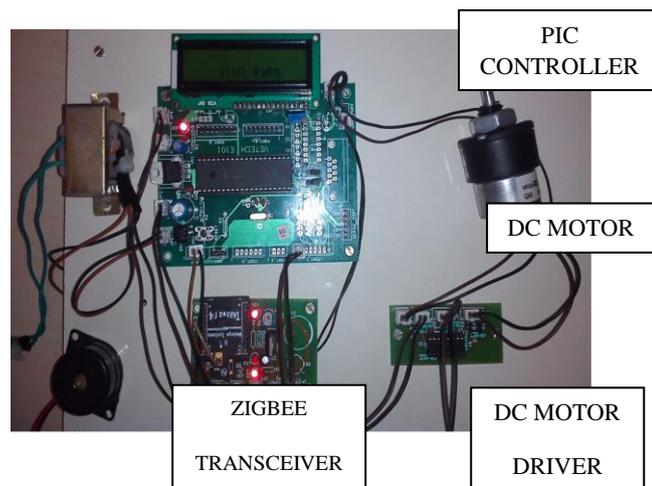
The circuit diagram which contains gate unit and train unit was elucidated discernibly. The flow of control was explicated by using the flow chart. By this the functioning of the project was enlightened perceptibly

### 5. PROTOTYPE DETAILS

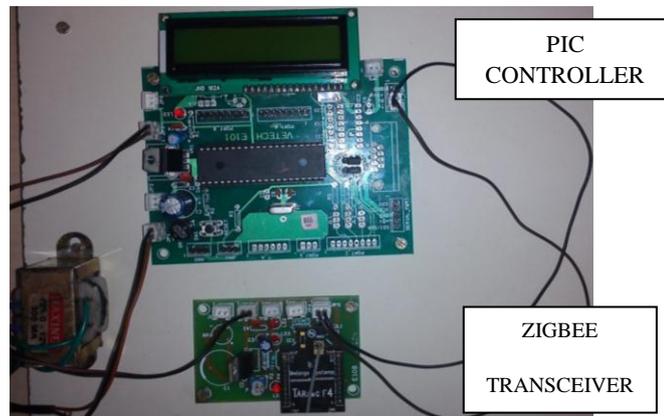


**Fig 6.** proposed prototype for unmanned automated railway level crossing system using ZIGBEE.

This is the schematic representation of proposed prototype for unmanned automated railway level crossing system using ZIGBEE.



**Fig 7** Gate Module



**Fig 8** Train Module

## 6. CONCLUSION

This venture gives the illustration to the issues happening in the unmanned railroad level intersection. It manages two things. To start with, it manages the decrease of time for which the gate is being kept shut. And after that, to give wellbeing to the street clients by decreasing the mishaps that more often than not happen because of imprudence of street clients. In this wander, ZigBee innovation has been utilized. By utilizing this innovation, blunder free correspondence can be effectively made and moment transmission of data can be made between the Train and Gate unit. This wander lessens the insufficient correspondence and gives most extreme security in level intersection. The reprobate of mishap dangers, at un-kept an eye on level intersections is subsequently deciphered.

In future, camera is settled in the gate to screen the entryway position and to check whether anybody exhibit inside the gate and the administrator will have the capacity to see whether the entryway is shut or not. Keeping in mind the end goal to maintain a strategic distance from mischances amid intersection the railroad track by the travelers the administrator need to quantify the speed of the prepare. So that the administrator can send an alert flag to the traveler close to the railroad track. The condition of the prepare will be observed ceaselessly by utilizing GPS innovation. So that holding up period will be limited contrast with the present framework and the exactness will likewise be expanded

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