

RAILWAY TRACK PEDESTRIAN CROSSING USING MOBILE PLATFORM

S.Sowmiya(M.E,CSE)¹ , Priyadarshini Engg College, Vaniyambadi, Vellore
email:sharansharvin@gmail.com, skalpana202008@gmail.com ,csk@priyadarshini.net.in

Abstract

This paper is to express our thoughts that is used for automatically close or opens the mobile platforms in between the train track. The "mobile platform" it means a bridge connects the two platforms through which the pedestrian can walk on it to reach the next platform. Sensors are placed on the two sides of the train track. If the train arrives and reaches the sensor placed before the receiver side the mobile platform will close automatically and allows the train to go through tracks and when the train departs the sensor that is placed after the receiver the mobile platform will open the bridging platform automatically. The microcontroller will manage this process by using infrared sensor. So on sensing the train on one path controller will give pulses to the stepper motor to close the mobile platform automatically.

Keywords: mobile platform, pedestrian, infrared sensor, microcontroller.

I. INTRODUCTION

India transportation mode has been highly depends on train. At present 40% of train accidents are due to use of tracks directly to cross the platforms and level crossing it is evident from daily newspapers and TV channels. The read sensor senses and sends a signal. The development of the most popular devices for automatic level crossing and gate switching system started about few years ago and continues to emerge. In the recent years, there is a rapid increase in accidents that might be due to several reasons like by level crossing, direct platform crossing etc..., although the automated level crossing, elevators, embedded system for crossing the platforms is available. Here I propose a automatic mobile platform for easily crossing the platform from one to another. Instead of crossing the platform directly or by using the over bridges, this automatic open/close system is displayed on LED. This will be also useful for both disabled persons and elderly persons. This system is compact, flexible and only takes less power to operate making it more reliable to use. The aims and objectives of this work includes

- 1) Basic object of this project is to design a portable embedded system.
- 2) Developing an economical and simple solution.
- 3) Cost effective, reliable method and signal conditioning.

II. MOTIVATION

Human beings have been gifted by nature; by crossing the platforms directly will leads to accidents. Unfortunately, not everybody possesses in out of danger. In India, there are around 44% of people are dies due to this level crossing directly without using the over bridges. This idea will be more helpful to every

passenger. Even disabled persons are affected and feel difficult to cross the platform through the over bridges. So this mobile platform will be very useful to ill and aged person.

III. OBJECTIVE

The project proposed here is useful not only for the elderly persons, but also for the deaf and blind persons. The objective of this work includes a mobile platform for effective platform crossing aiding the physically challenged and elderly persons. A portable embedded system is designed such that large number of users will get benefited.

IV. PROPOSED SYSTEM

.It saves the time for passengers to cross the next platform. The sensing is made continuously whenever the trains arrive and pass through, which automatically close/open the mobile platform which is beneficial for passengers to cross the rail grade crossing. This method will be more comfort for scheduling the train timings for reaching the particular destination and also for crossing the suitable platforms. And we have controlled the platform manually using the wireless communication method when the automated system is failed.

Advantages

- Reduce the chances of human error.
- Reduces the time consumption.
- Fatalities are less.
- Enhance reliability near level crossing and at platform crossing.

V. COMPONENTS OF AUTOMATED SYSTEM

a. POWER SUPPLY UNIT

The main component is power supply unit. The 230V ac supply is converted into 12V ac supply through the transformer. The output of the transformer has the same frequency as in the input ac power. This ac supply will be converted into dc supply by the diodes.

b. LCD DISPLAY

LCD: It is a type of display used in many portable computer.

LED: It is a semiconductor light source used as an indicator. It gets the information from the microcontroller. Here it is used to display whether the pedestrian can cross the platform or not.

c. IR SENSOR

IR SENSOR is a device that emits infrared radiation in order to sense some aspect of its surroundings. It can sense the heat of an object and detection motion. The radiation is invisible to our eyes but can be detected by an infrared sensor that interrupts it. Here the sensor will detect the train motion and intimates to the Microcontroller to close/open the Mobile platform.

d. MICROCONTROLLER:PIC16f877a

It consist of a memory which is used to permanently save the program being executed. PIC is a specialized microcontroller chip (Peripheral Interface Controller). It is a programmed circuit that carryout the task with timer.

e.AUDIO INDICATOR

It just indicates to the passengers either they can cross the platform or not. This indication will be in audio format that will helps us to understand the message.

f. BIDIRECTIONAL MOTOR

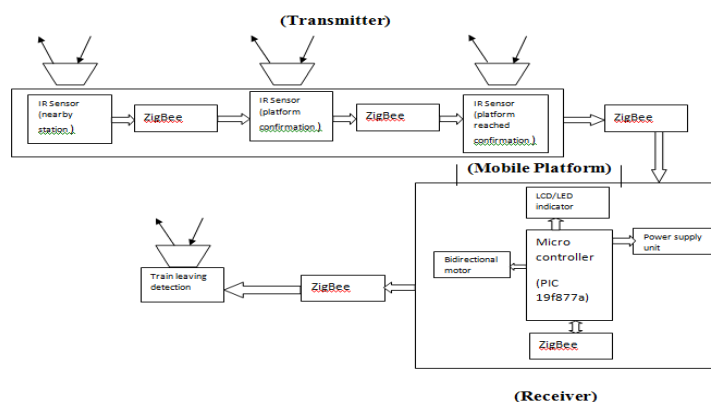
The motor is used to convert the electrical energy into mechanical energy. i.e. power supply will be changed to mechanical energy that helps to activate the platform in both direction. The bidirectional motor is helps the mobile platform to open and close immediately when the command is received from the micro controller.

g. ZIGBEE

It is designed for long battery timings at low cost and low power consumption. It is used to control the sensor networks in wireless technology.

VI. SYSTEM DESIGN

This system design will increases among physically impaired persons, passengers and elderly persons to meet their common needs. This project describes the use of reducing the time of climbing the bridges. The mobile platform handles this process of taking them to the next platform. This working procedure will record by the microcontroller that integrates all the devices. The instruction will be informed to the passenger to cross the platform or not.



Block Diagram: Working system

VII. WORKING PRINCIPLE

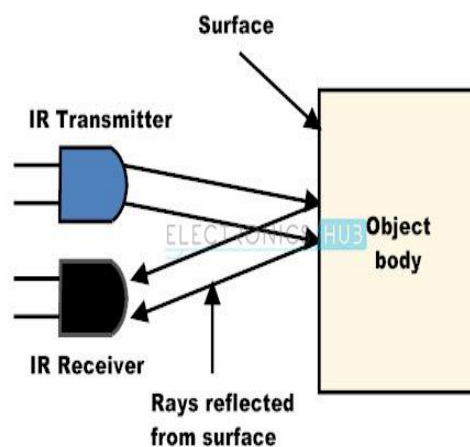
a. SENSING UNIT

The typical IR sensor like motion detector enters and reaches the center of device. It flashes on and off 38500 times/sec. The optical filter allows little light except 980nm. The electronic filter allows signals around 38.5kHz to pass through. The IR sensors are placed in the both sides of the train tracks. The IR rays gets emitted from LED, it moves in angled direction. When train interfaces in the path, the rays get cut and produces secondary wavelets in the opposite direction. Active infrared sensors consist of two elements: infrared source and infrared detector. Infrared sources include an LED or infrared laser diode. Infrared detectors include photodiodes or phototransistors. The energy emitted by the infrared source is reflected by an object and falls on the infrared detector.

Totally 4 IR sensors are used in this concept,

1. Nearby station confirmation (if necessary/less distance).
2. Platform confirmation
3. Platform reached confirmation
4. Train leaving detection

The first three sensors are fixed before the Receiver that detects the presence of train or entering into the station and alerts the platform to allow the train to go through and the last sensor is placed after the receiver part that detects the train leaving from the station. The IR sensor emits the infrared radiation to detect the obstacle in its surroundings that interrupts the radiation. Radiation is not visible to human eyes, but it detects the object (train) movement. The received reflected rays will be transferred through the zigbee.

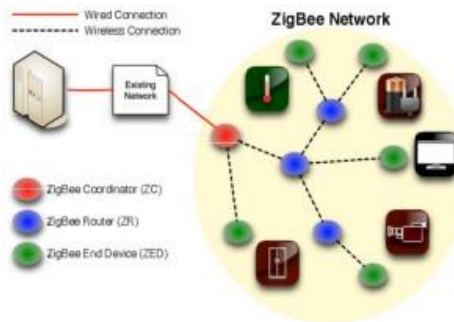


IR Sensor(transmitter & receiver)

b. MESSAGE PASSING UNIT

Zigbee is low-cost and low-powered mesh network widely deployed for controlling and monitoring applications where it covers 10-100 meters within the range. This communication system is less expensive and simpler than the other proprietary short-range wireless sensor networks as Bluetooth and Wi-Fi. The frequency that is received from the IR sensor will be matched with the ZigBee frequency and it communicates with its end devices. In ZigBee there are 3 main components

1. ZigBee coordinator(ZC)
2. ZigBee Router(ZR)
3. ZigBee End Devices(ZED)



Zigbee system structure

The zigbee coordinator will be connecting with the other router and end devices. Here the end devices refers the IR sensor, microcontroller, LED/LCD etc., The zigbee transfers the train arrival and departure message that is sensed by the sensor till it reaches the end devices(microcontroller).

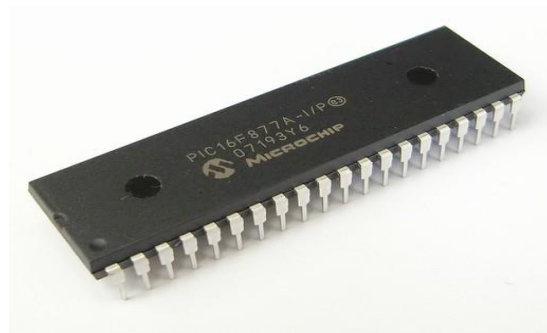


Zigbee modem

Zigbee supports different network configurations for master to master or master to slave communications. And also, it can be operated in different modes as a result the battery power is conserved. Zigbee networks are extendable with the use of routers and allow many nodes to interconnect with each other for building a wider area network.

c. CONTROLLING UNIT

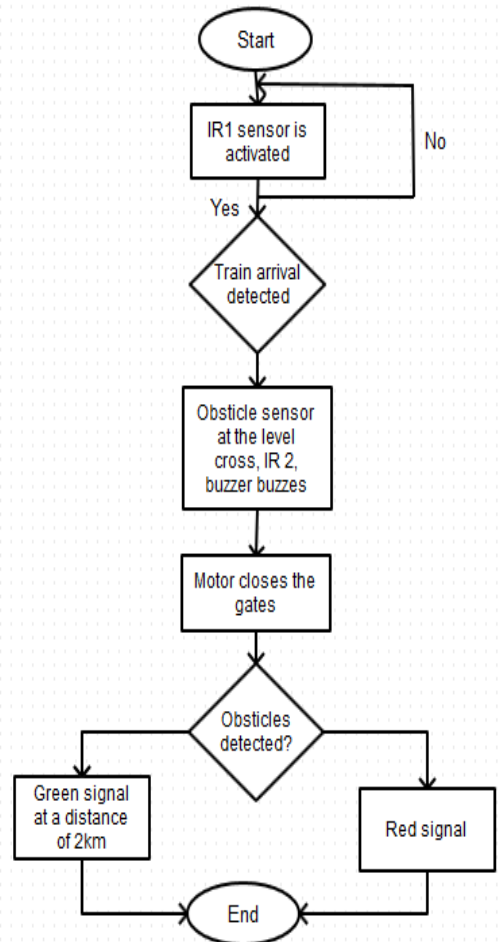
The entire controlling process is done by the microcontroller PIC16f877a. It has separate code and data spaces. A small number of fixed length instructions. Most instructions are single delay cycle upon branches and skips. The program is also mapped into the data space and writable. It consists of memory which is used to permanently save the program being executed. It is the heart of the concept, because it integrates with all the components and handles those working system. This makes the bidirectional motor to open and close automatically.



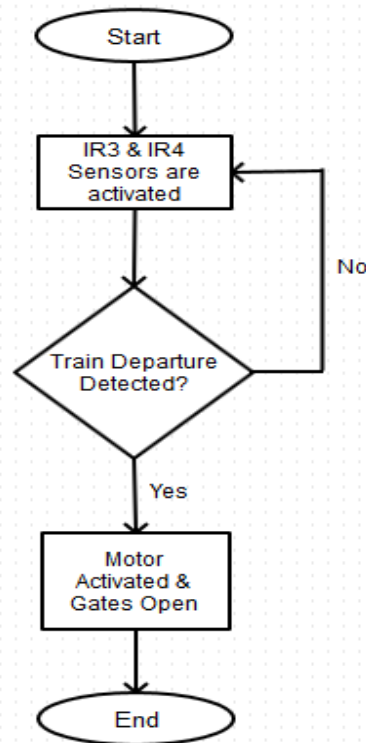
PIC16F877A microchip.

d. ACTIVATION OF MOBILE PLATFORM

The mobile platform is activated by microcontroller; this process is done by the bidirectional motor. The motor gear connects the motor and the teeth part will help the motor or mobile platform to start bridging the two platforms and again disconnects the platform whenever it gets the message from the previous system and microcontroller. The gear is motor works based on the principle of conservation of angular momentum.



Data flow: Closing the platform.



Data flow: Opening the platform.

e. **DISPLAYING MESSAGE TO PEDESTRIAN**

In this module the intimation will be displayed to the pedestrians through the LED/LCD displays and the audio indicator. It is a semiconductor light source used as an indicator lamp and also used for lighting. When the train arrives the signal in the station will turn into red color and when train passes the light will be turned to green color in LED display. The uneducated passengers can also understand by announcing the status whether the passengers can use the mobile platform or not in recorded voice through the audio indicator.



LED Display.

VIII. CONCLUSION

This paper is fully in the aim for avoiding human errors, accidents and decrease the fatalities in railway transportation department. Replacing manned type by adopting unmanned type i.e. fully automatic microcontroller based system, this helps in preventing the death caused near level crossing, also decline the time for which the people wait near the level crossing and completely prevent error that has done by semi manual system.

To help people those who are physically ill and aged because they are not having enough stamina to climb and cross the track with the aid of flyover, to keep in mind that use of automated platform bridge is predominant and did the same in this work. This is the step towards help them and also effective method for those who don't use flyover and cross the track along track itself.

In future, the system can be made more compact such that both transmitter and receiver parts mounted on the platform.

ACKNOWLEDGEMENT

I would like to thank my departmental staffs and friends, especially my mentor/guide for giving a restless effort to presenting this paper. Also a gratitude to many authors those who provides the material as reference.

REFERENCES

- [1] Acy M.Kottalil, Abhijith S, Ajmal M, Abilash L J, Ajith Babu: "Automatic Railway Gate Control System", Vol.3, February 2014.
- [2] J.Banuchandar, V.Kaliraj, P.Balasubramaniam, N.Tamilarasi, "automated unmanned railway level crossing system" Vol.1, Jan-Feb 2012 PP-458-463.
- [3] G.Prabhavathi, B.Sanjana, Ms.S.P.Dhivya, "Railway track pedestrian crossing between platforms" Vol-09, issue-02, Ver- III(Mar-Apr. 2014), PP87-91.
- [4] Prashantha.B.Y, Harisha.S, "smart railway crossing embedded with automated platform bridge" Vol-04, Issue- 08, Aug-2015.