Automatic Movable Platform for Crossing Railway Track

Indumathi.G, Kuralarasi.R, Kalieswari.S, Kanimozhi.M, Kanimozhi.N

Abstract—In order to facilitate the passengers in railway stations without disturbing the train activities, staircase and bridges were laid foundation. But during peak hours, it becomes more rush and crowded that becomes very difficult for the elderly persons or handicapped persons to use the bridge. To overcome this circumstance, we propose the idea of closing and opening the mobile platform in railway tracks automatically in this project. Mobile platform is one that connects two platforms together and thus facilitates passengers to use the path efficiently and reach the opposite stage. In this module, we make use of two Sensors on both sides of the track. When the train reaches the stage, the first sensor automatically closes the mobile stage. Once the train leaves the station, the second sensor helps to bridge two platforms mechanically. We make use of infrared sensors along with integration of microcontroller to sense the presence of train and it sends the pulses to stepper motor device that helps in closing the mobile stage. In order to avoid the confusions to the pedestrians regarding the usage of bridge, we implement green and red signal indication. When the signal is green, the pedestrians can use the bridge. If it turns red it indicates that train is arriving and hence bridge is closed and cannot be used until it leaves. The basic block diagram along with involved hardware and software devices are discussed in detail.

Keywords--Infrared sensors, Stepper motor, Interfacing unit, PIC 16F877 Microcontroller, motor driver circuit.

I. INTRODUCTION

The modern railway structures in India aren't device-managed which are absolutely synthetic. In railroad track station usually we use bridges. It's a long way very hard for the senior residents or handicapped humans to use the bridge. This paper finds beneficial answer. Specifically the route of a train is sense by means of sensor that used for mechanically near/open cellular bridge. Sensor is positioned on both facet of track to experience the movement of train. The microcontroller will feel the trains with the aid of the use of infrared sensors.

So on recognition the train on one track, the controller will deliver pulsates to the stepper motor to close the movable platform automatically.

II. COMPONENTS INVOLVED IN THIS MODULE

As this project is a combination of software and hardware it performs a specific task, rather than be a general purpose computer for multiple task.

A. Hardware components
IR-SENSOR
LCD
LED
DC MOTOR
B. Software components
PIC 16F877 MICROCONTROLLER
(i) IR sensor
   It is a device which emits and detects infrared radiation. Also it senses the heat of an object and detects its motion. Basically infrared radiations are invisible to human eye and hence IR-sensor are used to accepts and interpret it.
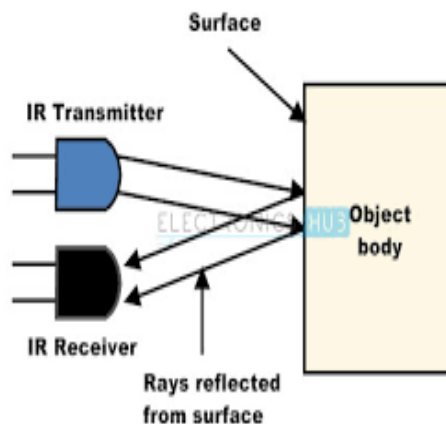

Fig.1 Diagram for IR sensor

(ii) LCD
   It is a type of display used in digital watches and many movable computers. It usually consists of two sheets of polarizing substance separated by liquid solution between them.
(iii) LED
It is a semi-conductor light source used as indicator lamps and lightening.
(iv) DC motor
   when compared with larger radius, more RPM is observed with gear of smaller radius   . The comparison between input and output gear gives gear ratio.

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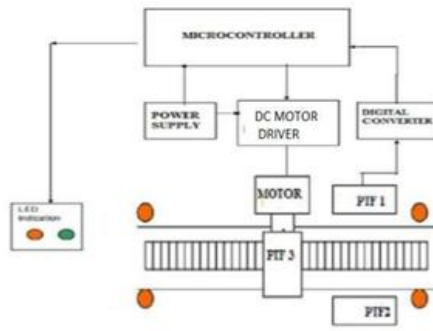
III. BLOCK DIAGRAM

Fig.2 Block diagram

A. *Power supply*

Regulator, transformer and rectifier act as the key sources of power supply in our module. By using a transformer, we are able to convert the 230V AC supply 12V at an ease. The input AC power and the output from transformer are found to be of the same frequency. Once the output AC power is yielded, with the help of bridge diode, it is converted to DC power. It can be noticed that the resultant DC power consists of ripple content and we have to make sure that it is slow as possible as the circuit life depends on the ripple content.

B. *Transformer*

Basically, a transformer is used to raise the AC voltage to high or low. Whereas, a step up transformer increases the value of input AC voltage while the work of step down transformer is entirely opposite to it. For this project, we make use of step down transformer in the power supply unit for safer operation.

C. *Rectifier*

The rectifier is a device such as a semi conductor cable of converting sinusoidal input waveform units into a unidirectional waveform with non-zero average components. In the circuit, the input is applied to the diagonal corners of the network and from the other two corners, the output is taken.

D. F*ilter*

As filters, capacitors are used to accompany the process of filtering in power supply unit by shunting the load. In the transmission stage, capacitor is in the charging stage where it stores energy and discharges it to the load during reception stage.

E. *Regulator*

A regulator is one that maintains a constant level via voltage or current. In this project ,a voltage regulator is used that has various IC units comprising of comparator amplifier, overload protection and control device all embedded in a single IC chip. Various regulation levels like fixed positive voltage, a fixed negative voltage or an adjustable set voltage are provided by a single IC unit.

F. *Controller*

Separate code and data spaces. A small number of fixed length instructions. Most instructions are single delay cycle upon branch and skips. The program also mapped into the data space and writable. It consists of a memory which is used to permanently save the program being executed.

G. *DC motor*

The gear having smaller radius will cover more RPM then the one with large radius. The larger gear will give more torque to the smaller gear than the vice-versa. Multiple gears

are connected together; conversation of a energy is followed.

H. *LED*

A LED (Light emitting diode) is a semi conductor device that has the capability to emit light when current flow is observed through them. Here, red and green LED's are used as the mode of indication.

I. *Infrared sensors*

For the main purpose of sensing the surrounding, we make use of the infrared sensor, electronic device that has the ability to give out and perceive infrared. Additionally, it can indicate motion along with measuring the heat of any object. IR detector is the one that always looks out for the infrared radiation that is flashing on and off 38,000 times per second. For permitting small light except of order 980nm, in-built optical filters are available. On the incident of emission of IR rays from LED, it starts to move in the appropriate angled direction. When the IR rays falls on any obstacles, interference takes place where it produces secondary wavelength and usually gets reflected to the direction from where it originated.

J. *DC Gear motors*

To work over light variety of voltage, DC gear motors are in hand. We can obtain a maximum RPM of 12V if a motor of range 6-12V is utilized for higher input voltage.

RPM=KI*V.

Fig. 3 Gear motor

K. *Relay drive*

Relay is usually an electro-magnetic switch that facilitates low voltage operation. One of the convenient examples for relay is a simple ON/OFF of a light bulb. Various relay driver circuits are available at present. They find application in various streams like telephone exchanges and in past computer devices for performing logical operations. Solid state relays are used to control power circuits by means of light triggering in order to perform a switching activity.
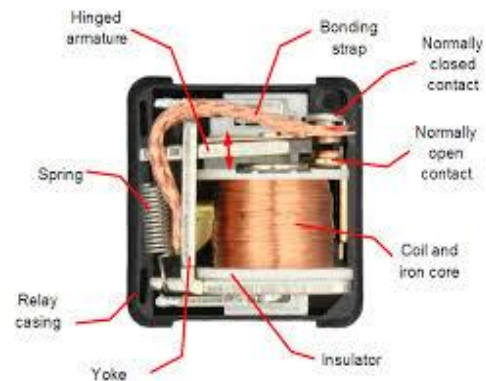

Fig.4 Relay drive

IV.   WORKING PRINCIPLE

Initially, IR sensor that is placed on the both sides of the track senses the incoming signal to analyze if the train arrives or not. On the event of absence of train arrival, the signal is sent to the digital converter. The output is given to the microcontroller. The microcontroller interprets the incoming signal and if it is 1, green led indication is made in the display. The microcontroller is connected to the DC driver circuit and driver circuit is connected to the stepper motor and it provides voltage and controls it.

Once the stepper motor starts rotating, a mobile stage from both platforms gets established. IR sensors sense the arrival of train, and then if it is 0, red led indication is made in the display. Then stepper motor rotates and mobile stage established is detached.

I.   RESULTS ANALYSIS
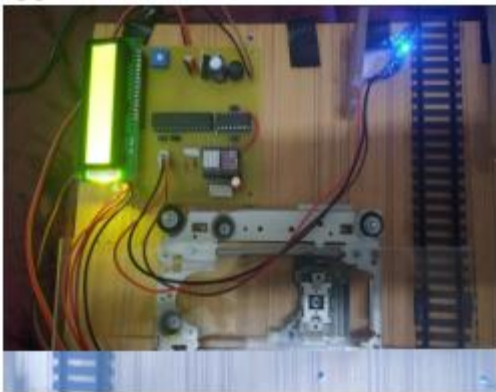
V.   CONCLUSION

In our proposed model in this paper, the train is tracked continuously and the opening and closing of the movable platform is made possible robotically. It is done in an automatic manner and suits to be the beneficial methods for passengers in passage of the railway path. Climbing of the staircase is no more needed as our proposed system covers it all. One more interesting factor is that, it suits to be the effective and a compact method in scheduling the train timings towards a destination also.

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