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Automation of Railway Gate and Road traffic using Internet of Things (IoT)

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Abstract -The Internet of Things (IoT) is a network of networked devices that may contain sensors and RFID technologies. These biases are not transportable, and they operate in network contexts using the most advanced communication protocols., such as Transmission Control Protocol (TCP), Stoner Datagram Protocol (UDP), and Internet Control Message Protocol (ICMP). The technology then speaks without the need for human involvement. The purpose of this figure is to give an automatic road crossing regulator that operates road crossings without a gate attendant. This is useful for road crossing operations. This regulator provides road druggies with useful coffers to save time when the gate is stored unrestricted and to reduce accidents typically caused by neglectfulness of road druggies and gate attendants. In addition, fresh modules are more enforced for passenger comfort. Then, passengers need to test the quantum on their Telecel mobile phone on their website in order to make an announcement of their appearance at the resort. This tool is cheap, real- time and automatic.

Keywords - IR detector, XBee, RF module, 8051 microcontroller, Automatic Railway Gate, Obstacle detection, Railway signal, IR detector, XBee, RF module, 8051 microcontroller

I. INTRODUCTION

The road is one of the world's oldest modes of transportation. It gets a lot of use for passenger and cargo transportation. Road is a completely massive community that connects far flung locales. There are a massive variety of individuals who calculate upon railroads for his or her every day delivery for longer distances at a less precious tariff. While the road is liable for safety, they'll now no longer generally stay as important as what they pretended to do. It is not always generally the fault of the railroads. There may be numerous rudiments bothered in private detriment cases springing up from extreme or murderous teach injuries because of derailments, vulnerable road crossings, mortal distraction, mechanical failure, etc. Indeed though there are multitudinous present day strategies that save you road injuries, nonetheless there may be lagging in road safety.

II. LITERATURE SURVEY

Less digital constructions are built in order to prevent road accidents. The functioning of IR detectors (1) (2) (3) (4) detects the approaching of each other, and as a result, the gates are operated (open/close). The operation of an Ultrasonic detector (1) honors any manacle at the song (3).In this system, the IR detectors are located at a distance from the gates and hire stressed-out connections among the detectors and the road gate. There are possibilities of disposition of the device that reasons device failure. The application of ultrasonic detectors is not always a green manner of detecting a manacle at the music as it's suitable to hit upon lower particulars that move the road music at that time. This strike has been triumphed over through the use of GSM generation for speaking with the gate. The educate is detected by the use of IR detectors and the data roughly the educate is insinuated to the gate thru GSM service (2). There's every other strike of GSM that can do community issues that make the device failing to talk with the gates.

III. PROPOSED METHOD

The ultrasonic detectors and GSM generation in the proposed system are replaced by an RF transmitter/ receiver brace to detect the approaching train, IR detectors for manacle detection, and XBee transceivers for communicating with the road signal a Microcontroller.

A micro regulator is a circuit or chip that has a processor and other support widgets such as software memory, data memory, I/O anchorages, and a periodic advertisement interface. A microcontroller no longer necessitates the use of external help widgets. The Intel 8051 is the most well-known microcontroller ever created for international use.

The proposed device utilizes four IR sensors-2 remaining and a couple of appropriate sensors. Left sensors are to hit upon the presence of the teacher .In the equivalent way Right sensors are utilized to hit upon the takeoff of the instructor. At the point when a fitting voltage is executed to the leads, electrons are equipped for

recombining with electron openings withinside the gadget, freeing power withinside the state of photons. This effect is known as electroluminescence. The proposed contraption incorporates 2 LEDs-purple and yellow.

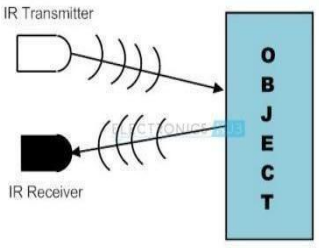

Fig-1. 8051 schematic Inputs and Outputs

IR Transceiver working

The modules require minimum energy and offer dependable shipping of statistics among devices. The modules perform inside the ISM 2.four GHz frequency band and are pin-for-pin well suited with every other

(i) Features:

- Indoor/Urban: **as much as** 100` (30 m)
- Outdoor line-of-sight: up to 300' (90 m)
- Transmit Power: 1 mW (0 dBm)
- Receiver Sensitivity: -92 dBm
- TX Peak Current: 45 mA (@3.3 V)
- RX Current: 50 mA (@3.3 V)
- Power-down Current: < 10 µA'

(ii) Description – Xbee

Baud Rate	: 9600 to 38400. Serial UART mode
Packet Length	: Variable or Fixed
Line of Sight	: 30+ meters range /
10	

With unicast and broadcast conversation guides, XBee modules provide source/vacation spot addressing functions. They direct factor to factor, multipoint to multipoint, peer to peer, and so on. topologies of discussion Whenever the instructor shows up purple LED will shine and keeping in mind that the teacher withdraws yellow LED will gleam.

Liquid Crystal Display

The managed interface and protocol has become standard for this type of show. The controller's person set consists of 28 lines of ASCII characters and a few symbols. When using an extension driver, the tool can show up to eighty characters. The LCD is solely capable of displaying monochrome textual content and is typically found in fax machines, laser printers, copiers, business examination equipment, networking equipment like routers, and garage devices.

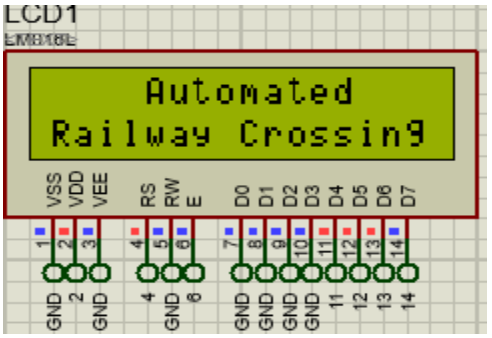

fig-2 LCD Display Pin Connections

LED backlights have a nominal working voltage of 5V at full brightness, with fading at lower voltages depending on LED color. Backlights that aren't LEDs usually demand higher voltages.

DC (Direct Current) Motor:

The output of a DC engine operating statute is based entirely on the fact that when a current-carrying guide is placed in an attractive field, it stores mechanical power.

Its miles are frequently used in robotics applications for controlling DC motors, including Arduino projects, due to its length and voltage need.

V. METHODOLOGY

(i) Working Principle:

On the L293D, there are Enable pins. Pin 1 (left H-bridge) and pin 9 (right H-bridge) (proper H-bridge). Pin 1 or 9 should be set to HIGH to apply pressure to the relevant motor. When both pins 1 and 9 are set to LOW, the motor within the corresponding section will stop operating.Pins 2 and 7 on the left, and pins 15 and 10 on the right, are the four input pins for the L293D, as seen in the pin diagram. The rotation of the left entrance pins will be changed to LOGIC 0.

(ii) Logic Table of L293D
Assuming a motor connected on left side output pins (pin 3,6

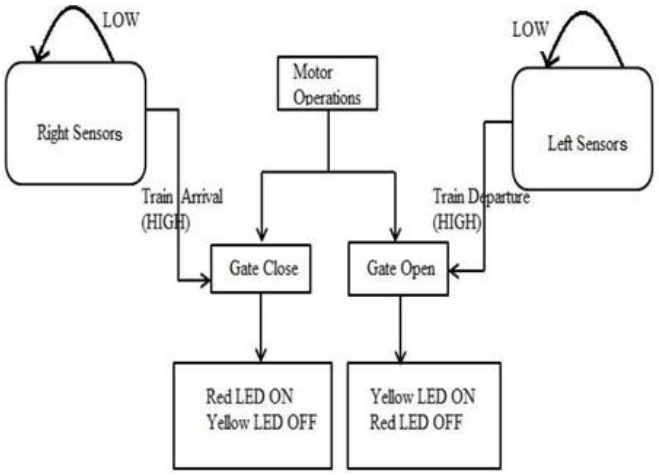

Fig.3. Data Flow Diagram for Gate Operations and LEDs Operations

Fleming's Left-hand Rule determines the direction of mechanical force, while F=BIl Newton determines its magnitude.

I DC Principle of Operation:

A motor is an electrical device that transforms electrical energy into mechanical energy. "Every time a cutting-edge worn conductor is positioned in a magnetic field, it reviews a mechanical force," says the DC motor's operational principle.

The L293D Motor Driver The L293D Motor Driver is a circuit with a motor motive force that is used to power DC vehicles that rotate in both directions. It's a 16-pin IC that can control both hard and fast DC automobiles at the same time. The L293D runs on 5V, therefore an external power supply is required to power the cars, which may be as large as 100 36V and draw as much as 600mA.The L293D works at the idea of a regular H- bridge, a circuit which permits the excessive voltage to be flown in both directions. In an singal L293D IC there are H- bridge circuits that may rotate DC vehicles independently. around on the premise of the inputs supplied on the enter pins as motor at the proper hand aspect.

Assume a motor is attached to the output pins on the left side (pins 3,6).

The Algorithm for opening and closing of the gate is as follows.

Table 1: Logic Table of L293D

Pin 2	Pin 7	Output
Logic 1	Logic 0	Clockwise direction
Logic 0	Logic 1	Anticlockwise Direction
Logic 0	Logic 0	Idle [No rotation] [Hi- Impedance state]
Logic 1	Logic 1	Idle [No rotation]

Step 1: Start with the first step.

Step 2: Turn on all of the IR sensors as well as the yellow LEDs.

Step 3: Check the status of the proper IR sensors on a regular basis.

Step 4: If both right IR sensors are dynamic [train arrival], proceed to step 3

Step 5. Otherwise, proceed to Step 3. Start the engine, which closes the door, and turn on the red LED [vehicle stop sign] while turning off the yellow LEDs.

Step 6: Check the status of the left IR sensors on a regular basis.

Step 7: If both left IR sensors are dynamic [train departure], proceed to Step 8; otherwise, proceed to Step 6.

Step 8: Disseminate the message to the engine for opening the door. Engine opens the door then Pi switches off the Red LED and turns on yellow LEDs [go sign for vehicles]. Go to Step 3.

The Algorithm for sending the destination station alert message is as follows.

Step 1: Start with the first step.

Step 2: Install an RFID reader [the train comes with an RFID tag].

Step 3: When a train approaches the RFID reader, it reads the tag's id and sends it to the main server via the Raspberry Pi.

Step 4: In light of the RFID number and the date of the excursion, the focal server obtains all telephone numbers

enrolled in this train. Send an emergency message to all phone numbers.

Step 5: close.

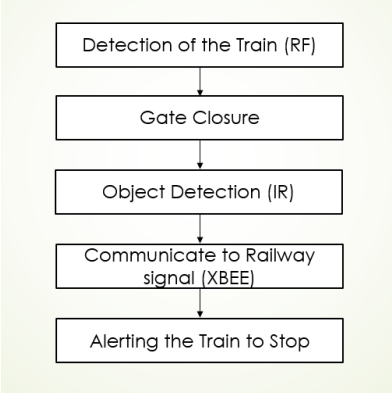

Fig-4. Working procedure of the proposed system

VI. RESULTS AND DISCUSSIONS

(i) Gate side

The RF transmitter sign code constant within the train's front end is detected by the RF receiver 1 constant on the railway gate when it enters into the receiver's sensitive range. When the RF receiver gets the code, it uses the microcontroller to send a controlled signal to the DC motor driving force, which closes the gate. After remaining at the gate, the Object Detecting IR Transceiver circuit is turned on and begins scanning the track for any hindrance (car). A put off timer is connected to the IR detector to identify the immovable obstruction. If there is an immovable barrier on the track, the IR sensor generates a voltage that is sent to the microcontroller unit as a manage signal, and it turns on the XBee transceiver on the gate.

(ii)Signal Side

The microcontroller unit communicates with the XBee transceiver 1 constant on the gate via XBee transceiver 2 on the railway sign. The information is received by the XBee transceiver 2 linked to the railway sign, which alters the sign (LED) and alerts the educator to stop.

The train passes through the crossing if there are no obstacles. A sign code is sent to the RF receiver constant with the gate by the RF transmitter 2 connected to the train's second stop. When the gate's microcontroller unit receives a signal from RF receiver 2, it sends a manipulator signal to the DC motor driving force, and the gate opens.

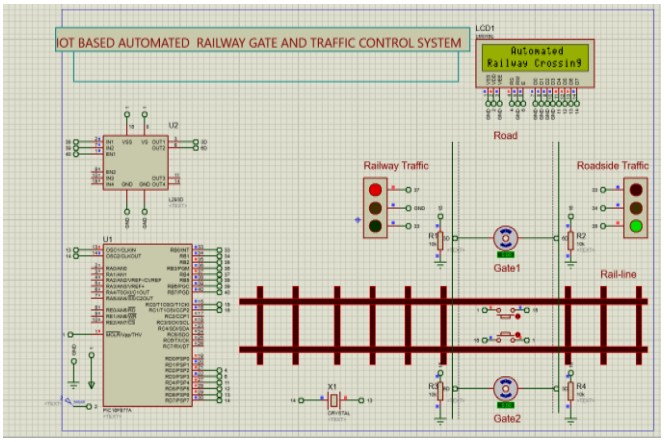

Fig-5: Now road traffic is in green signal and the railway traffic is in red signal.

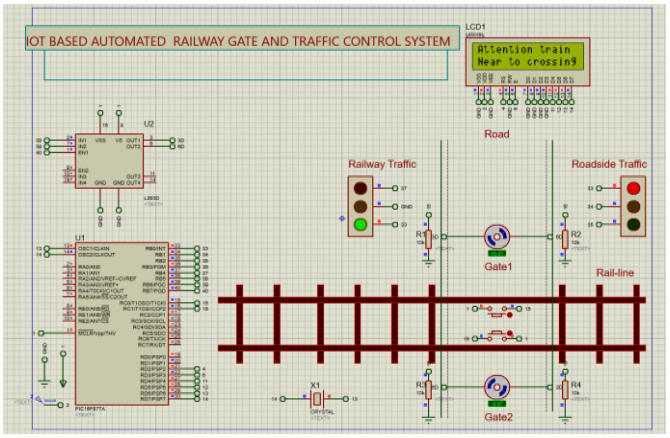

Fig-6: Similarly,now now road traffic is in red signal and the railway traffic is in green signal

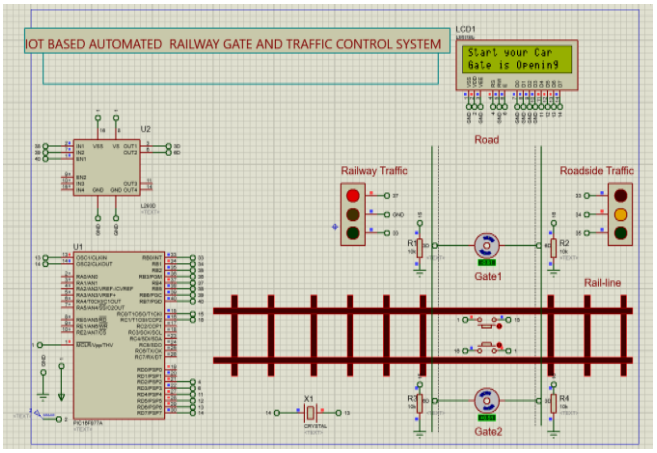

Fig-5: Road traffic is about to start while the train traffic is at a red signal.

VII. CONCLUSION

We tried to develop a simple yet effective solution for the level crossing in this proposed system, and with the usage of new technologies, this new system can last longer. This planned approach will pave the way for a more efficient upgrading of India's railways. A motion sensor camera can be mounted at a level crossing to make the proposed system more effective, and if there is no motion at the level crossing, an alert message with photos or Video capture of the level crossing can be sent to the train device.

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