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IOT Based Auto Metro Train Shuttle between Stations

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ABSTRACT

Presently a-days driverless metro trains which are used as a piece of most of the made countries like Germany, France, and Japan et cetera. These trains are equipped with the CPU which controls the plan. The get ready is tweaked for a specific way. Each station in transit is portrayed and moreover the stoppage timing of the get ready and partition between the two stations is predefined. This proposed structure is a self-decision train and it executes the need of any driver. Thusly, any human oversight is reduced. In this wander PIC microcontroller has been used as CPU. At whatever point the get ready gets in contact at the station it stops normally, as distinguished by an IR sensor.

By then the portal is opens thusly so the voyagers can go inside the plan. The portal at that point closes after an embraced time set in the controller by the program. The motorized structure for a metro rail is an organized application which make demonstrates the critical station information when the get ready accomplishes a particular station. This embedded application for the most part centers around conquering escape conditions in the present structure. It is progressed to meet the cost and power use necessities.

Keywords:- IOT, METRO, TRAIN

I. INTRODUCTION

This project is intended to exhibit the innovation utilized as a part of metro train development which are utilized as a part of a large portion of the created nations. This train is outfitted with a controller, that empowers the programmed running of the train starting with one station then onto the next. This proposed framework is self-sufficient train and it wipes out the need of any driver. Along these lines, any human mistake is precluded. In this project microcontroller from 8051 family has been utilized as CPU.

At whatever point the train lands at the station it stops consequently, as detected by an IR sensor. It is additionally furnished with a passenger checking segment, which tallies the quantity of passengers leaving and entering the train. The entryway closes when it achieves greatest inhabitance level regardless of time allocated for the way to stay open. The passenger checks are shown on a seven portion show interfaced to the microcontroller. The development of the train is controlled by an engine driver IC interfaced to the microcontroller.

II. LITERATURE SURVEY

In present day days metro train transportation has turned into the most practical and safe method for open transportation framework. It interfaces two noteworthy urban communities and gives a fast transportation administrations to people in general. The unmanned metro train (Driverless) permits an exceptionally secure and superior methods for transportation. The model makes utilization of microcontroller to control the train developments. It likewise controls passenger checking and creates a notice flag including programmed opening and shutting of entryways. The train keeps running between two predefined stations. It likewise gives an office of impact shirking if there should be an occurrence of two trains being on a similar track. The separation between two stations are additionally predefined. The train keeps running between two stations without human mediation. It gives a reset change to the passenger which goes about as a crisis stopping mechanism to stop the train if there should be an occurrence of crisis. The fundamental thought of the approach is to permit programmed metro train framework which is totally unmanned and is exact

and errorless in its task. Tallying of passengers occurs by utilizing bidirectional discovery by IR and photograph diode plan.

BLOCK DIAGRAM
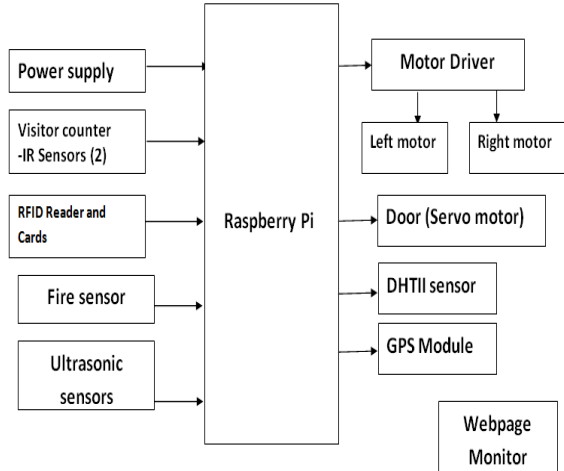
III. HARDWARE DESCRIPTION

A.Raspberry Pi 3 (Model B)

The Raspberry Pi is a progression of little single-board PCs created in the United Kingdom by the Raspberry Pi Foundation. It does exclude peripherals, (for example, consoles, mice and cases. A few ages of Raspberry Pis have been discharged. All models include a Broadcom framework on a chip (SoC) with an incorporated ARM good focal preparing unit (CPU) and on-chip designs handling unit (GPU).Processor speed ranges from 700 MHz to 1.4 GHz for the Pi 3; on-board memory ranges from 256 MB to 1 GB RAM. Secure Digital (SD) cards are utilized to store the working framework and program memory in either SDHC or Micro SDHC sizes. The sheets have one to four USB ports. For video yield, HDMI and composite video are upheld, with a standard 3.5 mm telephone jack for sound yield. Lower-level yield is given by various GPIO pins which bolster regular conventions like I²C. The B-models have a 8P8C Ethernet port and the Pi 3 and Pi Zero W have on-board Wi-Fi 802.11n and Bluetooth. Costs extend from US$5 to $35.
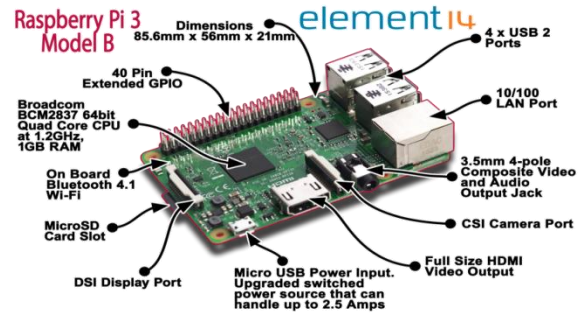
Fig 1: Raspberry Pi3 Model B

Specifications

SoC : Broadcom BCM2837

CPU : 4× ARM Cortex-A53, 1.2GHz

GPU : Broadcom VideoCore IV

RAM : 1GB LPDDR2 (900 MHz)

Networking : 10/100 Ethernet, 2.4GHz 802.11n

wireless

Bluetooth : Bluetooth 4.1 Classic, Bluetooth

Low Energy

Storage : microSD

GPIO : 40-pin header, populated

Ports : HDMI, 3.5mm analogue audio-

video jack, 4× USB 2.0, Ethernet, Camera Serial

Interface (CSI), Display Serial Interface (DSI)

B.IR Sensor

The IR Sensor-Single is a general purpose proximity sensor. Here we use it for collision detection. The module consists of an IR emitter and IR receiver pair. The high precision IR receiver always detects an IR signal. The module consists of 358 comparator IC. The output of sensor is high whenever it IR frequency and low otherwise. The on-board LED indicator helps user to check status of the sensor without using any additional hardware. The power consumption of this module is low. It gives a digital output.[2].

Based on a simple basic Idea, this IR obstacle sensor is easy to build, easy to calibrate and still, it provides a detection range of 10- 30 cm. This sensor can be used for most indoor applications where no important ambient light is present. It is the same principle in

ALL Infra-Red proximity sensors. The basic idea is to send infra red light through IR-LEDs, which is then reflected by any object in front of the sensor

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Fig 2: IR Sensor module

C.Ultrasonic Sensor

The ultrasonic sensor is a transducer which changes over electrical vitality into sound waves and the other way around. These sound waves fall over the ordinary scope of human hearing and henceforth it is known as ultrasonic waves. These sort of waves are over the recurrence of around 18000 Hz. A ultrasonic sensor transmits ultrasonic waves into the air and recognizes reflected waves from a protest. There are numerous applications for ultrasonic sensors, for example, in interruption alert frameworks, programmed entryway openers and reinforcement sensors for vehicles. Joined by the quick improvement of data preparing innovation, new fields of use, for example, industrial facility computerization gear and auto hardware, are expanding and should keep on doing so
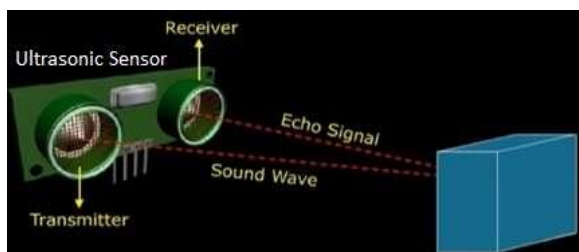

Fig 3: Ultrasonic Sensor

D.Fire Sensor

A fire sensor or fire indicator is a sensor intended to distinguish and react to the nearness of a fire or fire, permitting fire location. Reactions to a recognized fire rely upon the establishment, yet can incorporate sounding a caution, deactivating a fuel line, (for

example, a propane or a flammable gas line), and enacting a fire concealment framework. At the point when utilized as a part of utilizations, for example, modern heaters, their part is to give affirmation that the heater is legitimately; in these cases they make no immediate move past informing the administrator or control framework. A fire identifier can frequently react speedier and more precisely than a smoke or warmth locator because of the instruments it uses to distinguish the fire.

E.DHT11 Sensor

DHT11 computerized temperature and stickiness sensor is an aligned advanced flag yield of the temperature and mugginess joined sensor. It utilizes a devoted computerized modules catch innovation and the temperature and dampness sensor innovation to guarantee that items with high dependability and brilliant long haul soundness. Sensor incorporates a resistive component and a feeling of wet NTC temperature estimation gadgets and with a superior 8-bit microcontroller associated.
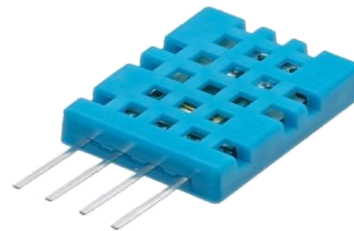

Fig 4:DHT11 Sensor

DHT11 yield aligned computerized flag. It uses elite computerized flag gathering strategy and dampness detecting innovation, guaranteeing its unwavering quality and soundness. Its detecting components are associated with 8-bit single-chip PC. Each sensor of this model is temperature repaid and adjusted in exact alignment chamber and the adjustment coefficient is spared in OTP memory. Little size and low utilization and long transmission remove (20m) empower DHT11 to be suited in a wide range of cruel application events. Single-push bundled with four pins, making the association exceptionally helpful.

F.Servo Motor

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to

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rotate and object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages. Doe to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc. Servo motors are rated in kg/cm (kilogram per centimeter) most hobby servo motors are rated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm tells you how much weight your servo motor can lift at a particular distance.For example: A 6kg/cm Servo motor should be able to lift 6kg if the load is suspended 1cm away from the motors shaft, the greater the distance the lesser the weight carrying capacity. The position of a servo motor is decided by electrical pulse and its circuitry is placed beside the motor.

Fig 5 : Servo motor

G.Global Positioning System (GPS)

The GPS is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defence. It is the only fully functional GNSS in the world. It uses a constellation of between 24 and 32 earth orbit satellites that transmit precise radio signals, which allow GPS receivers to determine their current location, the time, and their velocity. These satellites are high orbit, circulating at 14,000km/hr and 20,000km above the earth's surface. The signal being sent to the earth at the speed of light is what is picked up by any GPS receiver that are now commonplace worldwide. The first satellite navigation system, used by the United States Navy, was first successfully tested in 1960. Using a constellation of five satellites. A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each

satellite continually transmits messages containing the time the message was sent, precise orbital information (the ephemeris – orbit path and speed of each satellite), and the general system health, current date and time of all GPS satellites (the almanac). The receiver measures the transit time of each message and computes the distance to each satellite. A form of triangulation is used to combine these distances with the location of the satellites to determine the receiver's location.

The position is displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units also show information such as direction and speed, calculated from position changes.

Fig 6: GPS Module

H.L293D Motor Driver IC

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info.The L293 and L293D devices are quadruple high current half H-drivers .The L293D is designed to provide bi directional drive currents of upto 1A at voltages from 4.4 to 36 V. The L293D is designed to provide bi directional drive currents of upto 600-m A at voltages from 4.5V to 36V.

Let's consider a Motor connected on left side output pins (pin 3, 6). For rotating the motor in clockwise direction the input pins has to be provided with Logic 1 and Logic0.

• **Pin 2** = **Logic 1** and **Pin 7** = **Logic 0** | Clockwise Direction

• **Pin 2** = **Logic 0** and **Pin 7** = **Logic 1** | Anticlockwise Direction

• **Pin 2** = **Logic 0** and **Pin 7** = **Logic 0** | Idle [No rotation] [Hi-Impedance state]

• **Pin 2** = **Logic 1** and **Pin 7** = **Logic 1** | Idle [No rotation]

IV.Software Tool _ Python

Python is a wonderful and powerful programming language that's easy to use (easy to read and write) and with Raspberry Pi lets you connect your project to the real world. Python syntax is very clean, with an emphasis on readability and uses standard English keywords. Start by opening IDLE from the desktop. Python, on the other hand, is one of the most popular languages in the world and has been around for more than two decades. It is heavily used in academic environments and is a widely supported platform in modern applications, especially utilities, and desktop and Web applications. You can use Python from both an IDE (Integrated Development Environment) and from the terminal, depending on your comfort level. Python comes with a simple IDE called IDLE. Both the Python 2 and 3 IDLE are available, and since this article is focused on Python 3.x, we will look specifically at Python 3 IDLE

V. FLOW CHART
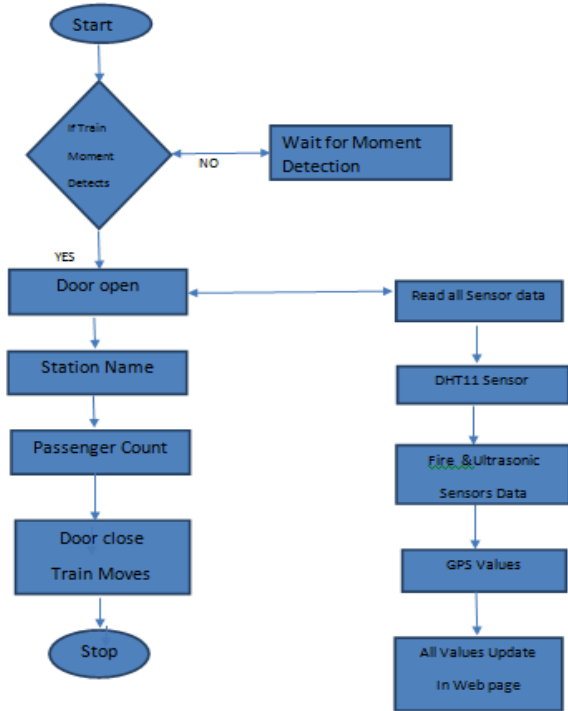
Fig 7: Flow Chart of system working

VI. RESULT

Whenever the train arrives at a station, the IR line is interrupted and the train stops automatically.

➢ After the train is stopped the door of the train will be opened and the station name will be displayed by using RFID

➢ Meanwhile the passenger counting section will count the no. of passengers present inside the train and displays it on a Webpage.

➢ After a prescribed time set in the processor as per program, the doors will be closed automatically.

➢ Then the train will move to the next station and process will continue at every station.

➢ Fire sensor is used to detect the Fire.
➢ DHT11 is used to detect Temperature and Humidity.

GPS is used to find the location of the Train

Fig 8:System Prototype

VII. CONCLUSION

These days the mischances of trains are expanding step by step. Of these real mishaps are happening because of human flaws. A man can complete a slip-up yet a customized processor doesn't have a possibility of doing mistake. This is the principle explanation for this project. This is an exceedingly propelled innovation which is right now utilized as a part of created countries, for example, Japan, Germany, France and so forth. By utilizing this auto metro train the timings of the train will be correct and it keeps away from a great deal of burden to the passengers. This project will extraordinarily lessen the human mediation in the control of trains and subsequently spares a considerable measure of time and cash. Subsequently the project "AUTO METRO TRAIN TO SHUTTLE BETWEEN STATIONS" is incredibly helpful in all perspectives.

VIII. FUTURE SCOPE

The metro train in the current project is designed to run only between two station but by programming processor differently we can design it to run between more than two stations. We can incorporate automatic announcement system to inform the passengers about the next station. We can introduce RFID based ticketing system at each station.

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