

IOT BASED AUTO METRO TRAIN SHUTTLE BETWEEN STATIONS

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ABSTRACT

This paper proposes the equipment utilized in metro train movement which are utilized in a large portion of the advanced nations. In this automatic metro train, we have given raspberry pi controller that encourages the modified stopping of the train starting with one station then onto the next station. This work introduces the upgrade procedure of a structure for a driverless train incited utilizing raspberry pi based controller. The equipment circuit's plan, which are based on circuit sheets, are furnished with different sensors for computerization purposes. The equipment is amassed in a toy-like train structure. Driverless trains are equipped with a control framework, which is modified to cause them to pursue an exact way. Stations on such a way, timings of the train and separations between stations are all predefined. Messages and admonitions are automatically created and reported to the passengers.

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.

I.INTRODUCTION

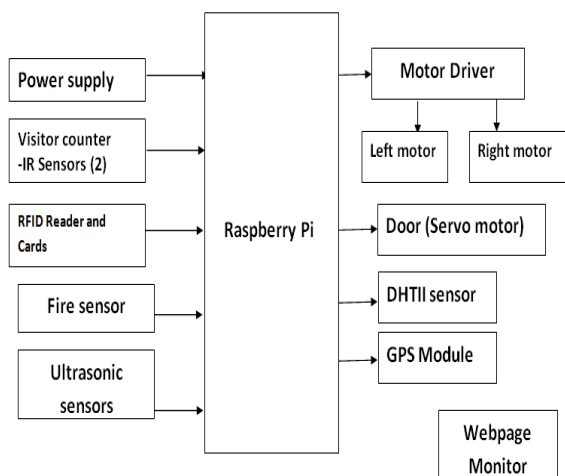
Later innovative advancements are being acclimatized in practically all purpose of our life including travel transportation, where a ton of upgradation has been made. Railroad transport, for actuality, has experienced an enormous change, beginning with the early steam worked motors to the latest shot train. Numerous advancements in travel transport has used the current framework, where the current metro framework is being modernized and outfitted with automatic train control and security framework so as to make them increasingly beneficial. Driverless robotized ideas have been received, The goal of this task is to drive the train automatically with the assistance of sensors and security of passengers is the essential worry of our model-based model metro train. In this work, some portion of this mechanization assignments is considered, and an

Arduino-based model is created. work, for example, going through a given way with predefined stations, and detecting the landing in the station and henceforth, appropriate stopping are executed in the structure. Data that are synced with the train's development through its way are reported to passengers by means of a LCD display. Additionally, alarm sign are delivered as fitting. Controlling of the entryways as far as open and close and timings of such activities are considered.

II.LITERATURE SURVEY

In present day days metro train transportation has transformed into the most down to earth and safe strategy for open transportation system. It interfaces two significant urban networks and gives a quick transportation organizations to individuals by and large. The unmanned metro train (Driverless) licenses an incredibly secure and prevalent techniques for transportation. The model makes use of microcontroller to control the train advancements. It similarly controls traveler checking and makes a notice banner including customized opening and closing of doors. The train continues running between two predefined stations. It in like manner gives an office of effect evading if there ought to be an event of two trains being on a comparative track. The partition between two stations are moreover predefined. The train continues running between two stations without human intervention. It gives a reset change to the traveler which goes about as an emergency stopping instrument to stop the train if there ought to be an event of emergency. The crucial idea of the methodology is to allow customized metro train structure which is completely unmanned and is careful and errorless in its assignment. Counting of passengers happens by using bidirectional revelation by IR and photo diode plan.

BLOCK DIAGRAM



III.HARDWARE DESCRIPTION

A.Raspberry Pi 3 (Model B)

The Raspberry Pi is a movement of minimal single-board PCs made in the United Kingdom by the Raspberry Pi Foundation. It excludes peripherals, (for instance, consoles, mice and cases. A couple of periods of Raspberry Pis have been released. All models incorporate a Broadcom structure on a chip (SoC) with a fused ARM great central getting ready unit (CPU) and on-chip plans taking care of 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 used to store the working system 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 maintained, with a standard 3.5 mm phone jack for sound yield. Lower-level yield is given by different GPIO pins which support ordinary shows 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. Expenses stretch out from US\$5 to \$35.

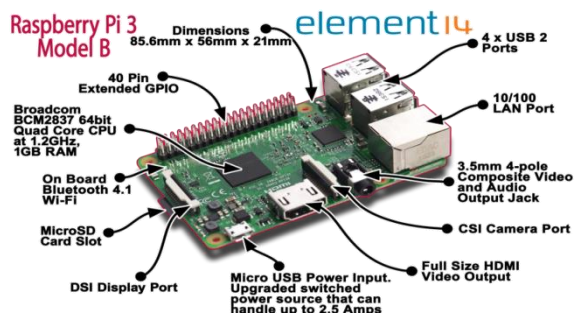


Fig 1: Raspberry Pi3 Model B

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



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

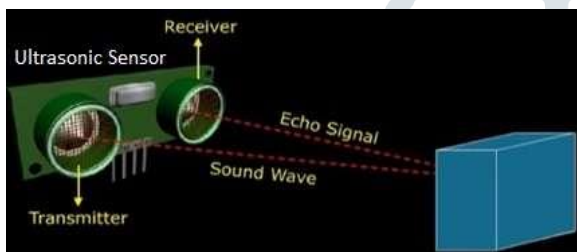


Fig 3: Ultrasonic Sensor

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.

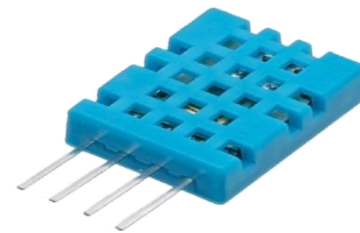


Fig 4: DHT11 Sensor

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 turn an article with extraordinary exactness. In the event that you need to pivot and item at some particular points or separation, at that point you utilize servo motor. It is simply comprised of basic motor which go through servo instrument. On the off chance that motor is utilized is DC controlled, at that point it is called DC servo motor, and on the off chance that it is AC fueled motor, at that point it is called AC servo motor. We can get a high torque servo motor in a little and light weight bundles. Doe to these highlights they are being utilized in numerous applications like toy vehicle, RC helicopters and planes, Robotics, Machine and so forth. Servo motors are appraised in kg/cm (kilogram per centimeter) most leisure activity servo motors are evaluated at 3kg/cm or 6kg/cm or 12kg/cm. This kg/cm reveals to you how much weight your servo motor can lift at a specific distance. For model: A 6kg/cm Servo motor ought to have the option to lift 6kg if the heap is suspended 1cm away from the motors shaft, the more noteworthy the separation the lesser the weight conveying limit. The position of a servo motor is

chosen by electrical heartbeat and its hardware is put adjacent to the motor.



Fig 5 : Servo motor

G.Global Positioning System (GPS)

The GPS is a Global Navigation Satellite System (GNSS) created by the United States Department of Defense. It is the main completely useful GNSS on the planet. It utilizes a group of stars of somewhere in the range of 24 and 32 earth circle satellites that transmit exact radio sign, which enable GPS receivers to decide their current location, the time, and their speed. These satellites are high circle, coursing at 14,000km/hr and 20,000km over the world's surface. The sign being sent to the earth at the speed of light is what is picked up by any GPS collector that are presently ordinary around the world. The primary satellite navigation system, utilized by the United States Navy, was first effectively tried in 1960. Utilizing a star grouping of five satellites. A GPS collector ascertains its position by correctly timing the sign sent by the GPS satellites high over the Earth. Each satellite ceaselessly transmits messages containing the time the message was sent, exact orbital data (the ephemeris – circle way and speed of each satellite), and the general system wellbeing, current date and time of all GPS satellites (the chronological registry). The recipient estimates the travel time of each message and figures the separation to each satellite. A type of triangulation is utilized to join these separations with the location of the satellites to decide the beneficiary's location.

The position is displayed, maybe with a moving guide display or latitude and longitude; height data might be incorporated. Numerous GPS units additionally show data, for example, bearing and speed, determined 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]

V.FLOW CHART

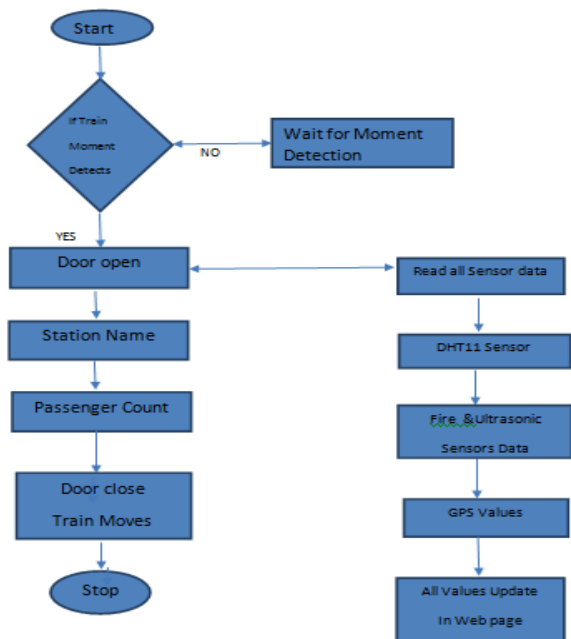


Fig 7: Flow Chart of system working

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

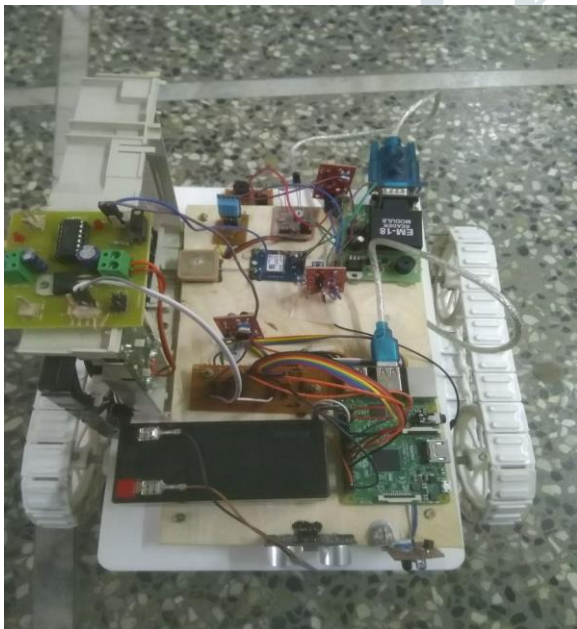


Fig 8: System Prototype

VII.CONCLUSION

These days the mishances 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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