AUTOMETRO TRAIN USING RASPBERRY PI

Mr.B.MALAKONDA REDDY Associate professor, Department of ECE, Narayana Engineering college (Autonomous), Gudur, SPSR Nellore, AP, India
P.V.Kusuma, P.Pavan , R.Lokesh Kumar Reddy, Y.Sai Bhavna UG scholar, Department of ECE, Narayana Engineering college (Autonomous), Gudur, SPSR Nellore, AP, India
bmalakondareddy1@gmail.com kusumamallikarjunreddy@gmail.com

Abstract : *This project illustrates the equipment utilized in metro train motion which is employed in most of the progressed countries. during this automatic metro train, we've provided Raspberry PI based controller that facilitates the programmed stopping of the train from one station to a different station. This work presents the enhancement process of a framework for a driver less train instigated using Raspberry PI based controller. The hardware circuit is meant on circuit boards, are given various sensors for automation purposes like IR sensor for out and in counting. The hardware is assembled during a toy-like train . Driver-less trains are use the RFID module for automatic stopping of train at their prescribed stations. Train timings path,delay timings , distances between the required stations are all predefined. Messages are automatically showed the passengers. This paper presents the event process of a framework for a driver less train implemented employing a RASPBERRY PI. The hardware circuits, which are built on handmade PCB board, are interfaced with various sensors for automation purposes. The Raspberry pi on python language is employed for programming the Raspberry pi.*
Keywords: Framework, actuators, raspberry pi, automation, sensors

I. Introduction

Recent technological advancements are being assimilated in almost all point of our life including transportation, where a lot of up gradation has been made . railway transport for fact has underground a huge transformation, start in with the early steam operated engines to the most recent bullet train. Many developments in transport has utilized the existing infrastructure where the existing metro system is being modernized and equipped with automatic train control and safety system in order to make the more productive. Driver less automated concepts have been adopted.The intent of this project to drive the train automatically with the help of sensors and safety of passenger is the basic concern of our model based pro-type metro train in this work part of auto mutation task is considered, and a raspberry based protype is developed work like running through a given path with predefined stations and sensing the arrival at the station and hence, proper stopping are implemented within the framework information that are sinked with the trains movement through its path are announced to passenger via LCD display moreover alarm signals are produced as appropriate. Controlling of the doors in terms of open and shut and timings of such actions are considered.

II. Literature survey

Manoj Kumar M et al proposed the concept of the train accommodates with a controller and the IR Object sensor that is used for the automatic stopping of the train from one station to another station. This paper presents the development process of a pattern for a driver less train using an RASPBERRY PI controller[1]. Prakash et al is designed to demonstrate the technology used in movement of metro train which is used in most of the developed countries like Germany and France.This train is provided with RFID module for automatic movement of train from one station to another.The passenger count will be displayed using IR sensor[2]. A.P. More et al in Presents a driver less train which is demonstrated to run between two stations it eliminates the need of the driver. Then the human error will be ruled out. RFID module is used to run the train from one station to another. The servo motor is used to control the doors opening and closing of train[3]. Thabit sultan Mohammad et al has been proposed a concept of proposed system challenges many problems in the metro trains like whenever a obstacle is less than 10 meters distance from the train the train will

automatically stops[4]. SVS.Prasad ,v.varun et al is proposed about the LCD display in auto metro train for passengers convenience llike count dislay,temparature and humidity display[5]. Kunal Dhayagude et al explains about Raspberry pi,it is a credit card sized electric board and about ultrasonic sensor,Fire sensor[6].

II. Existing System

Rail based "Mass Rapid transit system" has been extensively used in developed countries in overall world as a remedy for traffic related problems. when traffic will increased respectively the vehicles also increases due to this the traffic problems will be increases from past years.In order to improve the transport system the "mass transit system will be introduced. The major problems related to existing system is human error,Higher cost, consumes more time to install.

IV. Proposed system

This project is designed to demonstrate the technology used in auto metro train movement which are used in most of the developed countries like France . This train is equipped with RFID module that enables the automatic running of the train from one station to another. This proposed system is an Auto metro train and it eliminates the need of any driver. Because of automation the human error is ruled out. In this project servomotor is used for automatic opening and closing of doors. Whenever the train reaches the station it stops automatically by reading RFID tag. Then the door is opens automatically so that the passengers can go outside or inside the train. The door then closes after some prescribed time set in the controller by using program which is in python language. It is also equipped with a counting section for passengers by using IR sensors which counts the number of passengers entering and leaving the train. The door closes when it reaches maximum occupancy level of passengers . The humidity and temperature will be displayed on a seven segment display interface to the micro controller. Motor driver IC controls the moment of the train .

BLOCK DIAGRAM
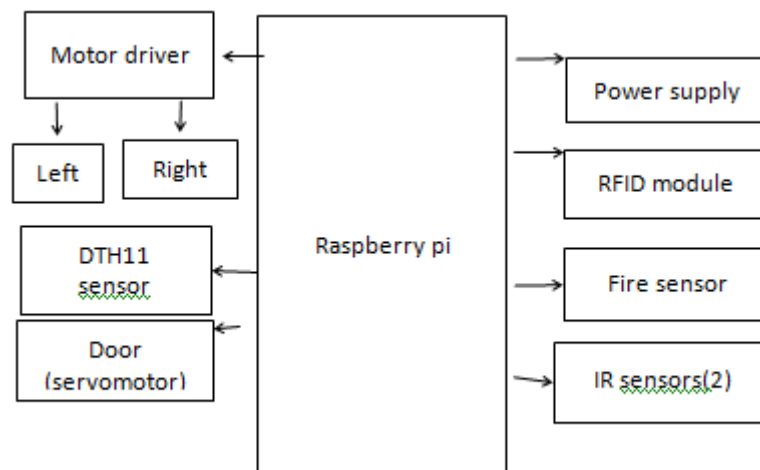
Ultrasonic Sensor

The ultrasonic sensor is a transducer which converts electric electricity into sound waves and vice versa. These sound waves fall above the everyday variety of human listening to and therefore it's far referred to as ultrasonic waves. These sort of waves are above the frequency of approximately 18000 Hz. An ultrasonic sensor transmits ultrasonic waves into the air and detects contemplated waves from an object. There are many packages for ultrasonic sensors, consisting of in intrusion alarm systems, automated door openers and backup sensors for automobiles. Accompanied via way of means of the fast improvement of facts processing technology, new fields of application, consisting of manufacturing unit automation system and vehicle electronics, are growing and have to preserve to do so.Ultrasonic sensors are superb creatures. Blind from the eyes and but a imaginative and prescient so particular that would distinguish among a moth and a damaged leaf even if flying at complete speed. No doubt the imaginative and prescient is sharper than ours and is a whole lot past human abilities of seeing, however is actually now no longer past our understanding. Ultrasonic

ranging is the method utilized by bats and plenty of different creatures of the animal country for navigational purposes. In a bid to mimic the methods of nature to gain an side over everything, we people have now no longer best understood it however have correctly imitated a number of those manifestations and harnessed their ability to the finest extent Ultrasonic sensors are gadgets that use electric–mechanical electricity transformation, the mechanical electricity being within side the shape of ultrasonic waves, to degree distance from the sensor to the goal object. Ultrasonic waves are longitudinal mechanical waves which tour as a succession of compression and rare factions alongside the route of wave propagation thru the medium. Any sound wave above the human auditory variety of 20,000 Hz is known as ultrasound.

Motor driver

L293D is a typical Motor driver which allows DC motor to drive in both directions. L293D can control a set of two DC motors at a time in any direction. We can control two DC motor with single L293D IC. The L293D is designed to provide bi directional drive currents of up to 600-m A at voltages from 4.5V to 36V. Both the devices are designed to drive inductive loads such as relays, solenoids, DC and bipolar stepping motors has high current or voltage loads in positive supply applications. Each output is a completely totem pole drive circuit with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs with driver 1 and driver 2 enabled by 1,2 EN and driver 3 and driver 4 enabled by 3 and 4 EN. The L293 and L293D is operated from 0°C to 70°C.

DC servomotor

A DC servo motor consist of a small DC motor feedback potentiometer, gearbox,motor drive electronic circuit and electronic feedback control loop. It's high or low similar to the normal DC motor. The rotor consists of brush and shaft. A commutator and rotor metal supporting frame are attached to the outside of the shaft .A brush is built with an armature coil that supplies current to commutator. At the back of the shaft detector is built into the rotor in order to detect the speed of rotation. it's simple to design a controller using simple circuitry because the torque is proportional to the amount of current flow through the armature. Types of DC Servo motors include series motor, shunt control motor, split series motor and permanent magnet shunt motor.

RFID module

Whenever the train reaches the station it stops automatically, as sensed by RFID reader. Then the door is opens automatically the passengers can go inside and outside the train . The door then closes after a certain time set in the controller by the program. It is also equipped with a passenger counting section, which counts the number of passengers entering and leaving the train. The passenger in and out counts are displayed on a LCD display. The movement of the train is controlled by a motor driver IC interfaced to it. When the train reaches the destination the process repeats . The train is automated as we know which will work without a driver. Thus this train will avoid human errors. Thus this train will be very beneficial to us. If we use this type of trains then the timetable of trains also will be maintained. Our proposed system uses RFID module which will detect the station. The train incorporates a station by using command on WIFI module start the train start and reach station the RFID card reader is read the card action for stopping train, at that time display the station one is arrived as well as by door is open automatically the door is close then train is reaches to next station. When next station is arrived the controller send vacancies by WIFI module it display on the LCD display which mounted on the train coach. At that time the RFID card reader detects RFID card which fixed on the station, that time display station 2 on LCD display the door open for 5sec to enter/leave passenger after certain time door of coach is closed and reach to next station.

Electric battery

Electric battery is a combination of one or more Electrochemical cells, used to convert chemical energy (stored) into electrical energy. The battery has become a common power source for

many industrial applications, robotics..etc. Larger batteries provide standby power for computer data centers or telephone exchanges

IR sensor

Transmits infrared rays in the range of wavelength760nm .Such LED's are usually made of gallium arsenide and aluminum gallium arsenic. IR receivers are commonly used as sensors. The human eye cannot see the infrared radiations, it is not possible to identify whether the IR LED is working or not, unlike a standard LED. To overcome this problem, the camera on a cell phone is used.

DTH sensor

It is used to measure the temperature and humidity present inside the train. DHT11 virtual temperature and humidity sensor is a calibrated virtual sign output of the temperature and humidity mixed sensor. It makes use of a committed virtual modules seize generation and the temperature and humidity sensor generation to make certain that merchandise with excessive reliability and exquisite lengthy-time period stability. Sensor consists of a resistive detail and a experience of moist NTC temperature size gadgets and with a excessive-overall performance 8-bit micro controller linked.DHT11 output calibrated virtual sign. It makes use of distinctive virtual-sign-collecting-approach and humidity sensing generation, assuring its reliability and stability. Its sensing factors are linked with 8-bit single-chip computer. Every sensor of this version is temperature compensated and calibrated in correct calibration chamber and the calibration-coefficient is stored in OTP memory. Small size & low consumption & lengthy transmission distance (20m) permit DHT11 to be proper in all sorts of harsh software occasions. Single-row packaged with 4 pins, making the relationship very convenient.

Fire sensor

It is used to detect the fire, when we met fire accident Fire sensor or flame detector is a sensor designed to come across and reply to the presence of a flame or hearth place, allowing flame detection. Responses to a detected flame rely on the installation, however can consist of sounding an alarm, deactivating a gas line (along with a propane or a herbal gas line), and activating a hearth place suppression system. When utilized in programs along with commercial furnaces, their function is to offer affirmation that the furnace is properly; in those instances they take no direct motion past notifying the operator or manage system.

Raspberry pi

Raspberry pi is a small single board computer. It does not need to add peripherals like keyboards,mics and cases.All models are featured like soc(system on chip) and the processor ranges from 700MHZ to 1.4GHZ.The code will be installed in Raspberry for processing.

V Results

After successfully giving connections to given to the raspberry pi processor the code will be install int he raspberry processor by using raspberry OS on system by connecting raspberry pi setup to same system using connector.

This is the OS used in raspberry pi the code is in python language.

Project outcomes:

1. Automatic stopping of train using RFID module.
2. Automatic doors opening .
3. In count of passengers.
4. Out count of passengers.
5. Temperature and humidity display.
6. Fire detection.
7. Automatic stopping of train when a obstacle is in distance less than 10 meters.

VI.Conclusion

The driverless train that is framework presented in this paper in fact a final year project. Research In and developing working prototype enhance self-confidence and assure that it is possible

to design a system and Apply it for solving a particular problem by acquiring the necessary information. Moreover, developing a prototype system can serve as a basis of a far more sophisticated and advance form of control system such as driverless strain system. In this paper we have decided how metro train can be automated with the help of paper presented above and it main advantage is counting the no of passengers automatically as they enter the train.This counting helps to reduce the overpopulation inside the train. The counting on a other hand is displayed on the LCD screen.

References
1. ManojKumar.M,Hemavathi.R,H.PrasannaKumar,"Driverless Metro Train Shuttle between the Stations using Lab VIEW", International Journal of Trend in Scientific Research and Development, Vol. 02, Issue 01, Nov-Dec 2017.
2. Naga Swetha R, Yashwanth Badri Mahesh, Rabbani Basha, "Auto Metro Train To Shuttle Between Stations", International Journal Of Current Engineering and Scientific Research, Vol.05, Issue 04, 2018.
3. K.S.Shilpashree,Lokesha,H,HadimaniShuvkuamr,"Implementation of Image Processing on RaspberryPi", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 04,Issue 05, May 2015.
4. G.Senthilkumar,K.Gopalkrishnan,V.SathishKumar,"Embedded Image Capturing System Using Raspberry Pi System", International Journal of Emerging Trends and Technology in Computer Science, Vol. 03, Issue 02, April 2014.
5. Sruthi P.M, Parani T.K, P. Rajasekar, "An Efficient and Secured Data Transmission in WBAN Using U-Wear Technology", International Journal of Current Trends in Engineering & Research (IJCTER) e-ISSN 2455–1392 Volume 3 Issue 5, May 2017 pp. 207– 217
6. Guru Prasad Patil, Dr.C.R. Rajshekhar, "RFID Based Metro Train System", VOL. 3, NO. 5,May 2014
7. P.Rajasekar, H Mangalam, "Design and implementation of power and area optimized AES architecture on FPGA for IoT application", Circuit World, ISSN 0305-6120 Vol. 47 No. 2, pp. 153-163 https://doi.org/10.1108/CW-04-2019-0039
8. Steven.F.Barrett, Daniel Pack, Mitchell Thornton, "Atmel AVR Microcontroller Primer: Programming and Interfacing," in Proc. Synthesis Lectures on Digital Circuits and Systems, vol 7, IJOART no. 2, Jun. 2012, pp.167-243
9. Penchalaiah P, Rajasekar P, Srinivas Viswanth V and Ramesh Reddy, "An Efficient Multi-User Hierarchical Authenticated Encryption Using Simultaneous Congruence For Highly Secure Data", International Journal of Future Generation Communication And Networking, ISSN/eISSN 2233-7857/2207-9645, 30 Jun 2020, vol. 13, no.2 , pp. 1-10, 10.33832/ijfgcn.2020.13.2.01
10.E.Fischer."Justifying automation".Railway Technology.com. 23 August 20
11.Friyadi, Achmad Dwi (27 July 2019). "Pakai Teknologi Jerman, LRT Jabodebek Bisa Jalan Tanpa Masinis". detikfinance. detikcom. detikcom. Retrieved 6 November 2019.
12.divyang kaka,Harshad sonawane, Hemang jani, Abhishek patel ,"Driverless Metro Train ", International Journal of Enginnering and technology ,vol.05,Issue 03,Mar 2018.
13.S.Bhuvaneswari,M.Haribabu,R.Deepika "Automatic Railway system using Wireless Sensor Network ",International Journal For Reasearch in Applied science and Engineering technology,Vol.03,Issue November 2015.