International Journal of Scientific Research in Computer Science, Engineering and Information Technology
© 2020 IJSRCSEIT | Volume 6 | Issue 1 | ISSN : 2456-3307
DOI : https://doi.org/10.32628/CSEIT206110

Smart Automated Cart

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ABSTRACT

Now a days, world is moving towards the Automation. Each and every field is using automation technologies for efficient work. The proposed methodology which can transfer objects from one place to another in workplaces like offices, hospitals, hotels, airports , etc. automatically. The key point of this proposed system is that only authorized persons will get access to that transferred object using the RFID tag. The proposed system uses the technique of Automated Guided Vehicle (AGV).

Keywords : Automation, Automated Guides Vehicle (AVG), Robotics, Encoder Motor.

I. INTRODUCTION

This proposed system is based on the technique of Automated Guided Vehicle (AGV). AGV vehicles are basically those vehicles or robot which can move automatically or do their work without any intervention human. Our proposed system "Smart Automated Cart" is also an Automated Guided Vehicle. Automated Cart is used to carry some sort of object from one place to another. This project basically aims to reduce the human effort, saves time and doing the required job on time . Automated Cart can be used in large and medium scale companies or industry or even in malls/store. It can also be used to send some documents, you can trust the cart with your confidential documents as the documents will be save inside the cabin of the cart with the help of RFID and servo motor .So, only authorized user can unlock the cabin. In industry or companies, it will be very useful if you want to send some confidential file to another cabin or building because it also provides security.

Hence we are building this Automated Cart to transfer the documents or object via a robot so that just tapping the button it will reach the destination. So, the need of human resource is eliminated and by this the speed of work will increase. As we are providing security by using "RFID" only the respected person can only collect the resource that is transferred. And hence, unauthorized persons cannot interfere with transferring. If any obstacle comes between the paths of the robot, it will sound beep, and stops the cart. The cart has also some additional features like it has GPS and GSM. So if someone tries to stole the cart, it can be traced using the GPS. As, all the operations are performing by a robot, there is fewer chances of corruption.

II. LITERATURE SURVEY

In this project the built robot is designed to avoid obstacles. The robot is controlled by using the microcontroller AT mega 8. The robot moves in any direction and with the help ultrasonic sensors it detects the object and based on the input the robot changes the direction. The microcontroller changes the direction based on the input of the ultrasonic sensors by giving input to the motor driver[1].

In the other project a mobile robot is developed for disabled people to avoid collision by using ultra sonic

sensors. Since, the project is highly dependent on the ultrasonic sensors it also has its limitations[2].

This project is developed to make your shopping experience more comfortable. In this project the developer uses arduino, lcd, rfid reader. The project calculates the price and displays the product name on the lcd screen. It aims to minimize the time required you to bill the products[3].

III. PROPOSED METHODOLOGY

The proposed system`s design consist of Arduino Mega that acts as a main controller. Android application, that helps in monitoring the entire system.

RFID will identify the user and give access to system, path will be stored in SD card Module and will recall it when user will try to use it. Fig-1 depicts the block diagram of system architecture.

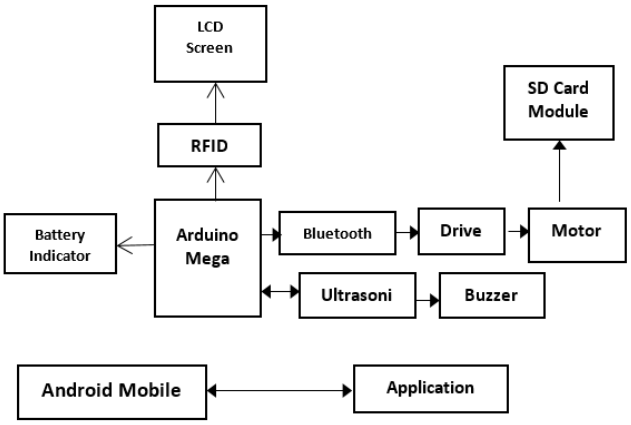

Fig 1 : Block Diagram of System Architecture

The functional requirements of the system are as follows:

(i) Arduino Mega:-

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega 2560 board is compatible with most shields designed for the Uno and the former boards Duemilanove or Diecimila.

(ii) Android Application:-

MIT App Inventor is an intuitive, visual programming environment that allows everyone to build functional apps for the smartphones and tablets. Blocks-based coding programs inspire intellectual and creative empowerment. The MIT App Inventor project seeks to democratize software development by empowering all people, especially young people, to move from technology consumption to technology creation.

(iii) Bluetooth HC-05:-

The HC-05 is a very useful module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART.

(iv) Relay:-

A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof.

(v) Encoder Motor:-

A rotary encoder, also called a shaft encoder, is an electro-mechanical device that converts the angular position or motion of a shaft or axle to analog or digital output signals.

There are two main types of rotary encoder: absolute and incremental. The output of an absolute encoder indicates the current shaft position, making it an angle transducer. The output of an incremental encoder provides information about the motion of the shaft, which typically is processed elsewhere into information such as position, speed and distance.

(vi) SD Card Module:-

The Arduino can create a file in an SD card to write and save data using the SD library.There are different models from different suppliers, but they all work in a similar way, using the SPI communication protocol.

(vii) Buzzer:-

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

(viii) Ultrasonic:-

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

(ix) RFID Tag:-

The **RC522** is a **13.56MHz RFID module** that is based on the **MFRC522 controller from NXP semiconductors.** The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob. It is commonly used in attendance systems and other person/object identification applications.

(x) LCD :-

LCD is a flat panel display that uses the light modulating properties of light crystals.

(xi) Battery Indicator:-

It is use to show the voltage of battery.

IV. IMPLEMENTATION

The following steps are involved in the implementation of the project:

Step 1: Insertion of SD Card:

Insert SD card in the mobile of worker to store the details of the users(employee name, id, RFID tag id) and to store the paths then he have to insert that SD card into robot to store the actual paths.

Step 2 : Hardware Setup:

The Worker will move the robot everywhere in the office to store the path. He have to give name to the paths he is storing. And he will assign RFID tags to users and each user will be get a unique RFID tag whose id will be saved in the system.

Step 3 : Software Setup:

The users who want to use it will be given a user id and a password for authentication. After they logged in to the system, they will reach to a screen where a drop down list of path names will be present. User

simply just have to choose the path and fill the receiver(employee) details whom he want to send by entering his name, id and RFID tag id.

Step 4: Operation:

1. Once the worker had stored all details and path the cart is ready to use.

2. When user sends particular item to another user the system will call the path choosen by the user and reach to the destination.

3. It will give access only to that user who has the tag.

4. As it consist Ultrasonic sensors, the obstacle will be avoided with help of it.

V. RESULTS AND CONCLUSION

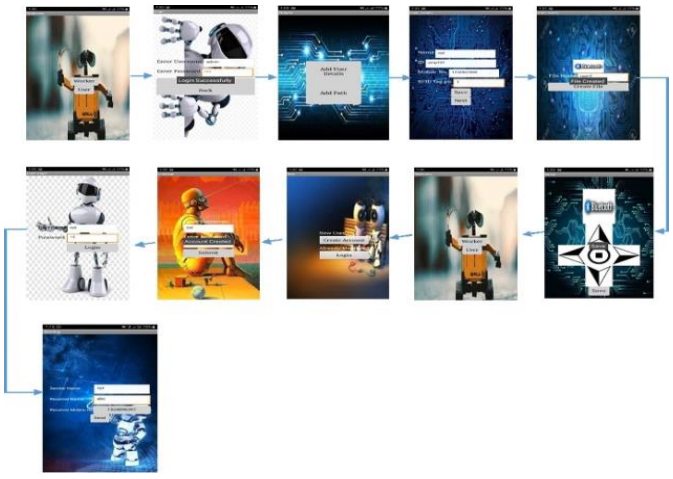

Figure 1. Result of Application

Our proposed system follows particular approaches and algorithms to avoid the problem stated above.

Our proposed system will solve the problem of security with the use of RFID tag. We are connecting all components (RFID, Battery Indicator, Motor, etc.) to arduino and code the arduino in such a way that it will co-ordinate all functions simultaneously and fluently.

The path will be stored in SD card so only once we need to store the path and after that it will follow that path automatically without any guidance of human and hence it will be fully automated as per the name.

If any obstacle comes between the path of robot, it will sound beep, sends a notification to robot sender. And if the robot has been interrupted by external human resource it will continuously beep and security alerts will be sent to robot sender with the location of path from which it is interrupted.

Due to all operations are performing by a robot, there is less chances of mistakes.

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Cite this article as :

Kevin Sheth, Aakash Gupta, Omakr Agarkar, Jaai Patwardhan, M. S. Aware, "Smart Automated Cart", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 6 Issue 1, pp. 57-61, January-February 2020. Available at doi : https://doi.org/10.32628/CSEIT206110
Journal URL : http://ijsrcseit.com/CSEIT206110