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SMART MEDICINE TROLLEY

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Abstract: This paper gives detailed design of smart medicine trolley, Smart Medicine Trolley used in pandemic condition of Covid 19. Smart Medicine trolley can mainly used in hospital for saving life of people also providing them with some medical related facilities. This project mainly related to the ultrasonic sensor, Arduino and bluetooth module and some other components are also used, basically Trolley is controlled by using remote controller and moved forward and backward, left-right.

Index Terms - Trolley, Safety, Covid 19

1. INTRODUCTION

In 2020, due to the pandemic situation of COVID19, social distancing has become a very crucial factor in our life. In this situation, mainly doctors and nurses and all medical staff should take care of themselves. Smart Medicine Trolley is one type of help for these covid warriors.

The smart medicine trolley does not only provide medical stuff to isolated patients but also it sanitizes the surrounding using UV light. This ensures safety for them. This trolley moves on the path using a mobile application [2]. So, the smart medicine trolley provides all medicines and other required stuff to patients without any direct contact with other people, it keeps the environment sanitized and safe and also it keeps communication between patients and doctor. Such that, this trolley ensures all environmental and health related issues should be taken care of.

2. RELATED WORK

[1]Awati J. Awati S, Author has published the paper “Smart trolley in mega mall” in international journal in the year of 2012. The Trolley mentioned in the paper is based on microcontroller where optical sensor is used to detect the distance between customer and trolley. Also, system contains barcode scanning due to this code scanning customer get the information about product and the prize. Major problem raised in this paper is it does not create communication between two people. In order to resolve the first problem, in proposed system decided to place a smartphone on the trolley, in which doctors can store prescriptions for patients and can communicate with them using this smartphone to give details about prescriptions and patients can ask their doubts too. To solve the second problem, in system by using a mobile application to give the path to the trolley for its movement and according to that path, the trolley can move towards the patients.

[2]“Smart trolley follower using vision-based technique” this paper is published in international journal of computer application by SeemaU.et.al. In this project, emphasis is given on precision vision based robotic applications achieved by an android camera, then it is sent to image processing software and then for further processing. But the main limitation of this project is that this trolley cannot be used in other applications; but smart medicine trolley can be used easily in hospital and at home too.

[3]Bedi HS, Goyal N., Kumar S. Gupta A., “Smart Trolley using Smartphone and Arduino”, Journal of Electrical and Electronics System, Vol 6.2, 2017. In this paper the author has discussed that, whenever a smartphone camera gets nearer to the bar code, it will decode the code of the barcode and the code will be accepted by Arduino Uno through Bluetooth Module. Barcode is scanned and information is displayed on Lcd it is cost efficient project. So from this paper we understood this advantage and disadvantage that it saves time of people but it is only useful for those having membership

[4]Renjini Jose,et.al.”Smart Trolley for a Smart Shopping”,IJERCSE,Vol 5,Issue 5,May 2018.

The main aim of this smart trolley is to avoid the long queue in front of the cash counter as customers can self-checkout by using this smart system. Other than it will also lessen the time of shopping and reduce the labor cost. Smart trolley consists of a scanner, card reader, a printer and a tablet in which the application is available Without this application, anyone cannot use this trolley.

[5].N.M.Saad,et.al. has published paper “Automated Medical Surgical trolley ” in journal of electrical and computer engineering in June 2019 in Vol 9.In this paper, authors have discussed the development and properties of automated medical surgical trolley. In

this project, they have used Arduino as a controller and interfaced with various components. Ultrasonic Sensor is used to detect an obstacle in front of a trolley. An IP camera and Bluetooth module are used for the development of this trolley. This trolley is made up of aluminium metal as it is hygienic and cannot spread any bacterial disease. this trolley is expensive so we are using trolley made by normal metals like steel but aluminium trollies have anti-bacterial property in itself so by using ultra violet light is used to kill bacteria on it so it reduces the price of trolley. [6] Sheikh Ferdoush, Xinrong Li. "Wireless sensor network system design using raspberry Pi and Arduino for environmental monitoring applications. "The represented their paper in 9th International Conference on Future Networks and Communications (FNC-2014) In this paper, they have described a wireless sensor network which they have developed using opensource hardware platforms, Arduino and Raspberry Pi.

[7].Ismila Che Ishak,et.al."A Smart Trolley with RFID Implementation: Survey among Customers",ARPN Journal of Engineering and Applied Sciences, Vol 12, No.4, 2017. In this paper, the author has discussed that RFID reader is used to read a tag which is present in product and dropped in cart. And all information of all products is collected and displayed on LCD which is present on cart this method is used for easy shopping. This paper has certain limitations such that among the 6 independent variable elements decided for this trolley.

[8]. Deepali Pandita,et.al."Automatic Shopping Trolley using Sensors",International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 04 Issue: 04 | Apr -2017 In this paper the author has discussed the solution to the problem in malls during shopping due to heavy weight and stuff. To overcome these issues or to ease this they have proposed a project, in which customers need not to concentrate on the movement of trolleys as Trolley moves automatically following the sensors. Not only this, the trolley has the RFID reader so that customers can keep track of billing. there are sensors on the trolley which will track the human and will move at the maintained distance. It will stop when the customer will stop. The track for the total amount is maintained.

[9]. Alexander A.S.Gunawan,et.al."Development of Smart Trolley System based on Android Smartphone Sensors", ICCSCI,12-13 September 2019. This paper presents the hardware and software design of a smart trolley system. The smart trolley used IOIO microcontroller and Android smartphone as sensors and controller. The trolley is modeled as a two-wheeled mobile robot. Android smartphones will control the robot by sending a signal to IOIO microcontroller paired with a robot's actuator and monitor the situation using the smartphone camera. Parameters like distance, deviation and wheel speed are calculated during the movement of the trolley. Radio signal logs are taken into consideration. The smart trolley movement is good at 1 meter and 3 meters. The movement is calibrated by adjusting the speed through Java code. But the movement of this trolley is not good for over 3 meters. In our project we have developed the system to overcome this problem for the good movement of trolleys for large distances,too.

[10]. Ankush Yewatkar,et.al."Smart Cart with Automatic Billing, Product Information, Product Recommendation Using RFID & Zigbee with Anti-Theft",7th International Conference on Communication, Computing and Virtualization 2016. The paper is about developing a smart shopping cart which keeps the track of purchase products and also online transactions for billing using RFID and ZigBee. The system also gives suggestions for products to buy based on user purchase history from a centralized system. In this system, every product in Mart has an RFID tag, and every cart has an RFID Reader and ZigBee attached to it. There will be a centralized system for the recommendation and online transaction. Moreover, there is also a RFID reader at the exit door for anti-theft. There is an online payment procedure for billing. If the product is removed, it gets deleted from the bill too. There is an RFID reader at the exit door for anti-theft. RFID reader and Zigbee transceiver sense the product information and display. A set of random variables and their conditional dependencies are calculated and drawn. The results that we get from this project are every product is detected using RFID reader and Expiry date, ingredients and total amount is displayed on LCD.

3. BLOCK DIAGRAM:

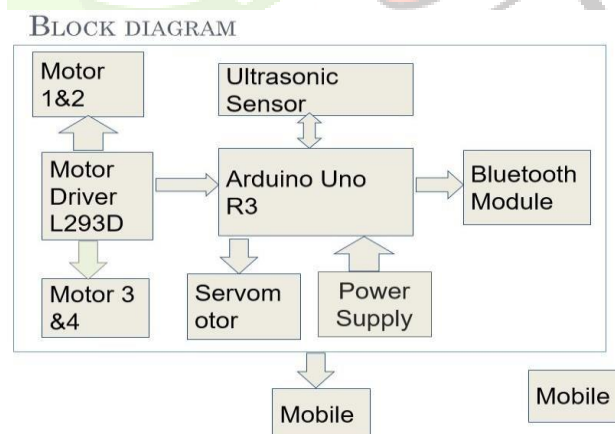


Fig1: Block Diagram

In proposed design consist of various components such as Arduino UNO R3 which is an open-source controller which interfaces with hardware. There are four motors connected to motor driver L293D. These four motors help the smart medicine trolley to move. It is interfaced with Arduino Uno R3. We have supplied power to UV bulbs too. These UV bulbs will emit the UV light to sanitize the environment. Ultrasonic sensor is used to detect the obstacle in front of the trolley. Servo motor maintains the linearity in the movement of the trolley and for this movement of the trolley, we are using bluetooth module HC-05.

4.WORKING OF SYSTEM:

The Smart Medicine Trolley is such an electronic device which avoids direct contact with isolated patients and sanitizes the environment by ensuring safety.

The doctor puts all required medicines and other stuff on the trolley. The mobile application drives the trolley and we can move the trolley as we want. So, this trolley moves according to the instructions it gets from the mobile application. The bluetooth module HC-05 helps in this process for movement of the trolley. Motor Driver L293D rotates the wheels and drives the trolley.

In working, Arduino is interfaced with multiple hardware components like Bluetooth, sensor, motor driver etc. Atmega328P Ic is used to load code into Arduino by using USB cable. according to the code trolley moves as it gets commands and remote is used for its movements.

The linear movement of the trolley gets controlled by a servomotor. Ultrasonic sensor detects an obstacle in front of the trolley. Thus, helps to facilitate movement of the trolley by providing all required stuff to isolated patients. There is a smartphone attached to a trolley in which doctors can save prescriptions and can communicate with patients using it.

5.HARDWARE DESIGN:

Hardware Design consists of :

i. Motor Driver

$$V_s=5V$$

$V_{ss}=9V$

UV light

Bluetooth module HC05

Trolley

Wheels: 2.5 in by diameter

Sensor: Ultrasonic Sensor Module

Communication Technology: Mobile Phone

Servomotor viii. Microcontroller: Arduino Uno R3

5.2.1 Motor Driver L293D:

16 pin Motor Driver IC

This is designed to provide bidirectional drive currents at voltages 5V to 36V.

Bidirectional Drive Current: Up to 600mA

PCB Dimensions 36mm*24mm

5.2.2 Arduino UNO R3:

Arduino is interfaced with a multiple hardware component.

This controller has Atmega328P IC

14 ip/op pins

6 Analog Inputs

16 MHz quartz crystal

USB Connection

Power Jack

ICSP Header Reset Button

5.2.3 Ultrasonic Sensor:

Ultrasonic sensor mainly used in project to measure the distance of obstacle from the trolley. As there is any obstacle in front of it, it gives command to microcontroller to stop the trolley and trolley gets stop. And by using servomotor it changes the direction of trolley. The sensor used in the project measure the distance till 400 cm.

5.2.4.Servomotor:

Servomotor turns if input is applied to it only in 90° and 180°. So it is used for changing the direction of trolley if some obstacle come in front of it ultrasonic sensor gives command to trolley to stop and by using servomotor we move ultrasonic sensor on trolley and after checking obstacle trolley moves.

5.2.5. Bluetooth Module HC-05:

In Project used Bluetooth module is HC-05.

Basically, this module is used for wireless communication.

This module can be used in a master or slave configuration. Range up to <100m which depends upon transmitter and receiver, geographic and urban conditions.

It has 6 pins.

Two modes: Data Mode and Command Mode.

VCC: 5V or 3.3V

6.SOFTWARE DESIGN:

6.1 Modules Of Project:

1.Building circuit diagram in the simulation software tinkercad according to the design decided.

2.Insertion of code including libraries of IR remote, ultrasonic sensor, servo motor and arduino uno r3.

3.IR remote controls movement of wheels of the trolley.

4.Ultrasonic sensor detects the obstacle in front of the trolley.

5.Servo motor maintains the linearity in the movement of the trolley.

6.Code is designed according to all these and after starting the simulation trolley operates according to the code.

6.1.2 CIRCUIT AND SIMULATION:

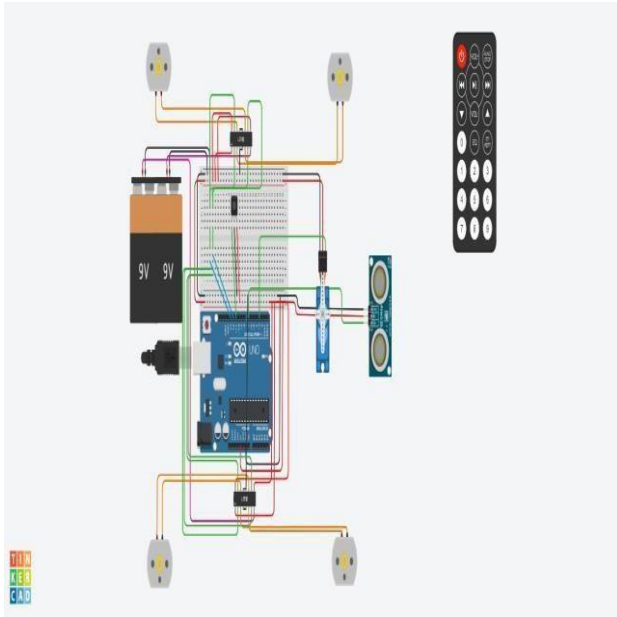


Fig 2: Circuit Diagram in Simulation

7.TEST AND RESULT:

Arduino Uno R3 interfaces with the hardware. Motor driver L293D and four motors connected to it help the trolley to move. Trolley moves according to the instructions given.

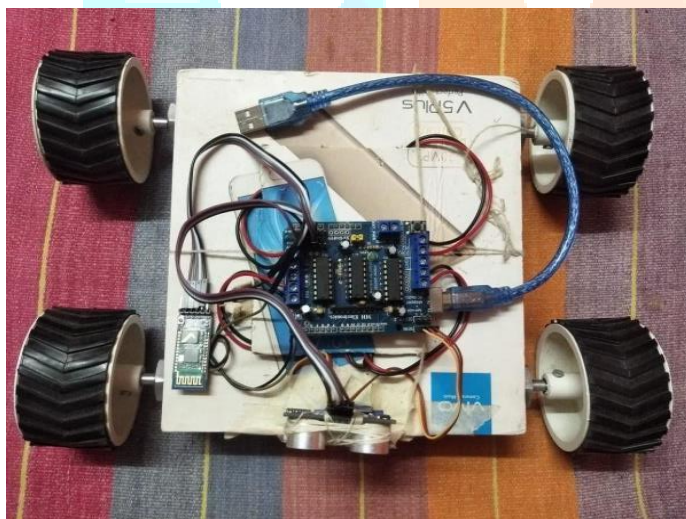


Fig 3: Circuit Building

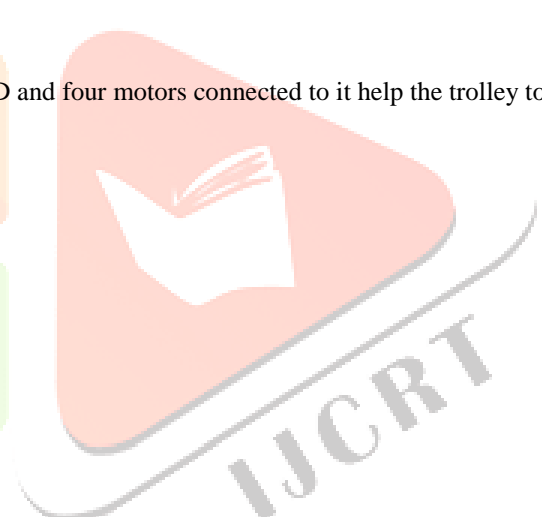




Fig 4: Final Hardware

8. CONCLUSION:

This system design enables the movement control of the medicine trolley. And the movement of the trolley in forward-backward, right-left is controlled by the remote controller as per requirement. It will avoid collision with the help of Ultrasonic sensor.

9. REFERENCES

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