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IMPLEMENTATION OF STOCK MANAGEMENT SYSTEM WITH A SMART TROLLEY

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Abstract— **A system based on the Internet of Things (IoT) will be used to control kitchen, grocery store, and medical inventories through quantity checking with RFID. Stock at supermarkets will surely start to fall in the racks due to an increase in customers. A new method that uses RFID is available to swiftly identify how much stock is left in each rack. The RFID reader periodically notifies the backend system of the items that are there and their movements when the tag is scanned. This helps with product positioning and inventory control. The RFID database saves each item's specifications so that the salesperson can quickly retrieve stock information, such as how many goods are stillon the rack and their precise location. When the stock decreases, a warning message will be displayed.**
There is a cart that fills the rack if the stock drops. In order for the salesperson to plan howto stock the rack in the supermarket using the android application developed by MIT app inventor, a portable robot is installed under the trolley that is led by users from the entry door to the items location. This allows the salesperson tocontrol the trolley by instructing it.

Keywords— **Arduino IDE; data base; PHP Server; XAMPP control panel; RFID, esp8266; Arduino uno; IoT; nodemcu; smart; Bluetooth;**

I. INTRODUCTION

Now a day's we are moving towards digitalization, our life and lifestyles are getting smarter by the day. There are multiple smart devices already available in the market like phone, TV etc., in our daily life, we are regularly visits supermarkets which are nearby our place. Inthe supermarket the stock will automatically reduce and the salesman's will do hard work to find empty stock and to fill the stock. To help the sales person's the stock management system anda smart semi-automatic trolley was designed.

Stock management process of managing goodsthat Involves organizing,and storing the details of goods.

Inventory management using RFID system is process of managing goods with RFID (Radio frequency identification) Reader and tags. An inventory management system is tool that uses RFID tags to track and manage inventory with real time updates. RFID tagging can be used to prevent under stocking of products. In RFID system each product is associated with RFID tag. When RFID Reader is interfaced with Node MCU which scans the tags of products and gives there details in main system. Based on research results the RFID system increases the efficiency and effectiveness of inventory control. Utilizing RFID in inventory enables us to count many objects at once without line of sight and as individual objects with unique ID's the product details stores in central database and that knows that a specific RFID tag is associated to the item. RFID provides nearly 99% accuracy.

RFID is a form of wireless communication that utilizes radio waves to recognize and traces the object. It does not have a battery instead they receive energy from radio waves generated by thereader. RFID technology is often associated with controlling inventory and reducing theft. It uses electro-magnetic fields to identify and track tags that have been attached to different items RFID system typically read from 300 feet away but many can now go up to 1500 feet. Most of tags currently being used contain around 256 bits of storage about the equivalent 6 phone numbers. RFID system are powerful tools for inventory management implementation of RFID solution automates and facilities inventory management, reduce errors and allow full stock control among many other advantages.

Here a portable robot that installed in trolley used in supermarket that leads the sales person directly to product location by using android application, so sales person can easily fill the rack. The robot is wirelessly controlling Arduino Uno with Bluetooth module(HC-05) and DC motors with motor driver which instructed from Arduino Uno. And the Bluetooth module was controlling by MIT Application in Android.

An open source programme called Apache Xampp is used to run PHP or PERL Web applications locally on a Web server. All major operating systems support it, and Windows users frequently use it to locally develop and test their Web applications. We will look at how to set up Xampp in this guide. Along the process, we'll build and manage our own PHP Web application and make use of MySQL databases and the PHPMy Admin tool. Xampp is a cross-platform Web server solution stack that is free and

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open source and was created by Apache Friends. Maria DB, MySQL, and the Apache HTTP server are pre-installed. For the programming languages PHP and PERL, it also includes interpreters. One of the most well-liked options for executing PHP applications locally on Windows is Xampp. Shamp is an acronym for "cross-platform MySQL PHP and Perl," and it is pronounced as such.

II. METHODOLOY

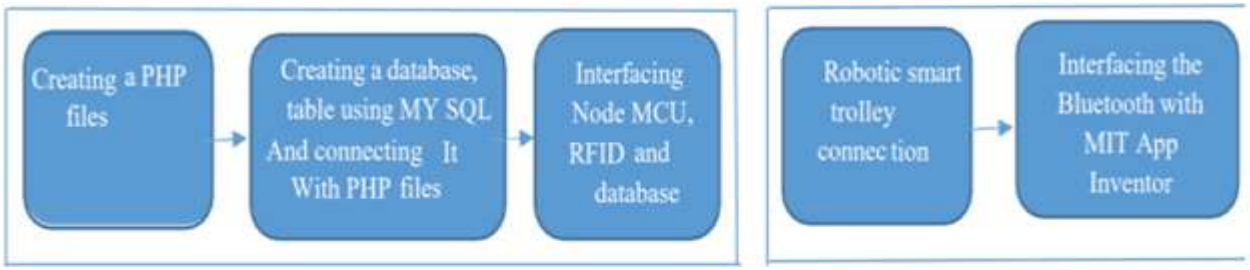


Fig 1. a)Stock management system b) Smart Trolley

Stock management system:

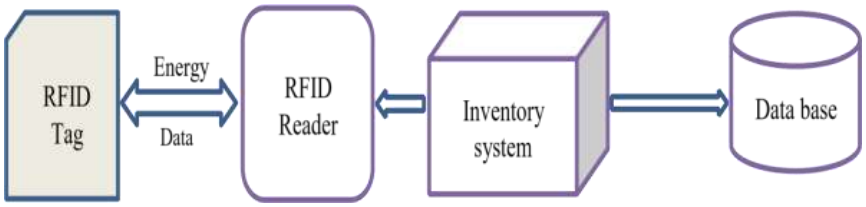


Fig 2. Stock management system based on RFID

The whole data of the stock management list will be entered in the database table when the full data of the RFID tag is scanned in the RFID Reader, which subsequently stores the total information in the inventory system. This entire operational system is based on RFID (Radio Frequency Identification). How to read stock will be demonstrated in the steps below:

Steps to Read Stock:
Step 1: Make Node MCU send ID data from RFID RC522 and create PHP files on the server toReceived data.
Step 2: Download Bootstrap and JQuery.
Step 3: Create a home page
Step 4: Creating Database and Table.
Step 5: Create a PHP file for access connection with the database and create a user data page.
Step 6: Create a page to edit and delete user data from a table/database.
Step 7: Create a page for registration.
Step 8: Create a page for stock data.
Step 9: Create a page for the Read ID Tag.
Step 10: Create stock entry page and update stockdetails.
Step 11: There are inward and outward radio buttons. The Inward button is for the stock Increment (Entry) and The Outward button is for the stock Decrement (Exit).

Now Read Tag ID and check with Reader with Arduino, then the information will appear on screen.

Smart Trolley:

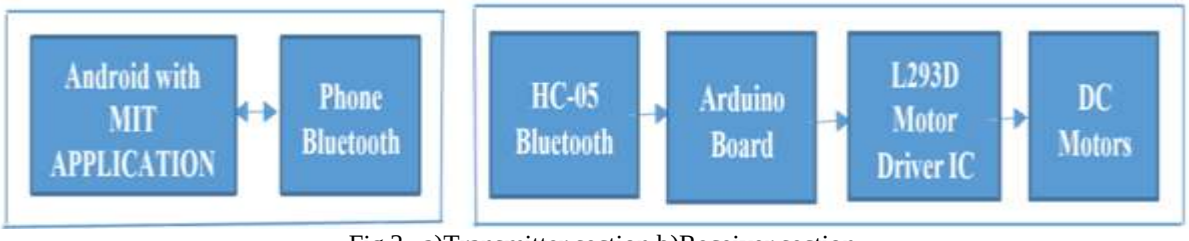


Fig 3. a)Transmitter section b)Receiver section

Now if we want to control the trolley by issuing specific instructions to move the trolley, we must link the robotic smart trolley interfacing the Bluetooth that is connected to the system with MIT App Inventor. The MIT Application

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was installed on an Android device and connected through Bluetooth in the transmitter area. The receiver section is based on HC-05 Bluetooth and communicates with the Arduino UNO. The Arduino code saves the device with the instructions Forward, Back, Left, Right, and Stop. So, the L298N motor driver receives instructions from the Arduino UNO and then transmits those to the DC Motor.

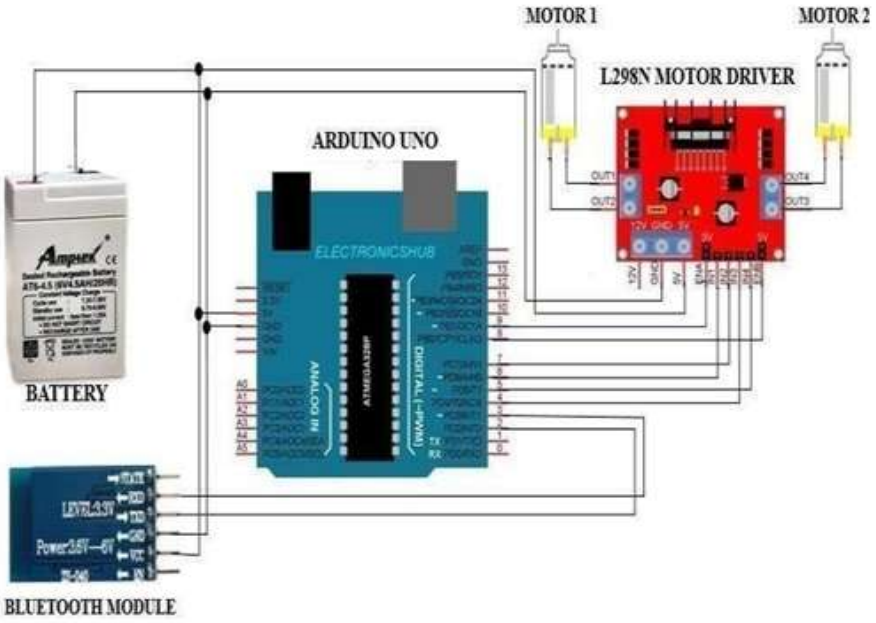


Fig 4. Cicuit diagram for smart trolley

The +5V and GND pins of the Bluetooth Module are connected to the +5V and GND of the Arduino UNO when it comes to the circuit design. The Bluetooth module's TX pin is connected to the Arduino's RX pin in order to communicate data relevant to system movement from Android to the Bluetooth module; no data from Arduino is intended to be received at this time. This Arduino RX pin is built using the Software Serial library (Pin 2 and Pin 3 are configured as RX and TX on Arduino). The L298N Motor Driver Module is now discussed. The L298N Motor Driver Module's IN1 through IN4 are linked to the Arduino's Digital I/O Pins 4 through 7, which are set up as input pins for the motor driver. The Arduino's pins 8 and 9 are each connected to one of the Enable Pins. Two DC motors are supplied to the robot chassis that is being used in this Bluetooth-controlled robot trolley project with the help of one supporting wheel.

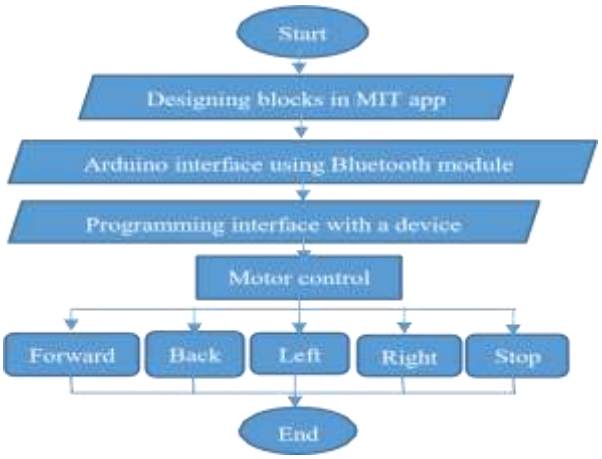
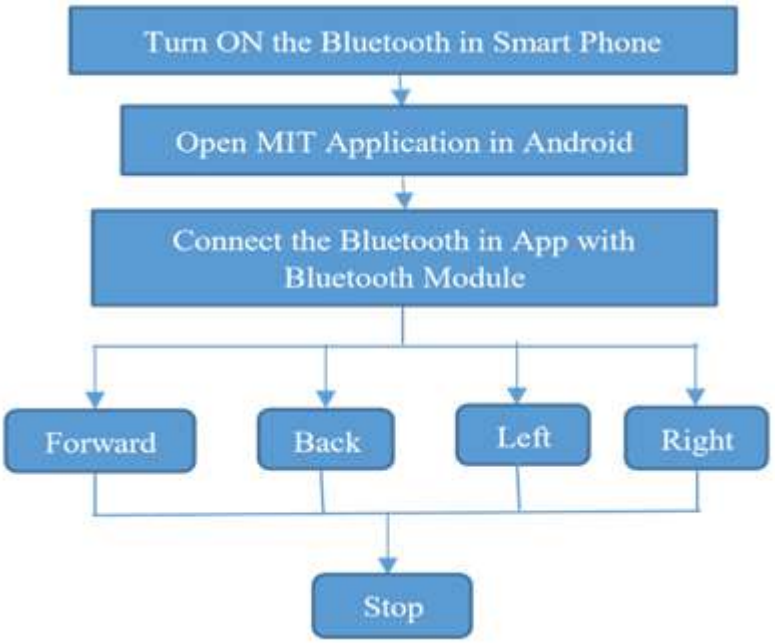


Fig 5. a) Flow chart of smart trolley

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b) Android flow chart

III. EXPERIMENTAL STEPS

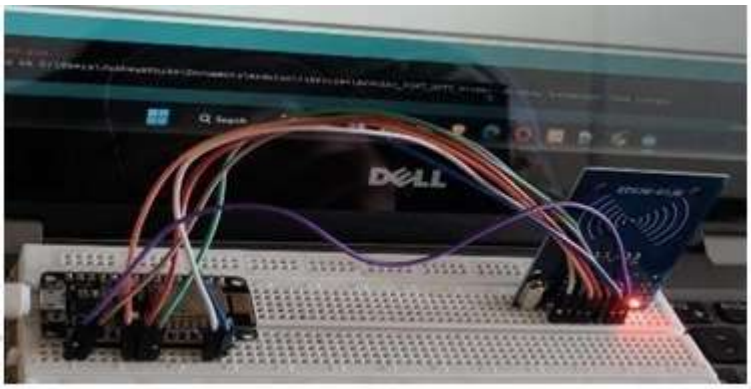
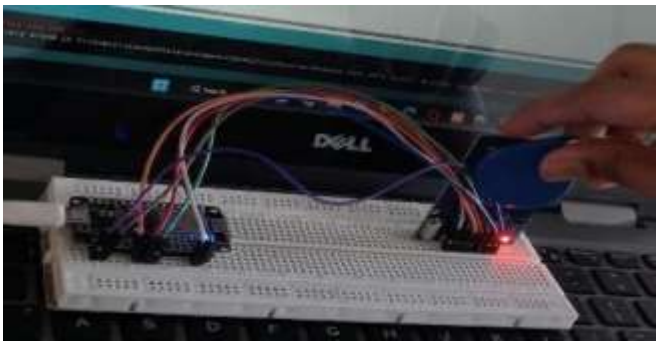


Fig 6. a) Interfaced Arduino Code with Node MCU



b) Using an RFID reader to read the tag

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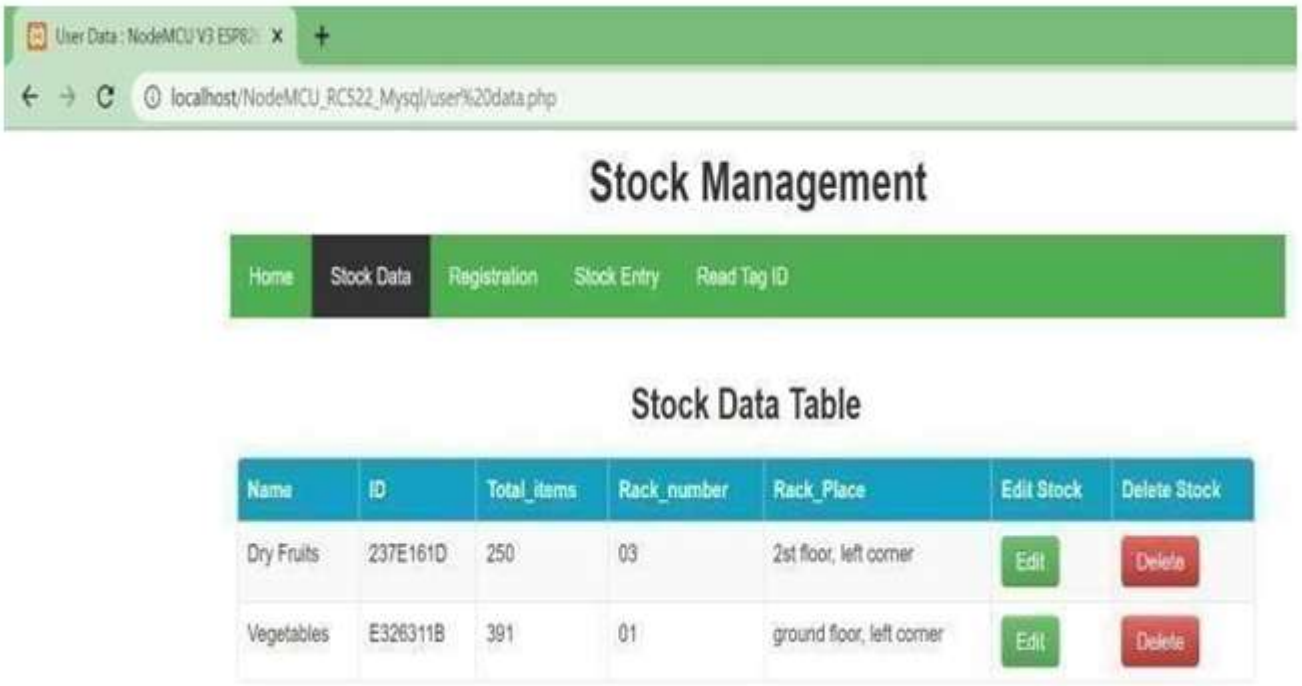
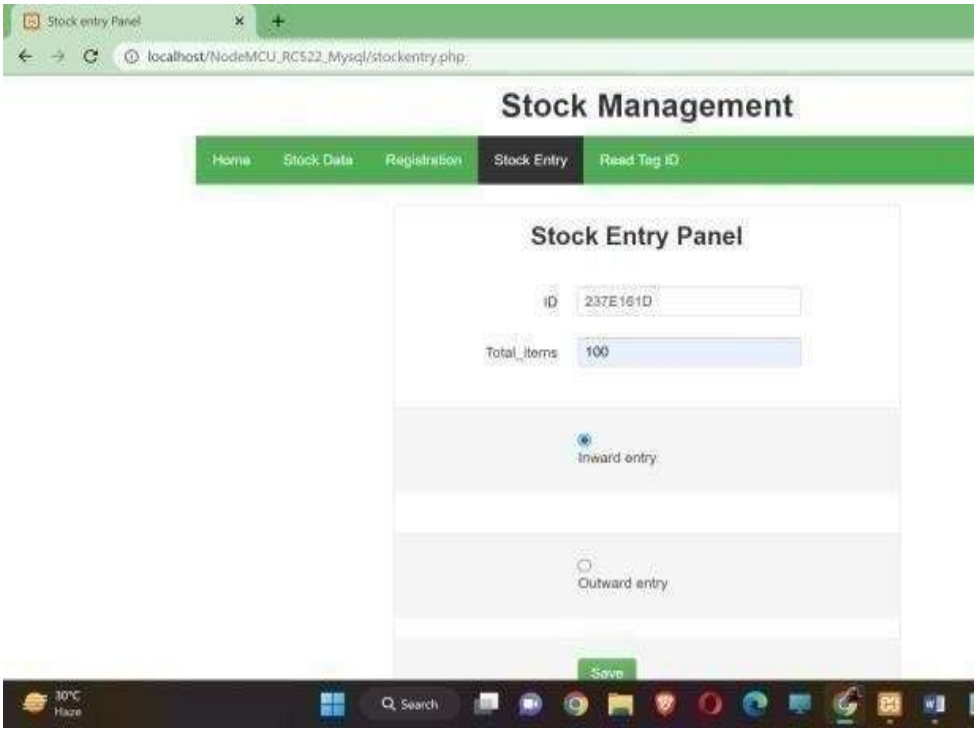
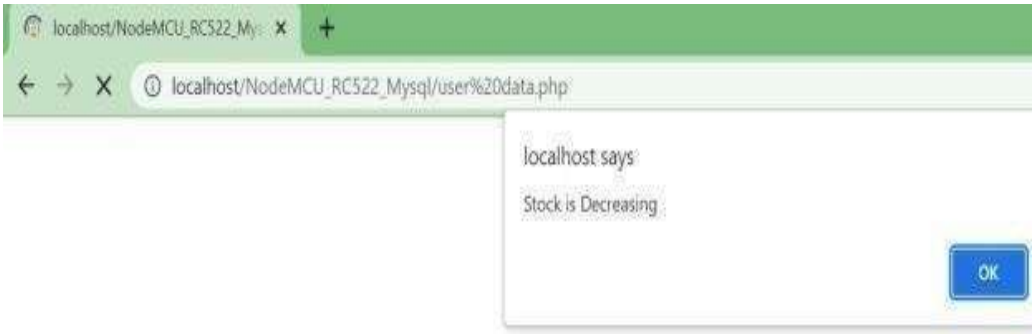


Fig 7. a) Stock data table



b) Quantity entry in stock entry panel

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c) When the stock falls, a warning message appears

Steps for Managing stock:

Step 1: Scan the RFID tag. The id is automaticallyvisible in the registration panel after scanning. If the tag is being scanned for the first time, we mustprovide information such as the item's name, total number of items, rack number, and rack location. **Step 2:** After completing the registration process, we can view the details in the stock data panel.

Step 3: Scan the tag at the stock entry panel now. The ID of the tag is automatically displayed in the stock entry panel after scanning.

Step 4: Now we must enter the quantity in the stock entry panel.

Step 5: After entering the quantity, click either theinward or outward button.

Step 6: If it is inward stock, click the inward entry button The final stock management display and then the save button. It will now automatically redirect to the stock data panel and display the increased value in the total items colu mn.

Step 7: If it is outward stock, click the outward entry button and then the save button. When we click the save button, it says billed successfully, which means that if we click the outward button, that particular item should be billed before. We must only consider it as outward stock after billing. It will now automatically redirect to the stock data panel, where it will display the decremented value in the total items column.

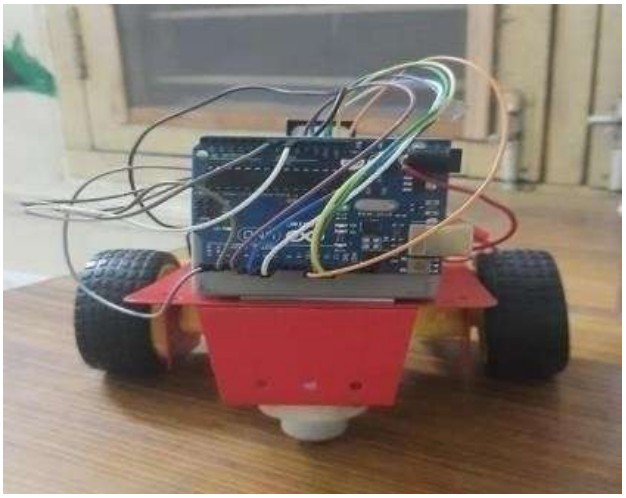
Step 8: When the stock falls, a warning message will appear.

Step 9: Finally, if we want to see the complete details of a specific tag, we must read the tag id panel and scan the tag.



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Result for smart trolley



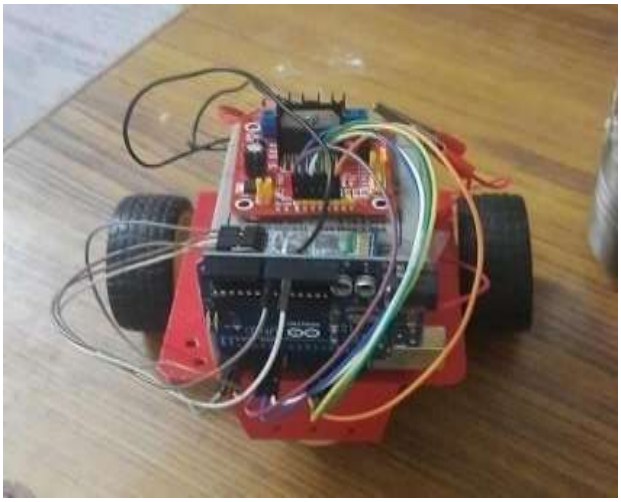


Fig 8. Final Smart Trolley connections design

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