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Bluetooth Controlled Farming Machine using Arduino

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Abstract: After years of observation it was seen that, Farmer faces a lot of critical conditions during the time of spraying pesticides & cultivation. In earlier days, the cultivation and fertilization process was done manually. As technology reaches to the farming industry, individual different machines were made for digging soil and spraying pesticides. In our proposed system, we tried to build a voice controlled Bluetooth operated vehicle which will spray liquid pesticides to the farming land as well as it will dag the farm land. Within a single system, we can propose a combo facility which is totally based on effortless speech command provided by the user. The entire system is controlled by the voice message send by the user. This project will add a major revolution to the farming industry and thus it will help farmers to overcome losses. By reducing cost for different machines and manpower, yield will increase in time and it will effectively help farmers financially. This system can be made in a bigger scale for real time prospects.
Keywords: Arduino, Bluetooth module, L298N motor driver, Microcontroller, Servo Motor.

I. INTRODUCTION

Arduino was designed to be used as an easy tool for fast prototyping, aimed at students without a background in electronics and programming. Over the years Arduino has been the brain of thousands of projects from everyday objects to complex scientific gadgets. As soon as it becomes successful to reach wider to wider communities, it started changing to form new characters, to adapt to new needs and challenges, differ from simple 8 bit boards to products for wearable, IOT applications and other embedded environments.

A worldwide society of makers- students, programmers, developers and professionals- came together around this open source platform, their contribution results an incredible amount of accessible knowledge that can be backbone to novices and experts. All Arduino boards are completely open source, empowers users to build them independently and eventually adapt them to their particular needs.

The software is too an open source and its growing through the contributions of users all around the world.

The L298N is a dual H-Bridge motor driver which allows direction and speed at a same time to control two DC motors. This module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A. A Bluetooth is a high speed lower power wireless technology standard which is used for exchanging data over minimum distances it is a specification for the use of lower power radio communication to link computers, phones and other network devices over short distance wirelessly. Wireless signals transmitted with Bluetooth cover short distance, typically up to 10 meters.

A servo motor is actually an assembly of four things: a normal DC motor, a gear reduction unit, a position sensing device, and a control circuit. The DC motor is connected to a position sensor which is mostly a potentiometer. From the gear box, the output of the motor is delivered via servo spline to the servo arm. For standard servo motors, the gear is normally made up of plastic whereas for high power servos, the gear is made up of metal.

II. OUR WORK

Our project is based on controlling car using Bluetooth technology. Bluetooth is a method of connecting two devices at a time. We have used Bluetooth module in our project to give commands to move the car through android device by using an application. An Arduino board plays an important role in the project only by using a Bluetooth module will not help us to move a car. So by using an Arduino "L298" we burned a code in Arduino which will help the car to move across according to the command. We have used Bluetooth technology in our project because it gives a wider range and is much more efficient and can be control through any medium like mobile, laptop etc. Our main target is to provide our farmers a smooth and simple way of cultivation and fertilization. And for these we have used a Spray bottle and a pinned cap as our prototyping equipment's. Here we used a multi output board as all the 5 volts of Arduino has been used for generating power for chassis kit. So the board will help us to generate power from its 5

volt to generate power for a servo motor. The spray bottle will be attached with the servo motor and the servo motor is connected with the Arduino by the multi output and it will process according to the commands. The pinned bottle cap will be attached with a 25 volt motor, which will work from below the chassis kit. It will be coded in such way that the bottle will spray fertilizers at a limited amount from the back to that particular cultivated area and the pinned cap will keep moving by digging farm land. Thus it will result a less time consuming, stress less and an easy simple kit for farming.

III.   WHY ARDUINO?

Because of its simple and accessible user experience, Arduino has been used in thousands of applications and different projects. The software is very easy to use for beginners. We can say Arduino is another flexible controller option like ROS, LinuxCNC, and Raspberry and so on but Arduino hard components are cheaper in relation with other controller architecture. It has a lot of peripheral supports to starts with. It runs on Linux, Windows and Mac. Its programming language is easy and has greater academic applications. It has a lot of sample applications to start with. Does easily scale between different members so of the family-including changing the microcontroller family the individual boards are based on.

In conclusion, for design of basic embedded system design (software + Hardware), and who are just beginners, Arduino is the best compared all other boards available in the market.
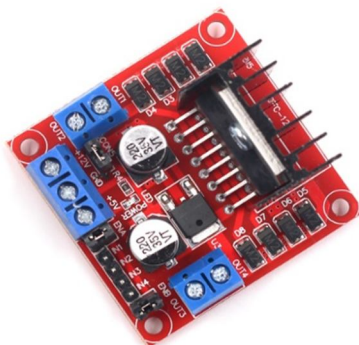
IV.   COMPONENTS REQUIRED FOR PROPOSED WORK

A.   Chassis Kit
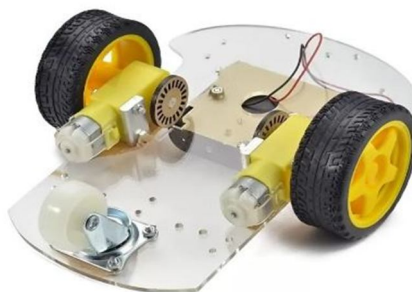
Chassis kit is probably the base of any moving project which will rotate in any angle if commanded. The frame, wheels, and machinery of motor vehicle on which the body is supported. The kit looks like the base of a car on which other components will be attached.

B.   L298N Motor Driver

Motor driver is used to control the speed of a motor. Motor driver is one of the important reason to move an object with the function of controlling the speed of an object. L298N is a 16 pin motor driver IC. Simultaneously two DC motors can be controlled by using l298N IC.

C. Arduino UNO

Arduino is an electronic device which is used to read inputs or commands and convert it into output. It helps a user to understand and make it easy for hardware and software to use. By burning the code into Arduino will help the user to move the object according to the command.

D. Bluetooth Module

Bluetooth is a module for connecting two devices at a time. Bluetooth module is used to move an object by giving commands by using inbuilt function or using an application through devices which will help the user to communicate between two devices and help to move an object through commands.

E. Servo Motor

Servo motor is used to rotate an object with an accurate angle or position. The motor helps to rotate the blades to a particular angle or distance with the help of servo mechanism. It is an electrical device which can rotate one object with great precision. If the motor which is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. Due to these features, they are being used in many applications like toy car, RC Helicopters and planes, robotics, machines etc.

F. Multi Output
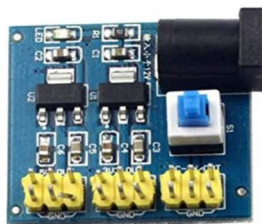
Here we used a multi output board as all the 5 volts of Arduino has been used for generating power for chassis kit. So the board will help us to generate power from its 5 volt to generate power for the servo motor.

G. Jumper Strips

A jump wire is also known as jumper wire or Jumper. It is an electrical wire or group of them in a cable with a connector or pin at which end which is normally used to interconnect with other components. There are various types of jumper wires. Some have the same type of electrical connector at both ends while others have different connectors.

H. Power bank

A Power Bank is a device used to put energy into a secondary cell or rechargeable battery by forcing an electrical energy through it. A 1000mAh Power Bank is used in the project to pass electric current to the battery cells to charge.
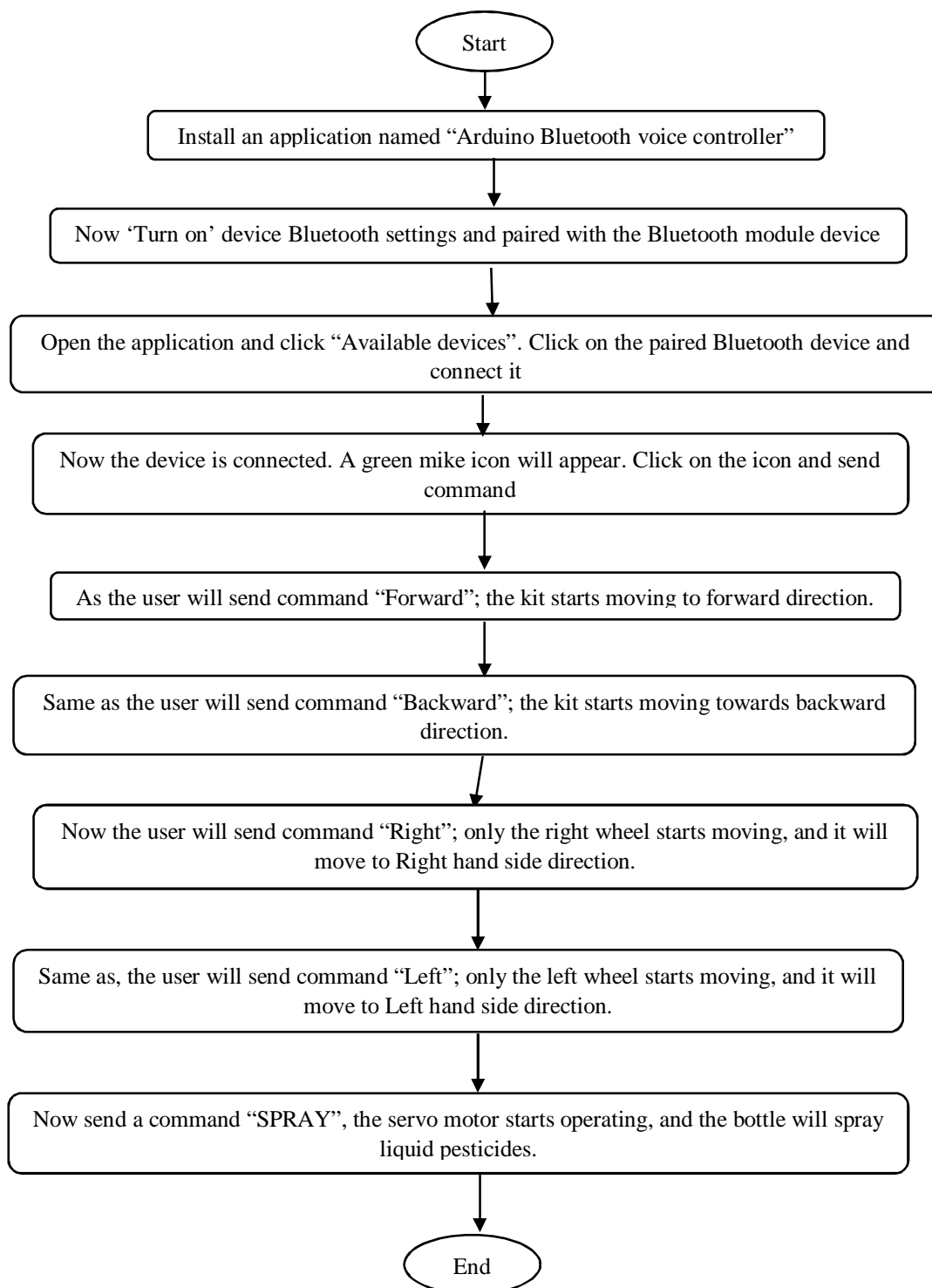
I. Battery

A Battery is a device that produces electrons through electrochemical relations and contains positive (+) and negative (-) terminals. It can be charged electrically to provide a static potential for power or released electrical charge when needed. Four 1.5 v battery cells is used to generate electrical power to motors connected with the Chassis Kit.
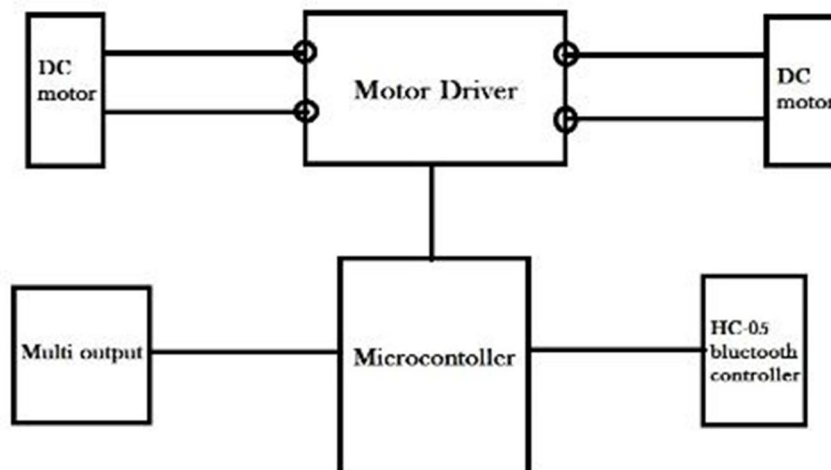
J. Spray Bottle

The spray bottle is a bottle that can squirt, spray or mist fluids. Here it is used as a prototype to spray liquefied fertilizers.

V. PROPOSED ALGORITHM FOR OUR PROPOSED SYSTEM

Start

Install an application named "Arduino Bluetooth voice controller"

Now 'Turn on' device Bluetooth settings and paired with the Bluetooth module device

Open the application and click "Available devices". Click on the paired Bluetooth device and connect it

Now the device is connected. A green mike icon will appear. Click on the icon and send command

As the user will send command "Forward"; the kit starts moving to forward direction.

Same as the user will send command "Backward"; the kit starts moving towards backward direction.

Now the user will send command "Right"; only the right wheel starts moving, and it will move to Right hand side direction.

Same as, the user will send command "Left"; only the left wheel starts moving, and it will move to Left hand side direction.

Now send a command "SPRAY", the servo motor starts operating, and the bottle will spray liquid pesticides.

End

VI.   BLOCK DIAGRAM

At first we connected both the DC motors with the L298N motor driver. Thereafter we connected the motor driver to the microcontroller Arduino UNO board. We take an HC 05 Bluetooth controller and connected with Arduino for wireless voice transmission. At last we used a multi output board for generating extra 5 volt power and connected with the Arduino.

VII.   CIRCUIT DIAGRAM
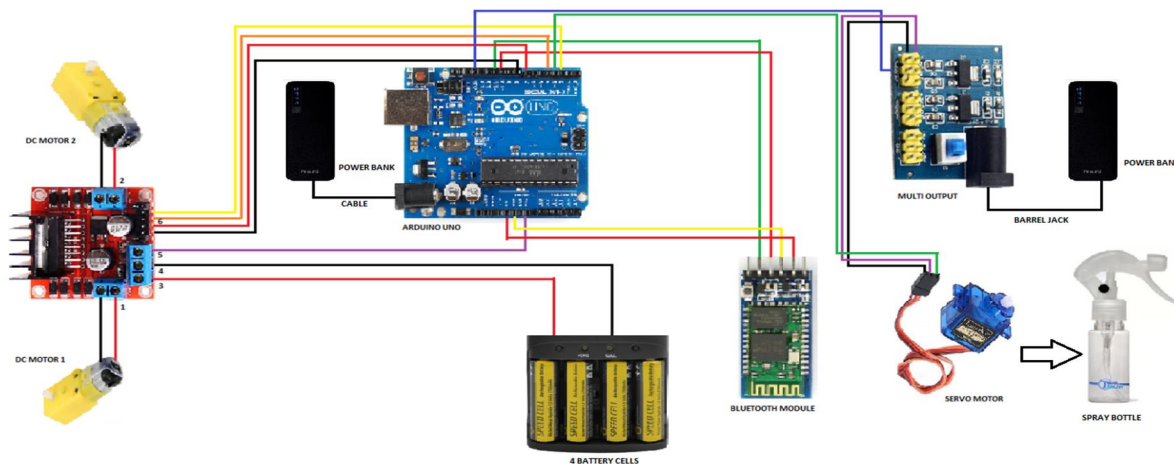
The Arduino UNO pin 5volt is connected to Bluetooth 5V.The Arduino UNO pin GND is connected to Bluetooth GND. The L298N 5Volt pin is connected to Arduino UNO 5volt.The Digital PWM pin's GND is connected to multi output GND. The Digital PWM pin's ~11 is connected to Bluetooth RX. The Digital PWM pin's ~10 is connected to Bluetooth TX. The Digital i/p and o/p pin's 8 is connected to input pin of L298n IN4.The Digital i/p and o/p pin's 7 is connected to input pin of L298n IN3.The Digital i/p and o/p pin's 4 is connected to input pin of L298n IN2. The Digital i/p and o/p pin's 2 is connected to input pin of L298n IN1. From both DC motors +/- wires are connected to L298n output pins. From Battery positive wire is connected to L298n 12 volt and negative is connected to L298n GDN pin. As all the 5 volts of Arduino has been used, we take a multi output board. The multi output board GND is connected to The Arduino UNO pin GND. The Digital PWM pin's ~3 and multi o/p 5volt is connected to servo motor.

VIII.   RESULT & OUTPUT
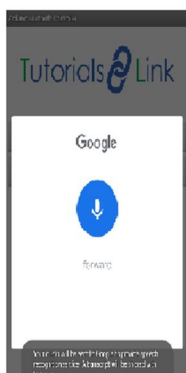
The kit starts moving to forward direction.
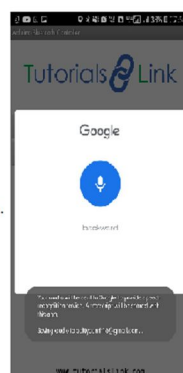
the kit starts moving towards backward direction.

only the right wheel starts moving, and it will move to Right hand side direction.

only the left wheel starts moving, and it will move to Left hand side direction.

The servo motor starts operating, and the bottle will spray liquid pesticides.

IX. CONCLUSION

Farmer plays a vital role in the economic development of a country. They are an important part of the survival of our various societies because they provide food and fiber that nourishes and cloths us. Farmers and Farming provides an excellent environment to raise a society. Our proposed project is mainly for the farmers, for the farming industry. We tried to provide an easy smooth a comfortable way of fertilization, a less time consuming process of cultivation, which will help in the early harvesting of the crop. It will help in reducing the man power during farming, an easy simple kit which can become a significant addition to crop cultivation.

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