

A Prototype Model for Controlled Lawnmower using Android Application

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Abstract – At present, the people grow lawns in front of their houses and spend so much of their time in cutting it. Some people use grass shears and manually handled gardening tools to cut the grass. This is overpriced and may lead to health risks. However, recent time technologies can give solution to these problems by using smartphones. This paper mainly focuses on designing and implementing of a user friendly and remotely controlled lawnmower which is low cost and it is controlled through android application using smart phone. A Bluetooth module has been used to provide wireless communication between the Arduino Uno Board and Android application. This lawnmower saves time, energy and also provides accurate results. It is safe and easy to use.

Key Words: Lawnmower, Android application, Arduino Uno Board, Prototype.

1. INTRODUCTION

Grass grows almost everywhere and major factors that determine the grass growth is carbon-di-oxide, sunlight, moisture, humidity. Trimming the landscape plants removes dead areas and dying branches, enhance the beauty of our gardens and also provides room for new plant growth. Hence trimming the grass or landscape plants is necessary. Grass shears and manually handled gardening tools are slow and not accurate. However, the recent time technologies can give solution to complex problems by using smart phones.

The main aim of this project is designing and implementing remotely controlled lawnmower, which is controlled through android application using smart phone. This new idea helps house owners to trim lawn of their houses using smart phones. This new idea give a practical exhibition of technologies like arduino, IOT and also addresses current problem that is helpful in building mobile application controlled lawn mower. Therefore, it is necessary to replace grass shears and manually handled gardening tools by mobile application controlled lawnmowers.

This paper is arranged systematically as follows. The first part explains introduction, the second part explains the objectives, and the third part explains the Methodology fourth part explains the System design fifth part explains the Hardware and Software requirement sixth part explains the Implementation part seventh part explains the result and final part will be the conclusion.

2. Objective

The main objective of this project is to design and test remotely controlled lawnmower, which is controlled through android application using Smartphone.

3. Methodology

The methodology used here is agile methodology. Agile methodology is a practice which supports iteration of development and testing in every part of the software development of the project. Agile methodology is used to incrementally complete tasks and projects. Agile methodology is prompt, flexible and delivers quick prototyping. In the Agile model, the development and testing are concurrent.

4. System Design and Architecture

Fig1.shows the system architecture of the proposed system. An Android application was developed using the Android studio, Android studio is Android’s IDE. It helps you to construct the high standard apps for every Android device. Bluetooth hardware is used for the communication between lawnmower and android application. Bluetooth module receives the command that is transferred by an android device. Bluetooth module then feed it to the Microcontroller (Arduino Uno) which is fixed to lawnmower. Command that is sent: forward, backward, left, right, cut, off. On the basis of commands, Microcontroller rotates particular motor.

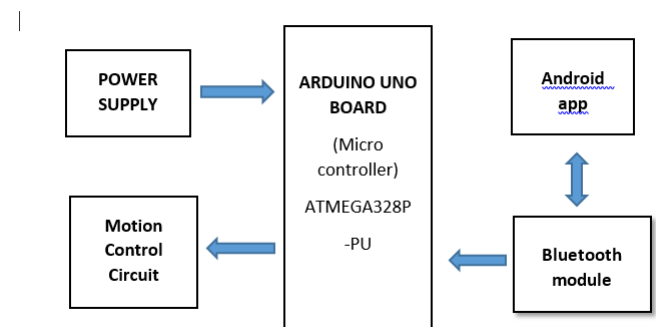


Fig -1: System Architecture

5. Hardware and Software Requirements

Hardware components essential for this project include a Smartphone (Bluetooth enabled), 2 DC motors, L293D motor driver, HC 05 Bluetooth module, SG-90 servo motor, Arduino

Uno microcontroller. DC motor is an electrical motor that converts electrical energy into mechanical energy. A DC motor will have two terminals. These terminals are connected simultaneously through a coil. Reversing the connection will change the direction of motor, L293D motor driver control the speed and direction of rotation of a 2 DC motors. HC-05 Bluetooth module is Bluetooth SPP (Serial Port Protocol) module, which is required for controlling the wireless communication between the Smartphone and Arduino board. Servo motor SG-90 is required to ensure accurate control of speed, angular position and torque of the output shaft. It can rotate approximately 180 degrees and are controlled by sending pulse width modulation (PWM), through the control wire. Arduino Uno is an open-source microcontroller board, which is based on the microchip Atmega328p microcontroller. The board is equipped with sets of 14 digital and 6 analog I/O pins and is programmable with the Arduino Uno IDE.

The software required for this project includes Android studio, which is the IDE for Google's Android operating system and designed specifically to construct the high standard apps for every Android device. In addition, Arduino IDE is required which is necessary to code and upload the source code to the Arduino Uno board and an OS that will host the Bluetooth terminal application.

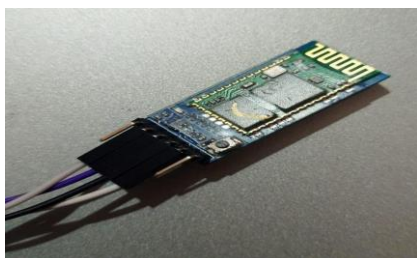


Fig 2: HC-05 Bluetooth Module



Fig 3: Servo Motor SG-90

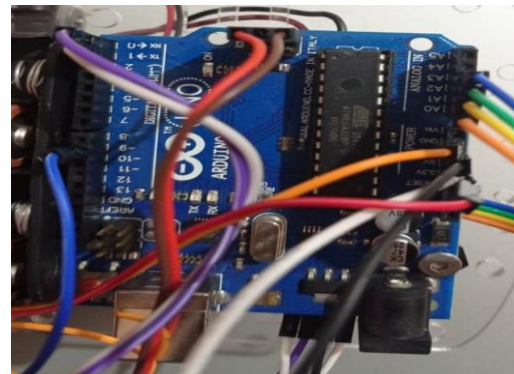


Fig 4: Arduino Uno microcontroller



Fig 5: L293D motor driver IC

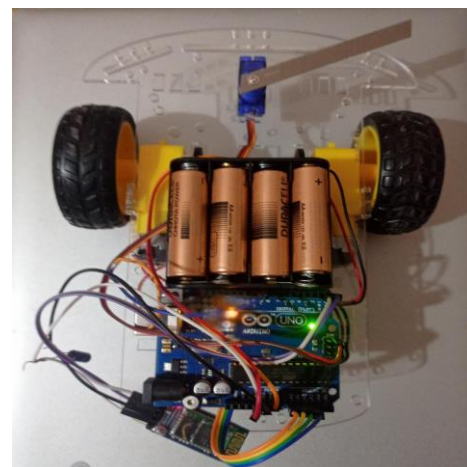


Fig 5: Interfacing of hardware components

6. IMPLEMENTATION

Firstly, Development of an Android Application using the Android studio is done. In Android app we created main

page, login page and home page. The system/laptop and Android device should be connected to same Network. Because each and every system will have different IP address. If the wrong IP address of system is given to the app we developed then, the system will not get connected to the Android app and they cannot communicate with each other. Secondly, we should get permission from the user to get access to the Bluetooth, then enable the Bluetooth automatically and pair android device with the Bluetooth hardware. While pairing, we choose the particular Bluetooth adapter. On the basis of unique MAC Address of the Bluetooth adapter pairing of android device with the bluetooth adapter will be done. Bluetooth socket will be created. Bluetooth socket will act as a server socket/Server Program which is used for communication purpose. In the Bluetooth socket we create a input and output stream. Input stream is used to receive signals from Bluetooth adapter (Bluetooth adapter to Android device) output stream is used to send commands (Android devices to Bluetooth adapter). Finally, we control the Lawnmower. So, we created buttons for same purpose. When the particular button is clicked then the corresponding command is sent to Bluetooth adapter. Backward Button - 'b' command is sent, Forward Button - 'f' command is sent, Right Button - 'r' Command is sent, Left Button - 'l' command is sent, Cut Button - 'c' command is sent, Off Button - 'b' command is sent. On the basis of commands microcontroller rotates particular motor,

7. RESULTS



Fig 7.1: Main page

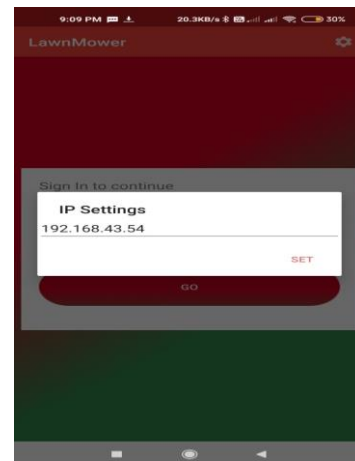


Fig 7.2: Setting an IP address

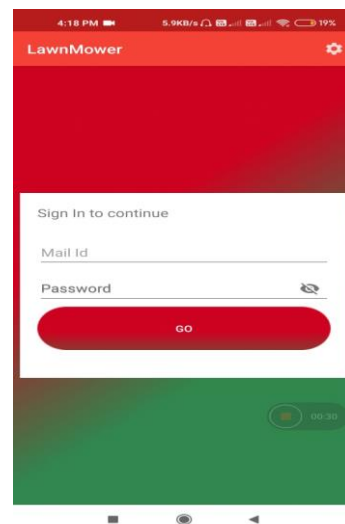


Fig 7.3: Login Page

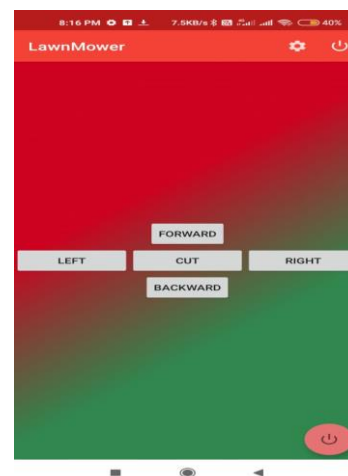


Fig 7.4: Home page

CONCLUSION

The project has achieved its aim i.e. design and implementation of remotely controlled lawnmower, which is controlled through an android application using Smartphone. Here Android application controls the lawnmower using Bluetooth communication. The future enhancement to the project is creation of a mobile application that is amicable with all platforms such as iOS. Another feature that could be added is Wi-Fi as a replacement of Bluetooth. The project can be strengthened by developing an independent system that is equipped with AI, sensors and latest technology.

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