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AGRIOT:- IOT BASE AGRICULTURAL ROBOT USING ARDUINO UNO

Manasi Mali*1

*1Department Of Information And Technology, B.K.Birla College Of Arts, Science And Commerce (Autonomous) Kalyan, Mumbai, India.

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ABSTRACT

Internet of Things- Concept & Definition Internet of Things (IoT) (Atzori et al 2010) (Nayyar, 2016) consists of two words- Internet and Things. The term "Things" in IoT refers to various IoT devices having unique identities and have capabilities to perform remote sensing, actuating and live monitoring of certain sorts of data[1].Agriculture is the backbone of economic system of a specified country standard techniques of farming rely on Man power and old procedures such as the application of synthetic chemical fertilizers, pesticides, herbicides and genetically changed creatures. To carry out similar tasks with efficiency, we make use of agricultural robotics. Agribots can spot the existence of diseases, weeds, insect infestations and other stress circumstances. Agri robots are lightweight. Agricultural robot can be controlled by an android application which is helpful for the farmers livelihood. An android application is used to monitor Agribot.(2)

Keywords: Internet Of Things (Iot), Agriculture, Agriculture Iot, Agriculture Precision, Arduino Uno Soil Moisture Sensor, Bluetooth Model.

I. INTRODUCTION

The Internet of Things (IoT) technology has made the human's daily life easier and effortless by developing the physical devices which are smart and intelligent. Therefore, if we implement this technology in Agriculture and Farming it will facilitate the farming. In this paper the project present design and prototype for Agricultural Robot which uses two main components Bluetooth Module as a wireless communicator which gives commands from a device to Arduino and Arduino Uno, which controls and manages input of Bluetooth Module. Any device can operate this Robot by connecting the device Bluetooth with the Bluetooth Module and there are three main functions: first, it can move in all directions with the help of dc motors and tyres. Second, it can be used for seeding process (which include digging, seed sowing and plaining the soil). Third, it can be used for watering (first it checks the moisture of the soil using soil sensor then it waters the soil. And all the functions would be handled by using an app.

1.1 Background

Agricultural Robot is a device which helps to control the agricultural works in farms. As the days are passing the demand of automatic devices are increasing. Thus, the controlling of such devices is getting more and more attention. From long time ago mostly, the controlling is done manually such as seed sowing and watering the farms and plants but as the time passed the arrival of automation gives the user alternative way to control such appliances without the need for the user to walk. The advancement mention is that without moving our body we can sow the seeds and water them with the help of Internet of Things (IoT) technology. We use mobile phone and an app to communicate with the device.

1.2 Objectives

In this paper the main objective of this project is to design an agricultural robot which helps the farmers to automate their basic manual work in the farms like seed sowing and watering. Basically, farmers carry the seeds and waters on themselves or on the tractor which uses energy or petrol or diesel but with the help of this robot all these deviations are gone. And it will help the new farmers to train themselves by understanding few technologies.

Besides that, this robot provides farmers a better safety against any harmful insects or pests because by using an automated robot they don't have to walk in the farms.

1.3 Purpose

The purpose of this robot is to reduce the work load of the farmers because all our farmers do their works day and night without any rest which also effect on their health and as per 2018, agriculture employed more than

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50% of the Indian work force and contributed 17-18% to country's GDP. So, by just automating the whole process of farmers using IoT helps them to reduce the time and energy, they spent in farms. They can utilize the remaining time for other works.

1.4 Scope

In order to achieve the objective of this robot, there are several scopes had been identified. The scope of this project includes the designing of a circuit diagram for the agricultural purpose. Follow by the designing of the microcontroller board using Arduino Uno, Motor Driver and Bluetooth Module as the hardware that control the whole project by serving as interface for the agricultural robot with other hardware. Next a C programming is to be designed and coded with the help of Arduino IDE to enable the microcontroller (Arduino Uno) to be able to function properly as desired.

1.5 Applicability

1. Using this project, we can water and sow the seeds with the help of a robot which supports the farmers in their farming works.
2. This project can be further expanded using some advancement by including some more sensors, other hardware and automatically adjust different parameters like number of seeds to sow and water to spray etc.
3. The same robot can be used in some other fields by alternating some functions like in construction if we remove the seed sowing the same robot can be used to dig the holes, planning the cement and watering the wall.
4. Additionally, we can control the farm from certain range and can avoid If there is any leakage monitoring the safety.

II. SURVRY OF THECHNOLOGY

In today's era of IoT, lots of new devices in terms of Smart IoT based product's development is being carried out to facilitate Smart Farming in terms of Crop Management, Pest Management, Agriculture Precision, Agriculture Fields Monitoring via Sensors and even Drones. In this section Smart IoT based Agricultural Robot being developed for seed sowing and watering process using Arduino, Motor Driver, Soil Sensors and etc which are discussed below

2.1 Internet of Things (IoT)

The internet of things (IoT) is a catch-all term for the growing number of electronics that aren't traditional computing devices, but are connected to the internet to send data, receive instructions or both. It encompasses all the enabling hardware IP, tools, systems, sensors, and software that support IoT device and application development. With IoT technology, everyday objects can be made smart.

III. COMPONENTS

3.1 Arduino Uno

The Arduino UNO is a standard board of Arduino Here UNO means 'one' in Italian. It was also the first USB board released by Arduino. It is a microcontroller board based on the ATmega328P. it has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller.

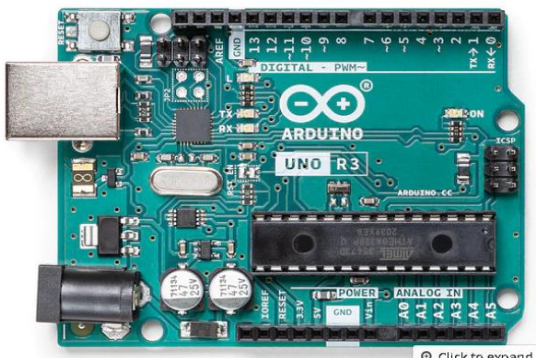

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Figure 1. Arduino Uno

3.2 Bluetooth Module

HC-05 is a Bluetooth module which is designed for wireless communication. This module can be used in a master or slave configuration. It has 6 pins (EN, VCC, GND, TXD, RXD, State). It has red LED which indicates connection status, whether the Bluetooth is connected or not. This module works on 3.3V and we can connect 5V supply voltage as well since the module has on board 5 to 3.3V regulator.

Figure 2. Bluetooth Module HC-05

3.3 Motor Driver

The L298N Motor Driver Module is a high-power motor driver module for Driving DC and Stepper Motors. This module consists of an L298 motor driver IC and 78M05 5V regulator. This module can control up to 4 DC motors, or 2 DC motors with directional and speed control.

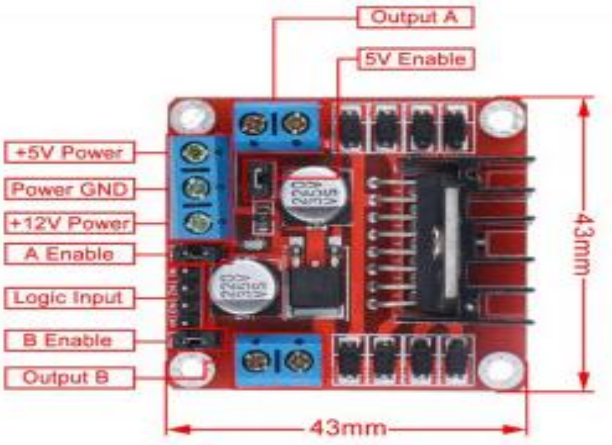

Figure 3. Motor Driver L298

3.4 Soil Sensor

The soil moisture sensor is one kind of sensor used to gauge the volumetric content of water within the soil. As the straight gravimetric dimension of soil moisture needs eliminating, drying, as well as sample weighting. These sensors measure the volumetric water content not directly with help of some other rules of soil like dielectric constant, electrical resistance, otherwise interaction with neutrons, and replacement of the moisture content. It contain the fork-shaped probe with two exposed conductors, acts as a variable resistor whose resistance varies according to the water content in the soil.

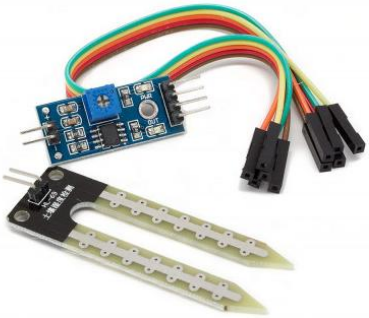

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Figure 4. Soil Sensor

3.5 Motors

Motors are essential when it comes to converting electrical energy into mechanical energy. Basically, they allow you to perform mechanical tasks using electricity. There are a number of types of motors including DC motors, servo motors and stepper motors which have different characteristics based on their working principles. Here DC motor and servo motors are used in this project.

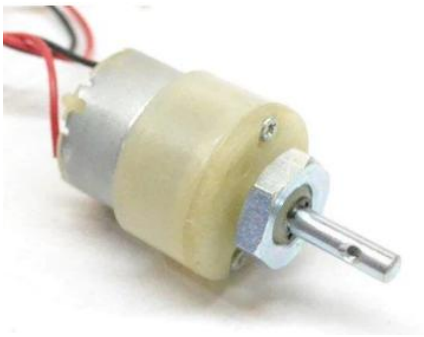

Figure 5. DC motor

Figure 6. Servo motor

IV. OTHER REQUIRED COMPONENTS

4.1 Wheels (4 in number) for the locomotion of the robot.

4.2 Battery and Battery Holder

Li ion 3.7 V rechargeable batteries have been used for the power supply and a battery holder, is one or more compartments or chambers for holding a battery, has been used for the perfect placement of batteries in the robot.

4.3 Jumper wires and led's

There also been the use of some jumper wires, normal wires for the connections and led's to check the connections.

Wheels

Battery

Battery Holder

Jumper wires

Led's

Figure 7

V. SOFTWARE REQUIREMENTS

5.1 Arduino IDE

The Arduino Integrated Development Environment (Arduino IDE) contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino hardware to upload programs and communicate with them.

C/C++

The Arduino Programming Language is basically a framework built on top of C++. You can argue that it's not a real programming language in the traditional term, but I think this helps avoiding confusion for beginners. A program written in the Arduino Programming Language is called sketch. A sketch is normally saved with the .ino extension (from Arduino). The main difference from "normal" C or C++ is that you wrap all your code into 2 main functions. You can have more than 2, of course, but any Arduino program must provide at least those 2. One is called setup(), the other is called loop(). The first is called once, when the program starts, the second is repeatedly called while your program is running.

ACHIEVEMENTS

After completing various task, it is been known that the agricultural robot is too much in demand and this project is very important for the elderly and disabled farmers due to their critical health condition and also for the new comers too. As the agriculture and farming is the very big aspects of the life its need be upgraded and advanced due to high demand of food from the increasing population. If cultivate the 200 sq. Ft land in 20 mins manually the same work can be done in 5 mins using this agricultural robot.

VI. FUTURE SCOPE

Since the designed robot is used only for sowing of seeds and spraying of water with the help of moisture sensor controlled through IOT, in future wee will try to work on pH meter can be in order to determine the pH of the soil which helps to identify the suitable pesticide/fertilizer to be employed Moisture level sensor can be employed to know about the moisture content present in the soil of the farmland and with the help of Cloud Computing and Solar Technology the robot has high efficiency and accuracy in fetching the live data of temperature and soil moisture in the future.

VII. CONCLUSION

In this paper IoT controlled robot has been designed, builted and for seeding and spraying water in an agriculture field. The robot which helps the farmers to automate their basic manual work in the farms and save their time. The seeds are been sowed in a proper sequence which results in proper germination of seeds.

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