Smartphone and it uses to Control Agricultural Robot

GAURAV SAI GRANDHI[1], RAGHAVENDRA.K[2], M.N.SANDHYA[3]

PG Scholar, Dept. of Mechatronics Engineering, JNTU College of Engineering and Technology, Telangana, India.

--***--

Abstract - *The main objective of the article is to control agricultural robot through a Smartphone. According to 2019 survey the united nation states estimates the world population will rise from 7.3 billon today to 9.7 billion in 2050. The world need lot more food and farmer will face serious pressure to keep up with demand. In current generation most of the countries do not have sufficient skilled man power specifically in agriculture sector and it effect the growth of the developing countries. In Indian there are approximate 70 percent people dependent on agriculture. We need to study the basic agriculture to automate the process of sowing, plough, seeding, watering, by using a microcontroller Arduino board, Raspberry microcontroller board, Bluetooth module which is controlled through a Smartphone. These robots can agriculture the fields with crop like sunflower, groundnut, onions, potato and many more. The world in field of agriculture is changing form drones to autonomous tractor to robotic arms. These revolutionary changes in farming practices not only come with the opportunities but also certain challenges which prove to be in restrain in the growth of the market.*

Key Words: **Arduino, Raspberry, Bluetooth module, Automation, Agriculture,**

INTRODUCTION

1. Introduction to robotics

Apply autonomy is the interdisciplinary part of building and science that incorporates mechanical designing, electronic &electrical building, software engineering, and others. Mechanical technology manages the plan, development, activity, and utilization of robots, just as PC frameworks for their control, sensor input, and data handling. There are the same number of various kinds of robots as there are assignments for them to perform. **Robots** in hazardous environments help in preventing accidents which can cause severe threat to life of the human being and the environment and with the help of robots, some processes can be made faster, more reliable and safer. Robots helps to create a safe working environment with less amount of risk. The Arduino plays a vital role in this project. The controlling segment will be fixed to the robot. The controlling contains the microcontroller, Arduino board, and the ringer circuit. From the start the framework is set to control the development of vehicle. The client needs to press the press catches for moving the vehicle in whichever heading it should move.

1.1. ARDUINO

Arduino is an ASCII text file instrumentality and programming, endeavor and consumer network that structures and produces single-board microcontrollers and microcontroller packs for building advanced gadgets and intuitive articles that may discover and management. The Arduino Uno is an microcontroller board obsessed on the ATmega328. It's fourteen advanced data yield pins, half dozen easy information sources, a sixteen megacycle per second clay resonator, a USB association, a force jack, AN ICSP header, and a push button. It contains everything expected to assist the microcontroller; primarily associate it to a computer with a USB link or force it with AN cooling to-DC instrumentation or battery to start. The Uno varies from each single going before board in this it does not utilize the FTDI USB-to-sequential driver chip. Rather, it includes the Atmega16U2 (Atmega8U2 up to rendition R2) made-to-order as a USB-to-sequential convertor.
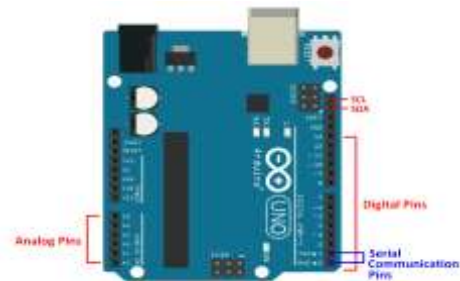

Fig 1.1

1.2. DC GEAR MOTORS

A rigging engine is either an cooling (substituting flow) or a DC (direct flow) electrical engine. Most equipment engines have a yield of between around one,200 to 3,600 cycles for each moment (RPMs). These forms of engines in addition have 2 numerous speed determinations: typical speed and also the hamper speed torsion particulars. equipment engines area unit essentially accustomed decrease speed during a progression of riggings, that so makes additional torsion. This can be cultivated by a coordinated arrangement of riggings or AN equipment box being joined to the elemental engine rotor and shaft by suggests that of a succeeding decrease shaft. the following shaft is then related to the arrangement of riggings or casing to create what's referred to as a progression of decrease gear
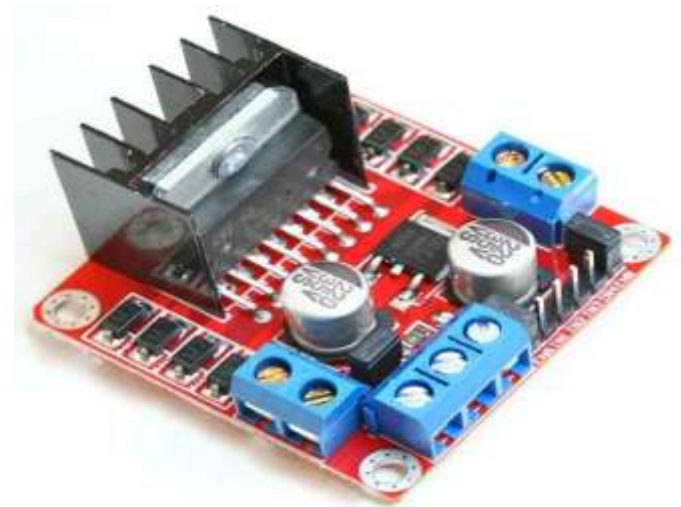
fig 1.2

1.3. MOTOR DRIVERS (L293D)

L293D may be a typical Motor driver or Motor Driver IC that permits DC motor to drive on either direction. L293D is a 16-pin IC which may manages a group of 2 DC motors at the same time in all direction. It means you'll be able to management 2 DC motor with one L293D IC. It works on the conception of H-bridge. H-bridge is a circuit which is flown in any direction which is permitted by the voltage. The voltage got to amendment its direction for having the ability to rotate the motor in clockwise or anticlockwise direction. Thus H-bridge IC area unit ideal for driving a DC motor.
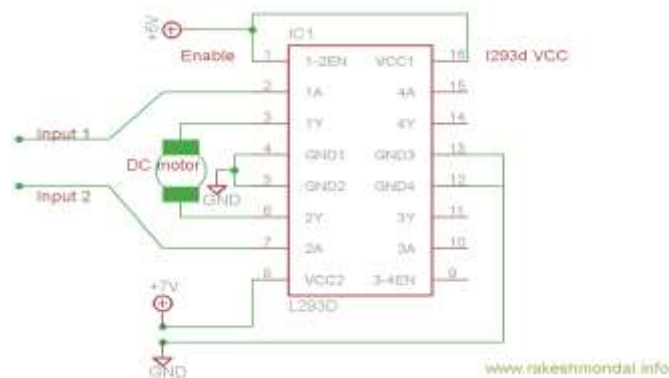

fig 1.3

1.3.1. MOTOR DRIVER (L298N)

L298N Drive. The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.The L293D IC receives signals from the microprocessor and transmits the relative signal to the motors. It has two voltage pins, one of which is used to

draw current for the working of the L293D and the other is used to apply voltage to the motors.

fig 1.3.1

1.4. HC-05 BLUETOOTH MODULE

A Bluetooth module is usually a hardware component that provides. A wireless product to work with the computer, HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband computers and other network devices over short distance without wires. Wireless signals transmitted with Bluetooth cover short distance, typically up to 30 feet (10 meters).It is achieved by embedded low cost transceivers into the devices. It supports on the frequency band of 2.45GHz and can support up to 721KBps along with three voice channels. This frequency band has been set aside by international agreement for the use of industrial, scientific and medical devices (ISM).rd.-compatible with 1.0devices.

fig 1.4

1.5. RACK AND PINION GEAR SYSTEM

Gear racks are utilized to convert rotating movement into linear motion. A gear rack has straight teeth cut into one

surface of a square or round section of rod and operates with a pinion, which is a small cylindrical gear meshing with the gear rack. Generally, gear rack and pinion are collectively called "rack and pinion". There are many ways to use gears. For example, as shown in the picture, a gear is used with the gear rack to rotate a parallel shaft. To provide many variations of rack and pinion, KHK has many types of gear racks in stock. If the application requires a long length requiring multiple gear racks in series, we have racks with the tooth forms correctly configured at the ends. These are described as "gear racks with machined ends". When a gear rack is produced, the tooth cutting process and the heat treatment process can cause it to try & go out of true. We can control this with special presses & remedial processes. There are applications where the gear rack is stationary, while the pinion traverses and others where the pinion rotates on a fixed axis while the gear rack moves. The former is used widely in conveying systems while the latter can be used in extrusion systems and lifting/lowering applications. As a mechanical element to transfer rotary into linear motion, gear racks are often compared to ball screws. There are pros and cons for using racks in place of ball screws. The advantages of a gear rack are its mechanical simplicity, large load carrying capacity, and no limit to the length, etc. One disadvantage though is the backlash. The advantages of a ball screw are the high precision and lower backlash while its shortcomings include the limit in length due to deflection. Rack and pinions are used for lifting mechanisms (vertical movement), horizontal movement, positioning mechanisms, stoppers and to permit the synchronous rotation of several shafts in general industrial machinery. On the other hand, they are also used in steering systems to change the direction of cars. The characteristics of rack and pinion systems in steering are as follows: simple structure, high rigidity, small and lightweight, and excellent responsiveness. With this mechanism, the pinion, mounted to the steering shaft, is meshed with a steering rack to transmit rotary motion later (converting it to linear motion) so that you can control the wheel. In addition, rack and pinions are used for various other purposes, such as toys and lateral slide gates.

Fig 1.5

2. OPERATIONS

2.1. PLOUGH

The plough represents one of the major agricultural inventions in human history. The primary purpose of plough is to turn over the upper layer of the soil, bringing fresh nutrients to the surface, while burying weeds and the remains of previous crops and allowing them to break down. Plough is large farming implement with one or more blades fixed in a frame, drawn over soil to turn it over and cut furrows in preparation for the planting of seed.

2.2. SEED SOWING

Seed sowing is the process of scattering seeds over the ground for growing .seed sowing is held after plough. Seed sowing is plays crucial role in planting. Sowing machine should be suitable to all farms, all types of corps, robust construction, also is should be reliable, this is basic requirement of sowing machine. Thus we made sowing machine which is operated manually but reduces the efforts of farmers thus increasing the efficiency of planting also reduces the problem encountered in manual planting. For this machine we can plant different types and different sizes of seeds also we can vary the space between two seeds while planting. This also increased the planting efficiency and accuracy. We made it from raw materials thus it was so cheap and very usable for small scale farmers. For effective handling of the machine by any farmer or by any untrained worker we simplified its design. Also its adjusting and maintenance method also simplified.

2.3. WATER SPRINKLING

The first use of sprinkler by farmers was some form of home and golf course type sprinklers. These ad hoc systems, while doing the job of the buried pipes and fixed

sprinkler heads, interfered with cultivation and were expensive to maintain. In the 1950s a firm based in Portland, Oregon *Stout-Wyss Irrigation System*, developed the rolling pipe type irrigation system for farms that has become the most popular type for farmers irrigating large fields. With this system large wheels attached to the large pipes with sprinkler heads move slowly across the field.

2.4. LEVELLER

Land Leveller is an important equipment that is used for farming and agriculture with a purpose to level the land. We are pioneer in the manufacturing of excellent quality Land Leveller with an affordability of price too. Heavy Duty Land Leveller and Laser Guided Land Leveller. In order to make the best selection, we make you understand the complete uses of Land Leveller.

3. SOFTWARE USED (ARDUINO 1.8.8)

The Arduino integrated development environment(IDE) is a cross-platform application (for Windows, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino board. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main()into an executable cyclic executive program with the GNU tool 1 chain, also included with the IDE distribution. The Arduino IDE employs the program argued to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware. The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open source software. Arduino programming language can be divided in three main parts: structure, values (variable sand constants), and functions. The Arduino Reference text is licensed under a Creative Commons Attribution-Share Alike 3.0 License. Arduino is activated by writing code in the Arduino programming language and using the Arduino development environment.

4. ARDUINO LINE DIAGRAM
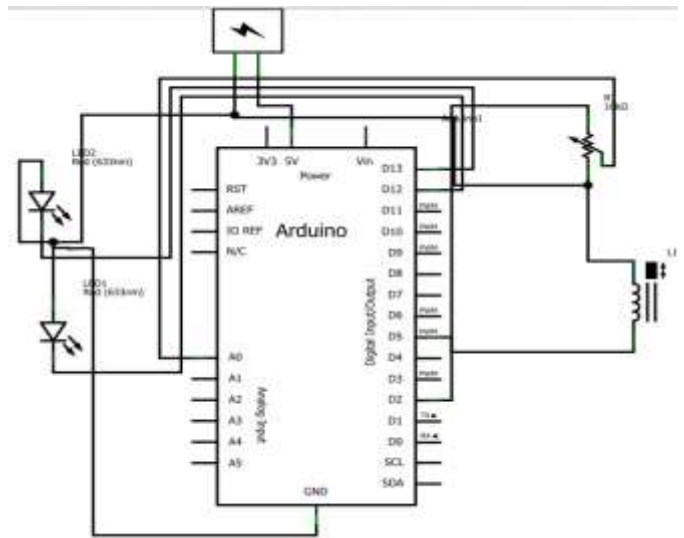
5.PROGRAMMING AND ARUDINO

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes pre burned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega8U2 firmware source code is available. The ATmega8U2 is loaded with a DFU boot loader, which can be activated by connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2. You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU boot loader). See this user-contributed tutorial for more information.

6. ARDUINO OVERCURRENT PROTECTION

The Arduino Uno has a resettable poly fuse that protects your computer's USB ports from shorts and over current. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed. Physical Characteristics The maximum length and width of the Uno PCB are 2.7 and 2.1

inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil(0.16"), not an even multiple of the 100 mil spacing of the other pins.

7. MIT APP INVENTOR

From the MIT App Inventor website we need to log in into the online building application by clicking the "Create apps!" button. In order to log in we need to have a Gmail account. Once we are logged in now we can create our first project. Here's how the design window looks and now we can start building our application. But before do that, we can connect our smart phone to this project so that we can see how the app is taking shape directly on our smart phone in real time. In order to do that first we have to download the MIT AI2 Companion app from the Play Store and install it on our smart phone. Then from the Connect menu from the online editor we will select AI Companion and a barcode will appear which we just need to scan it or insert the code into the smart phone app and the connection between the online editor and the smart phone app will be established.

8. CONCLUSION AND FUTURE SCOPE

The current review presented the necessity advantages, application and success stories of using agribots in agriculture. This paper has presented the usage and outcome of using robots in agriculture. This paper tries to enhance knowledge on using agri bots instead of farmers especially in developing countries like india, parague ,Albania ,guinea etc. In the coming years, smart farming is projected to create a massive impact on the agricultural economy by bridging the gap between small and large-scale businesses. The trend is not only pertinent in developed countries — developing countries have also realized its immense importance as well. In countries such as China and India, wide-scale deployments of smart phones and internet of things (IOT) systems have led to a rapid adoption of precision agriculture solutions. The governments of several countries have also realized the need for, and the advantages of these technologies, and thus, their initiatives to promote precision farming techniques are expected to drive the growth of the market further. However, such revolutionary changes in farming practices not only come with opportunities but also certain challenges which prove to be a restraint in the growth of the market. The awareness and knowledge about newer agriculture technology are yet to spread extensively, especially in emerging countries. According to the report, in 2017, the hardware systems solution segment held more than 72% of the total global smart farming market. The precision crop farming application currently holds the largest market share of over 31%. Companies in the market offer a variety of solutions for several types of precision crop farming applications such as precision irrigation, yield monitoring and forecasting, variable rate application, crop scouting, and recording keeping, among others. Precision irrigation products have been a major contributor to the large market share of precision crop farming. With the growing need for the appropriate use of agricultural inputs, variable rate application products in the market are expected to propagate the growth of the precision crop farming market in the next five years. The introduction of autonomous milking robots into milk harvesting is expected to augment the growth of smart agriculture in the livestock sector. In addition, growing urbanized areas and the increasing demand for fresh agricultural produce all year round shall propagate the growth of indoor farming.

9. REFERENCES

1. https://www.robotics.org/blog-article.cfm/Robotics-in-Agriculture-Types-and-Applications/74