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# Development of an IOT Based Automatic Robot for Agricultural Applications

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**ABSTRACT:** Agriculture is the most important sector for survival of living organisms. The history of agriculture shows that techniques in agriculture improved gradually. There is a huge gap between technologies what we have and present agricultural techniques in India. Here we develop a robot which will automatically do seeding process. The robot also identifies the growth of crops for cultivation. Thus, the robot set up will have automatic cultivating system along with the robot. So that the final yield can be more efficient and easy to use. This project is implemented using ARDUINO UNO development board with IOT module.

**KEYWORD:** ARDUINO UNO ,ESP32 Camera, IOT module, DC MOTOR.

## I. INTRODUCTION

Day by day, the Electronics and Electrical industry develops the different systems as per requirement of people. So as an Engineer, we always think about the need of people and try to complete that requirement. So as per requirement of society we design this system, which is a combination of different subsystems and using this subsystem we can produce this important and intelligent device. This project which can help the people in different problematic condition between Agricultural farming and pesticide spraying. Agricultural is one of our most important industry for providing food, feed and fuel necessary for our survival. Certainly, robots are playing an important role in the field of agriculture for farming process autonomously. Normally, farming process include planting, irrigation, fertilization, monitoring and harvesting of a crop of any kind.

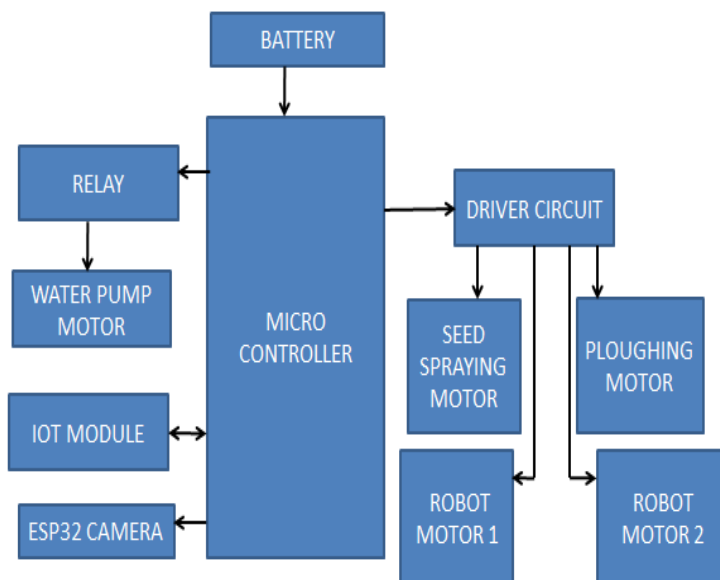
## II. WORKS RELATED

- In this section, we briefly review the purposed system we are going to design a agriculture robot it is used to reduced farmers stress and also save time.
- ARDUINO UNO is used for this robot it control the entire functions and also embedded c language is used to built a program for robot.
- The robot set up will have automatic cultivating system along with the robot.
- First in this robot is used to do seeding process but the control is is not automatically.
- Because the control of robot is manual.so, that's why we are implement IOT module
- IOT module is used to control the robot through mobile application.
- And also we implement Esp32 camera to monitor the field in live video streaming through mobile screen.

## III. PROPOSED SYSTEM

Aim of purposed system is used a robot. It is used to help farmers to reduce stress. ARDUINO UNO is used to control robot do automatic seeding and cultivation process but the control are manually.so we use IOT module to built the robot it used to control the robot through mobile application.

**BLOCK DIAGRAM**



**ARDUINO UNO:**



**Arduino UNO**

The ATmega2560 is a Microcontroller and operating voltage of this microcontroller is 5volts, recommended Input Voltage will range from 7volts to 12volts input voltage will range from 6volts to 20volts The digital input/output pins are 54 where 15 of these pins will supply PWM o/p. Analog Input Pins are 16 DC Current for each input/output pin is 40 mA DC Current used for 3.3V Pin is 50 mA Flash Memory like 256 KB where 8 KB of flash memory is used with the help of boot loader.

**IV. RELAY BOARD**

A relay is an electromechanical switch which is activated by an electric current. A four relay board arrangement contains driver circuit, power supply circuit and isolation circuit. A relay is assembled with that circuit. The driver circuit contains transistors for switching operations. The transistor is use for switching the relay. An isolation circuit prevents reverse voltage from the relay which protects the controller and transistor from damage. The input pulse for switching the transistor is given from the microcontroller unit. It is used for switching of a four device.

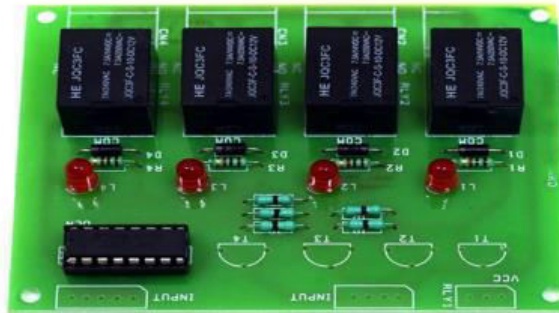
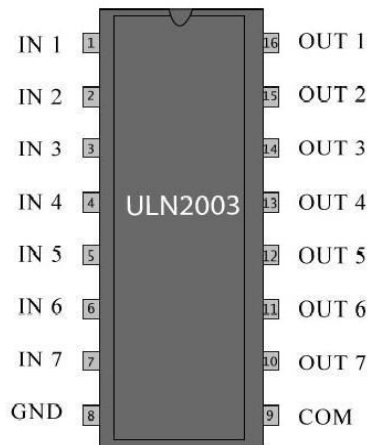


Fig . Relay board

### V. DRIVER CIRCUIT

The ULN2003 is a monolithic high voltage and high current Darlington transistor arrays. It consists of seven NPN Darlington pairs that feature high-voltage outputs with common-cathode clamp diode for switching inductive loads. The collector-current rating of a single Darlington pair is 500mA. The darlington pairs may be paralleled for higher current capability. Applications include relay drivers, hammer drivers, lamp drivers, display drivers (LED gas discharge), line drivers, and logic buffers. The ULN2003 has a 2.7kW series base resistor for each Darlington pair for operation directly with TTL or 5V CMOS devices.



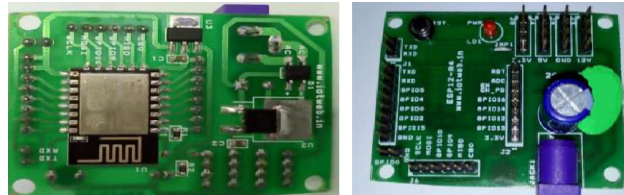
### VI. DC MOTOR:

Geared dc motors can be defined as an extension of dc motors. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. A DC motor can be used at a voltage lower than the rated voltage. But, below 1000 rpm, the speed becomes unstable, and the motor will not run smoothly.



Fig DC Motor

## VII. IOT

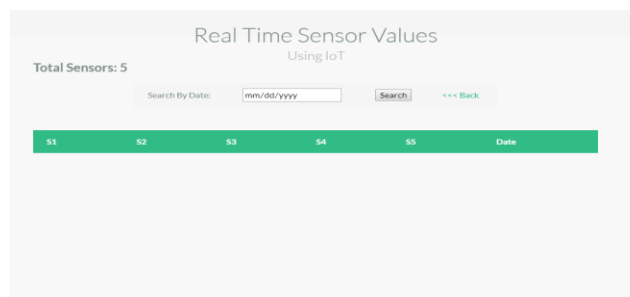


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The Internet of things (IoT) is the network of everyday objects — physical things embedded with electronics, software, sensors, and connectivity enabling data exchange. Basically, a little networked computer is attached to a thing, allowing information exchange to and from that thing. Be it lightbulbs, toasters, refrigerators, flower pots, watches, fans, planes, trains, automobiles, or anything else around you, a little networked computer can be combined with it to accept input (especially object control) or to gather and generate informational output (typically object status or other sensory data).

This means computers will be permeating everything around us — ubiquitous embedded computing devices, uniquely identifiable, interconnected across the Internet. Because of low-cost, networkable microcontroller modules, the Internet of things is really starting to take off.

## VIII. WEB SERVER



Espresso's ESP8266EX delivers highly integrated Wi-Fi SoC solution to meet users' continuous demands for efficient power usage, compact design and reliable performance in the Internet of Things industry. With the complete and self-contained Wi-Fi networking capabilities, ESP8266EX can perform either as a standalone application or as the slave to a host MCU. When ESP8266EX hosts the application, it promptly boots up from the flash. The integrated high speed cache helps to increase the system performance and optimize the system memory. Also, ESP8266EX can be applied to any microcontroller design as a Wi-Fi adaptor through SPI / SDIO or I2C / UART interfaces. ESP8266EX

integrates antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules. The compact design minimizes the PCB size and requires minimal external circuitries. Besides the Wi-Fi functionalities, ESP8266EX also integrates an enhanced version of Tensilica’s L106 Diamond series 32-bit processor and on-chip SRAM. It can be interfaced with external sensors and other devices through the GPIOs. Software Development Kit (SDK) provides sample codes for various applications.

Espressif Systems’ Smart Connectivity Platform (ESCP) enables sophisticated features including fast switch between sleep and wakeup mode for energy-efficient purpose, adaptive radio biasing for low-power operation, advance signal processing, spur cancellation and radio co-existence mechanisms for common cellular, Bluetooth, DDR, LVDS, LCD interference mitigation.

### IX. WEB SERVER: Controlling Section

#### Smart IOT Based Load Control

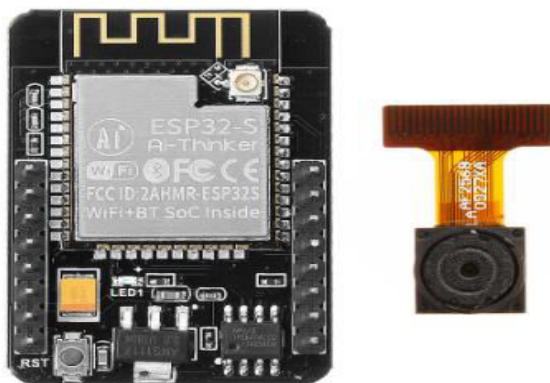


### APPLICATIONS

- Online Traffic monitoring
- Online Health monitoring
- Real time Transport and Logistics monitoring
- Daily life and domestics

### X. ESP32 WIFI CAMERA

The ESP32 CAM WiFi Module Bluetooth with OV2640 Camera Module 2MP For Face Recognition has a very competitive small-size camera module that can operate independently as a minimum system with a footprint of only 40 x 27 mm; a deep sleep current of up to 6mA and is widely used in various IoT applications. It is suitable for home smart devices, industrial wireless control, wireless monitoring, and other IoT applications. This module adopts a DIP package and can be directly inserted into the



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package and can be directly inserted into the backplane to realize rapid production of products, providing customers with high-reliability connection mode, which is convenient for application in various IoT hardware terminals. ESP integrates WiFi, traditional Bluetooth, and BLE Beacon, with 2 high-performance 32-bit LX6 CPUs, 7-stage pipeline architecture. It has the main frequency adjustment range of 80MHz to 240MHz, on-chip sensor, Hall sensor, temperature sensor, etc.

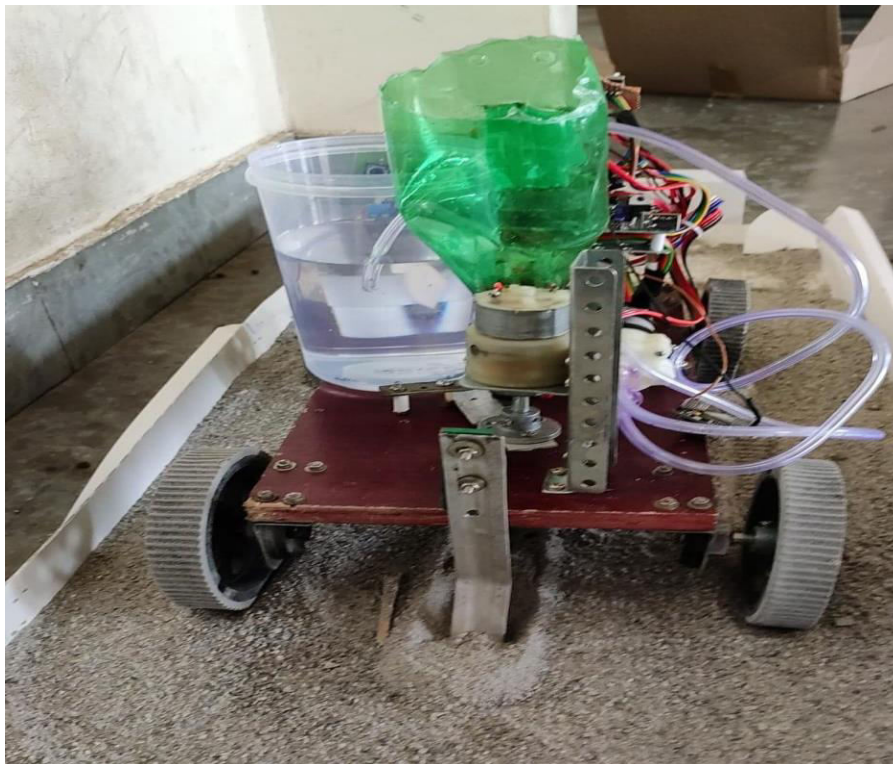
### XI WATER PUMP MOTOR

A pump motor is a DC motor device that moves fluids. A DC motor converts direct current electrical power into mechanical power. DC or direct current motor works on the principal, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. This is known as motoring action. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid. Pumps operate via many energy sources, including manual operation, electricity, engines, or wind power, come in many sizes, from microscopic for use in medical applications to large industrial pumps.



Water pump motor

### RESULT



We Implement the ARDUINO UNO To built autonomous agriculture robot for help the farmer to reduce the stress.



## XII. CONCLUSION

Automated seeding and cultivating system is very important for any farmer while growing crops in the farm. Thus, developing a automated Seeding System would help farmers in establishing a integrated system with more time efficiency and IOT module for Monitoring Purposes. Thus it would help being a great leap in developing and Uplifting the Farmers Society.

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