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Solar Energy Based Multipurpose Agriot Using IOT

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ABSTRACT: Modern farming methods are desperately needed in India, where agriculture supports over 70% of the population. This entails utilizing technology to automate a variety of chores, including plowing, spraying pesticides, cutting grass, and planting seeds. India's agriculture sector may greatly increase productivity while lowering its reliance on labor-intensive manual operations by adopting automation. The creation of user-friendly agricultural robots that make use of Internet of Things (IoT) technology is one suggested way to meet this need. With the help of sensors and a web interface, users would be able to remotely monitor crop conditions and control particular tasks using these robots. By enabling autonomous farming processes, this development in agricultural robots offers a promising chance to completely transform farming techniques. Agricultural robots are becoming more commonplace.

I. INRODUTION

Innovative technology integration is essential in today's dynamic agricultural environment to address the many issues that farmers throughout the world confront. The creation of a multifunctional solar agriculture robot that makes use of the Internet of Things (IoT) is one such innovative approach. This next-generation robot offers an effective and sustainable farming method, thereby bringing about a paradigm shift in agricultural methods.

The robot's use of solar energy allows it to function with little negative influence on the environment, lowering its need on fossil fuels and promoting sustainable farming methods. Because of its versatile capability, it can handle a variety of duties on a single platform, including pest control, crop monitoring, soil cultivation, and seed sowing.

Moreover, farmers are able to remotely monitor and manage agricultural operations at any time and from any location thanks to the seamless connectivity and real-time data transfer made possible by the incorporation of IoT technology. Because of this connectivity, data-driven decision-making is made easier, which maximizes resource use and raises productivity levels all around.

We will examine the many uses and advantages of the multifunctional solar agriculture robot in this introduction, emphasizing its potential to transform farming methods and enhance global food security in a world that is becoming more resource-constrained and dynamic by the day.

II. LITERATURE SURVEY

The concept of an AGRIBOT, an agricultural robot, was developed to help farmers carry out various tasks that are essential for productive farming operations. Using solar power, this AGRIBOT attempts to simplify a number of agricultural chores, such as planting seedlings, cultivating land, applying liquid droplets precisely to crops, cutting the grass, and identifying obstacles[1].

To reduce labor-intensive tasks and increase agricultural output, the suggested system incorporates Internet of Things (IoT) technologies with an emphasis on robotics and precision farming[2].

The goal of development is to produce a multipurpose agricultural tool that can effectively carry out necessary operations such as seeding and excavating soil. Compactness and mobility to traverse a variety of agricultural settings are prioritized in the design [3].

A multifunctional autonomous agricultural robotic vehicle driven by Internet of Things technology is part of the proposed system. It has sensors that measure various aspects of the soil and spray pesticides according to the height and location of the plants. Furthermore, the robot has the ability to seed at the ideal depths and spacing [4].

The system's essential parts are sensors for soil moisture and temperature, as well as a pump that controls water flow in response to sensor readings. This makes it possible to precisely monitor and regulate crop growth by modifying the water supply using a motor [5].

The multifunctional agricultural robot is battery-operated and can perform tasks including leveling, excavating soil, and autonomously applying fertilizer and water [6].

The goal of the design and development is to build a solar-powered robot that can spray pesticides, mow grass, and plant seeds. The robot is operated by means of an Android application, which provides commands to carry out different functions and motions necessary for productive farming practices [7].

III. METHODOLOGY

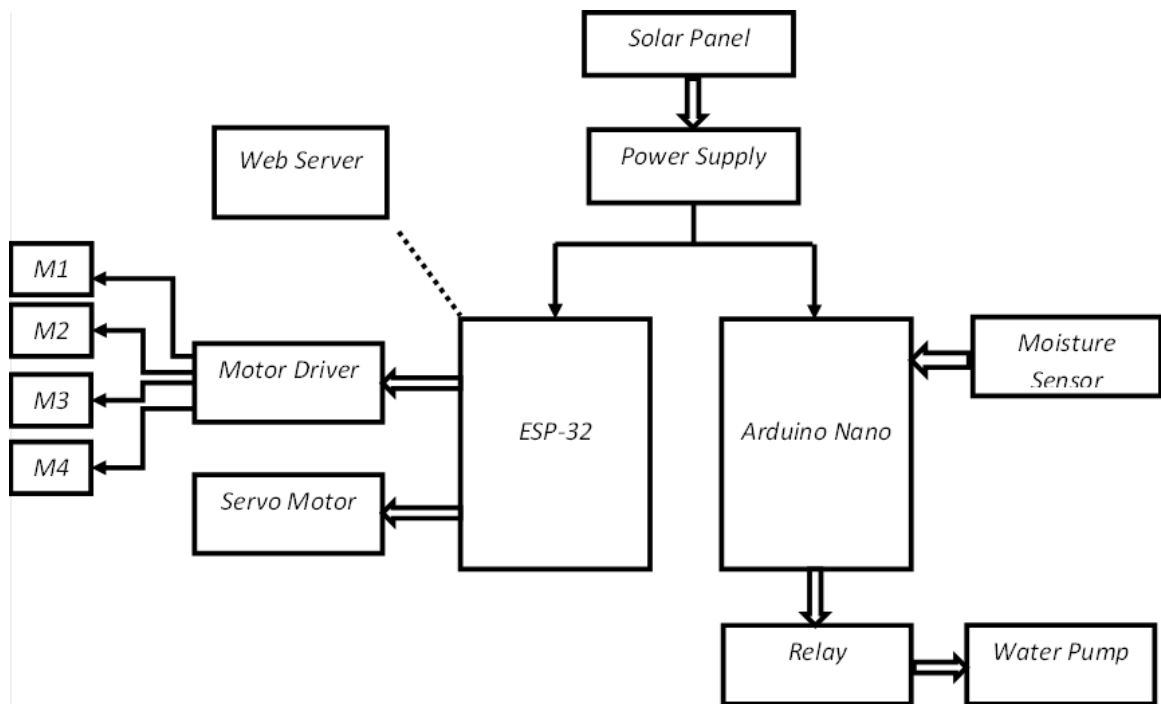


Fig (a) Workflow

The suggested system's block diagram is displayed in figure(a) above. It has a solar panel inside that is utilized for charging. The robot can run later on the power that the solar panels charge and store in the batteries. Connecting the ESP-32 to the mobile phone's web server allows it to be used to control many functions, like controlling the robot's movement and opening and closing the servo motor gate to plant seeds. The Arduino Nano is utilized to regulate several functions, including water spraying relay on/off and off, PH and moisture sensor.

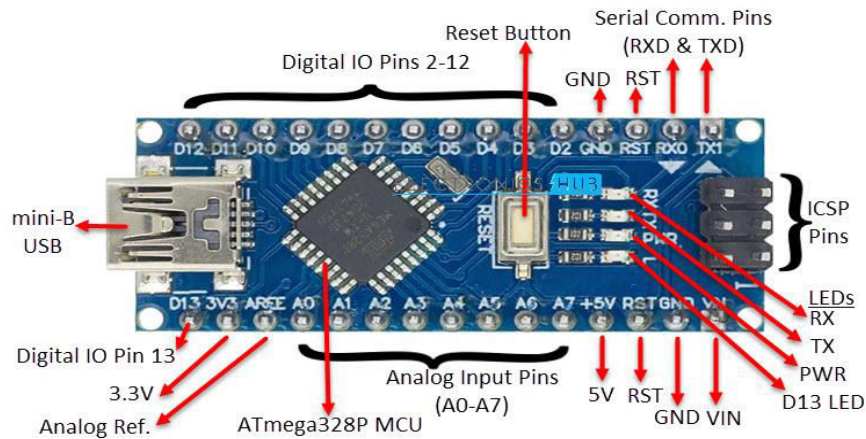
ESP 32



Fig (b) AgriBot

A line of low-cost, low-power system-on-a-chip microcontrollers featuring dual-mode Bluetooth and integrated Wi-Fi is called ESP32. The ESP32 series incorporates built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. It uses either a TensilicaXtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor, or a single-core RISC-V microprocessor. The Shanghai-based Chinese business Espressif Systems designed and developed ESP32, which is produced by TSMC utilizing their 40 nm technology. It is the ESP8266 microcontroller's replacement.

ARDUINO NANO



The suggested system's block diagram is displayed in figure 3.1 above. It has a solar panel inside that is utilized for charging. The robot can run later on the power that the solar panels charge and store in the batteries. Connecting the ESP-32 to the mobile phone's web server allows it to be used to control many functions, like controlling the robot's movement and opening and closing the servo motor gate to plant seeds. The Arduino Nano is utilized to regulate several functions, including water spraying relay on/off and off, PH and moisture sensor.

IV. EXPERIMENTAL RESULTS



Fig(b)Solar Power

V. CONCLUSION

The Internet of Things-based, solar-powered, multipurpose agribot offers a productive and ecological answer for contemporary farming. This creative Agribot provides uninterrupted operation in remote regions while minimizing its influence on the environment by utilizing solar energy. This project is a big step toward tackling the issues facing the farming industry, encouraging sustainability, and realizing the potential of renewable energy to influence farming methods in the future.

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