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Title **Control a water pump with different time slots using a Bluetooth module and solar energy for power**

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Control a water pump with different time slots using a Bluetooth module and solar energy for power.

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Abstract— **Modern technologies are becoming more and more important in today's fast-paced society, particularly in the field of agriculture. These technologies are enabling smart agricultural methods that are changing how farmers approach their work and making it more productive, efficient, and sustainable. We're thrilled to present a novel solar-powered water pump with a Bluetooth module that has many time slots because of this. With the help of this creative innovation, farmers may remotely manage irrigation systems via mobile devices; no physical labor is needed. Farmers may enhance crop yields, save time, and experience greater convenience with this state-of-the-art equipment. The goal of this project is to lessen the challenges involved in manually turning a pump on and off at different times. The pump is operated by a mobile app; an integrated real-time clock measures the passing of time and turns the pump on and off automatically. In addition, an LCD is interfaced to display the time, and a solar panel is used to charge the battery.**

Keywords— Solar Panel, Batteries, Arduino UNO, RTC, LCD, HC-o5 Bluetooth, Motor.

I. INTRODUCTION

The fluctuating annual demand for irrigation water must be taken into consideration by a solar-powered pumping system. Because of its endurance and long-term economic benefits, solar-powered systems are chosen above other alternative energy sources in developing nations. For rural areas in developing nations with abundant solar radiation but no access to grid electricity, solar-powered water pumping systems are perfect. These systems don't require fuel or a lot of maintenance to supply basic needs like drinking and agricultural water. Over 240 individuals can receive water from a sizable solar-powered water pumping system. The main power source for the water pump is a solar panel, which also charges a battery. The charging and current transmission rates are managed by a different circuit. The recommended approach uses a battery that powers the water pump after it is fully charged, guaranteeing that the pump runs on schedule. The load in the block diagram is linked to a relay, which turns it on. An extra feature of the system allows for more effective control of the water pump's on/off duration. A real-time clock can be connected to do this.[1]

II. EXISTING METHODOLOGY

In agriculture, water pumps are required for watering and irrigation. The water pumps use DC or AC. The pumps were once powered by a power supply; however, there were frequent power outages back then. When power is available, they must often operate or turn on the pumps. To overcome power outages, water pumps have recently been powered by solar panels; nevertheless, they must run the pump manually by traveling to the field, which is fairly challenging.

III. PROPOSED BLOCK DIAGRAM

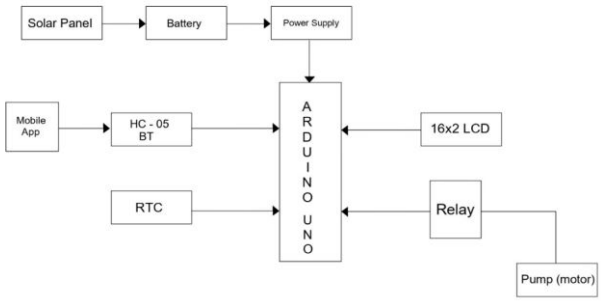

Fig.1. Block Diagram of Control a water pump with different time slots using a Bluetooth module and solar energy for power

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IV. PROPOSED METHODOLOGY

We aimed to enhance the existing methodology by adding more features to address the challenges of manually operating the water pump when turning it on and off. To achieve this, we proposed a project named " Control a water pump with different time slots using a Bluetooth module and solar energy for power " This project utilizes a Bluetooth or GSM module to operate the water pump based on predetermined time slots with varying durations at different periods. The duration of these time slots can be set using a mobile app or device. By adopting this method, the amount of human effort required is reduced, and the operation of the water pump is more precise. Furthermore, we can operate the pump from any location and at any time without any delays.

V. IMPLEMENTATION

In this prototype model, the pump has been replaced with a DC motor. The operation of the system is explained based on this modification.

A. Solar Panel

A solar panel is a device that converts sunlight into electricity using photovoltaic cells. This electricity can then be used to power various devices or stored in batteries for later use.[2]

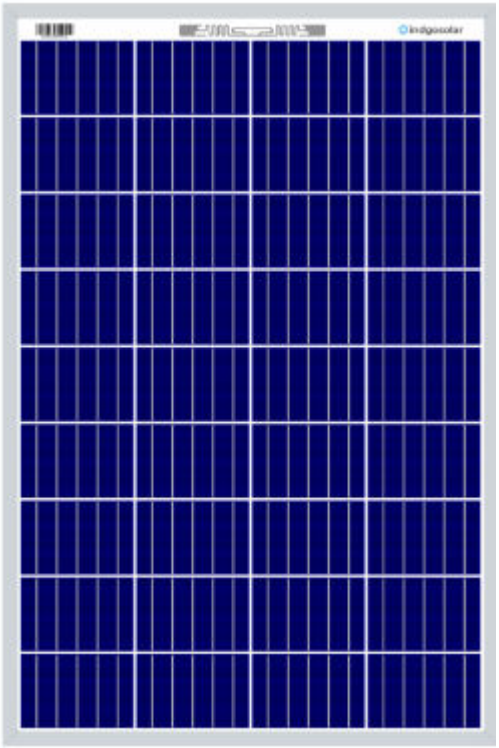

Fig.2. Solar Panel

B. Battery

The solar water pump control system's battery stores excess solar power for later use, ensuring continuous pump operation even during power interruptions and efficient power usage through scheduled intervals.

Fig.3. Battery

C. Arduino UNO

It is an ATmega328 microcontroller board that reads input signals and controls various operations, such as starting motors and sending messages through Bluetooth, based on the input value.

Fig.4. Arduino UNO

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D. LCD

A 16x2 LCD system information, time, set time slots, and pump status (on/off). The user can conveniently monitor and control the system using the LCD interface.[2]

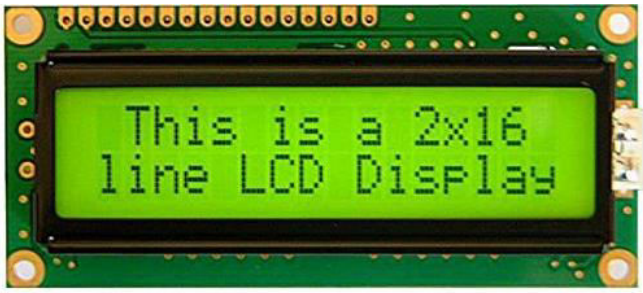

Fig.5. Liquid Crystal Display

E. RTC

The Real-Time Clock module is a component found in electronic devices that maintains the present time and date, even in the absence of power to the device.

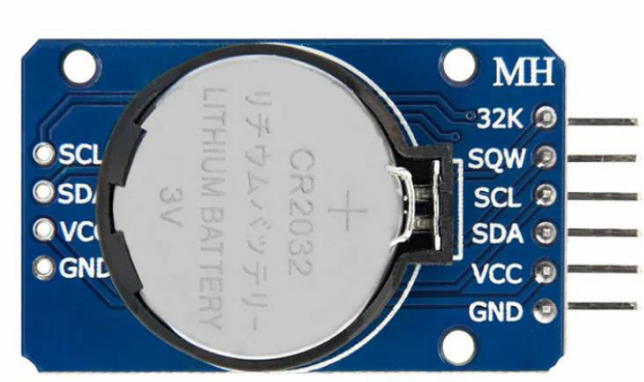

Fig.6. Real Time Clock

F. Relay

A relay is an electrical switch that can be controlled by a low-voltage signal, typically from a microcontroller or similar device. It uses an electromagnet to mechanically open or close its contacts, allowing it to control the flow of higher voltage or current to other devices or circuits.

Fig.7. Relay

G. Hc-05 Bluetooth

The HC-05 BT (Bluetooth) module is a wireless communication device that enables data transmission between electronic devices over short distances. It uses Bluetooth technology to establish a connection and can operate in either master or slave mode.[3]

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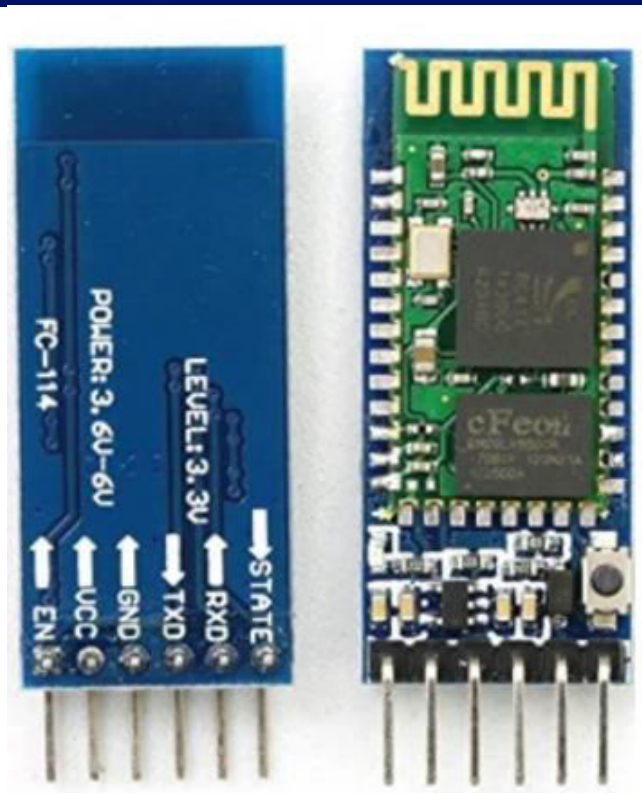

Fig.8. Bluetooth Module

H. Motor

The motor is used to regulate the operation of the water pump according to specific schedules or time intervals.

Fig.9. Motor

VI. WORKING

The process of controlling a water pump using a Bluetooth module and solar energy involves a detailed procedure that combines hardware components, programming, and renewable energy technology. The system begins by collecting solar energy through the solar panel, which charges the battery to ensure a continuous power supply. The Arduino Uno reads the current time from the RTC module and compares it with the predefined time slots programmed into the system. Once it's time to activate the water pump according to the schedule, the Arduino triggers the relay to turn on the 12V motor. The motor then starts pumping water from the source (such as a well or reservoir) to the designated irrigation area. Users can remotely monitor and control the system using a smartphone app through Bluetooth connectivity. They can adjust the pump's schedule or check the system's status as needed.[4]

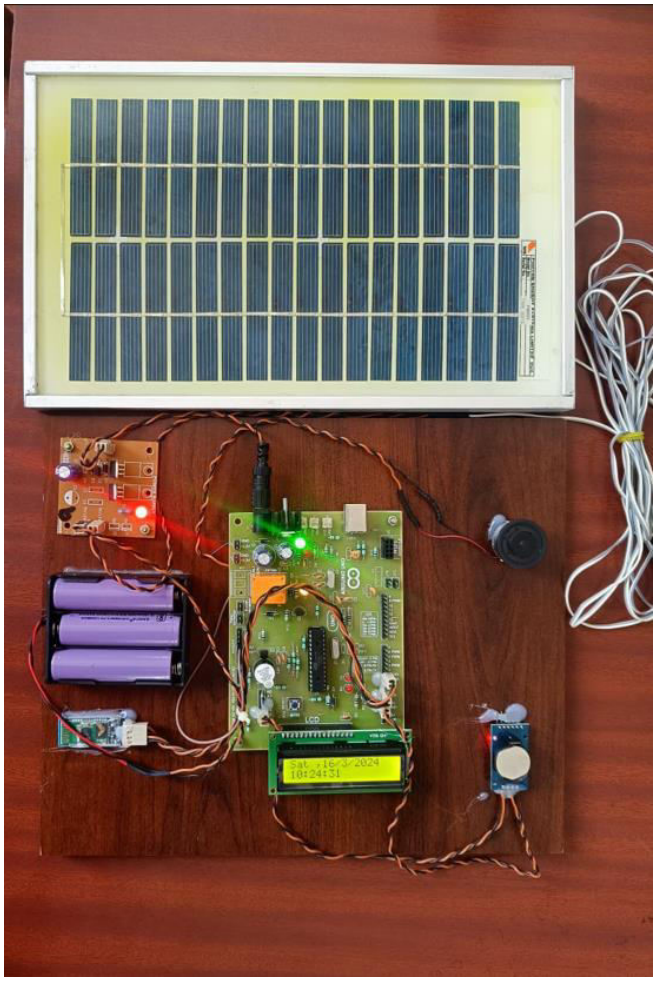

Fig.10. Prototype model of Control a water pump with different time slots using a Bluetooth module and solar energy for power.

VII. RESULT

The implementation of a water pump control system utilizing a Bluetooth module and solar energy has yielded promising results. By harnessing the power of solar energy, the system operates efficiently while minimizing environmental impact and reducing operational costs associated with traditional energy sources. The integration of a Bluetooth module allows for remote monitoring and control, providing users with increased flexibility and accessibility. Through this setup, the water pump can be scheduled to operate at different time slots, optimizing water distribution and ensuring that irrigation needs are met effectively. This functionality is particularly valuable in agricultural settings, where precise timing of water delivery is crucial for crop health and productivity. Overall, the combination of solar energy and Bluetooth technology presents a sustainable and practical solution for controlling

water pumps, offering benefits such as reduced reliance on grid electricity, enhanced remote management capabilities, and improved efficiency in water resource utilization.

VIII. CONCLUSION

In conclusion, utilizing a Bluetooth module in conjunction with solar energy to control a water pump across various time slots offers a sustainable and efficient solution for managing water resources. By harnessing solar power, the system not only reduces reliance on traditional energy sources but also minimizes operational costs and environmental impact. The integration of Bluetooth technology enables remote monitoring and control, enhancing flexibility and accessibility for users. This innovative approach holds significant promise for optimizing water distribution in agricultural, rural, and remote areas, ultimately contributing to improved resource management and sustainable development.

IX. REFERENCES

[1] [1]D Shyamnath Rao, [2] Sayed Mahaboob, [3] Kahkashan Sharab, "Solar water pump control with four different time slots for power saving applications," [1] Associate Professor, Department of Electrical and Electronics Engineering, [2,3] Assistant Professor, Department of Electrical and Electronics Engineering, [1,2,3] Shadan College of Engineering and Technology. Peerancheru 500086 Telangana India.

[2] Dr V S Gupta, Ramjeet Pal, Pankaj Kumar Yadav, Prashant Kumar, Rajan Keshari, "Solar Water Pumping System with Automation," Galgotia College of Engineering and Technology.

[3] https://electrosome.com/hc-05-serial-bluetooth module/amp/#amp_tf=From%20%251%24s&aoh=17111694003913 &referrer=https%3A%2F%2Fwww.google.com

[4] Akshay Prajapati1, Ronak Rana2, Ashish Pathak3, Henal Bhagatwala4, "Solar water pump with smart time control for power saving application", 1,2,3 Students, Department of Electrical Engineering, 4Assistant professor, Department of Electrical Engineering, Vadodara institute of engineering, Kotambi, Vadodara -390018, Gujarat, India.

[5] https://www.researchgate.net/publication/325474819_Solar_Water_Pump_Irrigation_with_Different_Time_Slots