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AUTOMATIC SOLAR PANEL CLEANING SYSTEM

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ABSTRACT

Sun based control is basically saddled from photovoltaic (PV) boards which are orchestrated in multiple clusters in a sun oriented cultivate or sun based framework. In any case, the proficiency of vitality created from PV boards is influenced by the amassing of clean and flotsam and jetsam, indeed on one board in an cluster. Sun oriented panel is helpless to amassed clean on its surface. The effectiveness of the sun powered board slowly decreases since of clean aggregation. Here an Arduino based sun powered board cleaning framework is designed and actualized for tidy evacuation. An ESP 32 controller are utilized to screen the water level of tank and stickiness, temperature. Those all parameter is appeared on firebase cloud. The proposed sun based board cleaner is waterless, temperate and programmed. Exploratory comes about appear that the proposed cleaning framework can work with an productivity of 87-96% for distinctive sorts of sand. This condition leads to the require for normal cleaning of the surface of PV boards. Current labour -based cleaning strategies for photovoltaic clusters are exorbitant in time, water and vitality utilization as well as missing in robotization capabilities. To overcome this issue, a completely programmed sun based panel cleaning framework with water is proposed. The plan utilizes an Arduino controller framework to control the operations amid the cleaning prepare which cleans the clean on the surface of the sun powered panel and makes strides its productivity.

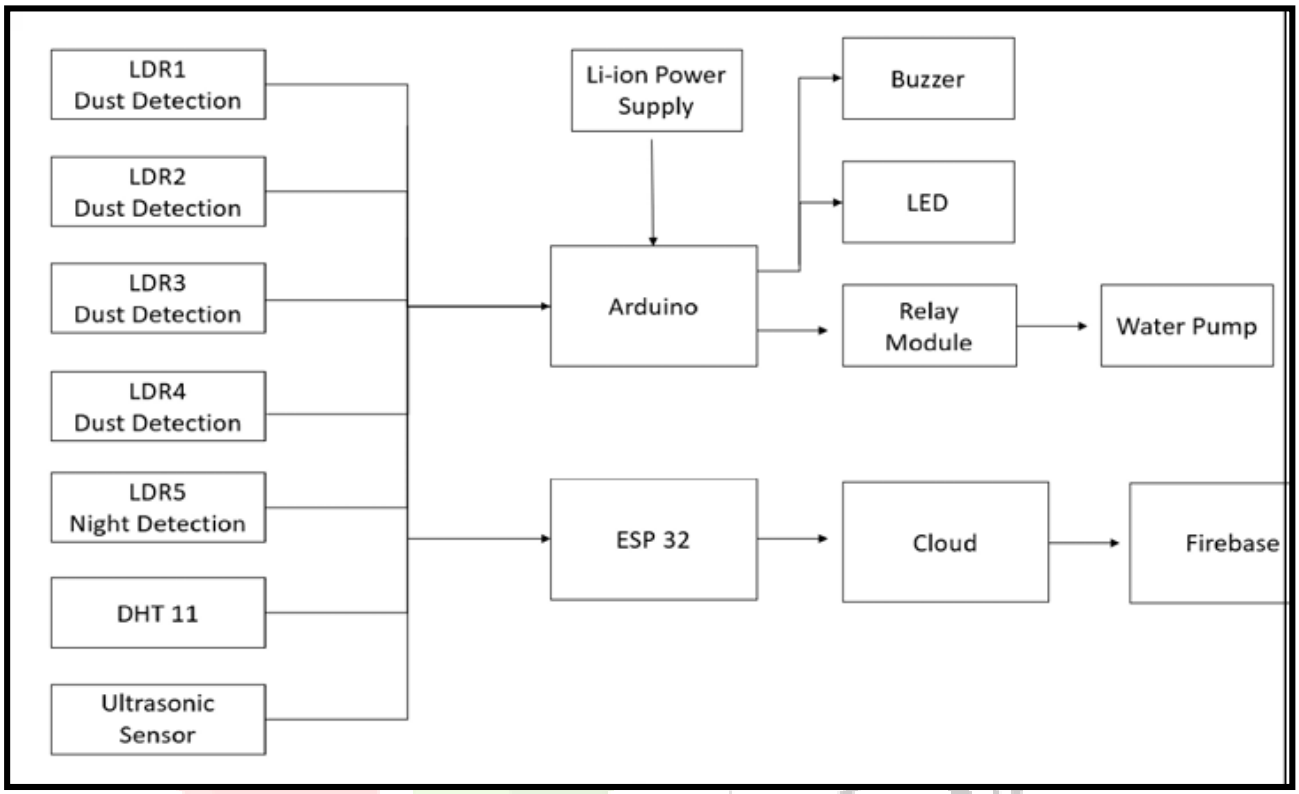
Keywords: Arduino, Cleaning System, Dust Accumulation, Efficiency, IOT, Water level.

I. INTRODUCTION (Font-Cambria, Bold, Font Size -12)

Solar energy can be crucial in ensuring a sustainable environment since it is a very renewable and safe for the environment energy source. Direct use of solar energy can produce electricity for a range of uses, including household, business, and industrial ones. You can supply the necessary amount of energy without putting your health or the environment in jeopardy because energy conversion does not produce any hazardous gases. Furthermore, the U.S. Department of Energy claims that the world's annual energy needs may be satisfied by the sun's total energy reaching the earth's surface in just 1.5 hours. The whole amount of fossil fuels stored on Earth is thought to be equivalent to the energy the sun's rays produce in about 18 days.

Renewable energy is a clean, non-polluting energy source that will likely grow more affordable, profitable, and cost-effective in the years to come. Rooftop solar panel capacity is rising, and usage has picked up speed recently. Installed on roofs or empty lots facing the sun are polycrystalline silicon solar panels, which react to sunlight by providing a mild electrical charge. The inverter receives the direct current that is produced when sunlight is converted into energy and transforms it into alternating current. All household appliances are powered by the main switchboard, which receives this alternating current (AC).

II. METHODOLOGY



The proposed dust detection system uses four LDR sensors to measure the analogue value of a 10k resister attached to the panel. The intensity of the LDR sensor is affected whenever dust is deposited on the panel, and we assess the amount of dust deposited on the panel based on that intensity.

The LDR sensor's intensity ranges from 0 to 1023. The system threshold is established at 800 because, in real time, as dust is deposited, the LDR's value rises above 800. The realay module linked to the Arduino Uno will turn on the water pump if any sensor reading exceeds 800. The realay module linked to the Arduino Uno will turn on the water pump if any sensor reading exceeds 800. For night detection, one LDR is employed. The alert will sound when the LDR intensity drops too much due to low brightness.

An ultrasonic sensor is used to determine the level of water; a three-step buzzer operates in different modes based on the level. The Firebase Platform displays the water level as well. The DHT11 sensor is used to measure temperature and humidity; when the temperature rises over 40.

when the water pump turns on. There are three phases for humidity; if the humidity rises beyond 50%, an alert will sound and an LED will turn on. The 5 volt DC water pump is turned on using a 5 volt relay module. The temperature, humidity, and water level are shown in real time and updated continuously in the Firebase platform. A Li-ion battery with a voltage of 7.4 volts is employed as the power source.

III. RESULTS AND DISCUSSION

The solar panel's surface has been thoroughly cleaned. The panel has been cleared of all dust and undesired particles that had gathered on its surface. Efficiency, or the solar panel's output, is higher following cleaning than it was prior to cleaning.

IV. CONCLUSION

Using readily accessible parts, an automated solar panel cleaning system is suggested and put into place. The suggested approach is affordable and just needs a small amount of cleaning supplies to complete the cleaning task. Without the need for human assistance, the technology automatically finds the dust on the surface and cleans the solar panel's surface. This suggested cleaning system works in two stages. First, sensors identify and remove dust and other undesired particles and debris from the panel's surface. Next, a water pump uses these sensors to clean the panel's surface By applying water under pressure, one can remove dust and other particles from the panel's surface using air blowing.

No brushes are used in the cleaning process. This feature guarantees the panel's safety by preventing any kind of damage or scratch throughout the cleaning procedure. The cleaning method can be adjusted to suit different situations, such as weather, panel area, and location, in addition to its experimental capabilities.

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