HARVEST AND PRIORTIZE EXCESS SOLAR POWER

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DEFINITION

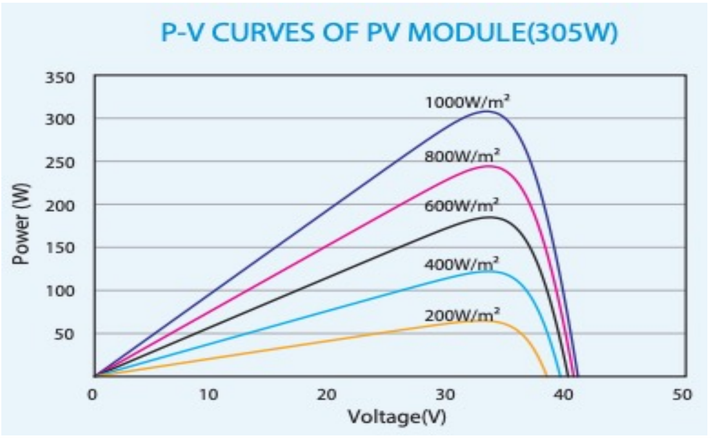
The objective is to develop a self-sufficient solution for water pumping and power supply in humanitarian scenarios where access to fresh water is limited. Existing solar panels and well pumps are durable and readily available. The project aims to create a compact and intelligent device that efficiently transfers power from solar panels to pumps. By using reliable components and incorporating fail-safe mechanisms, the device can be trusted to deliver water pumping with minimal maintenance and user intervention.

SYSTEM REQUIREMENTS

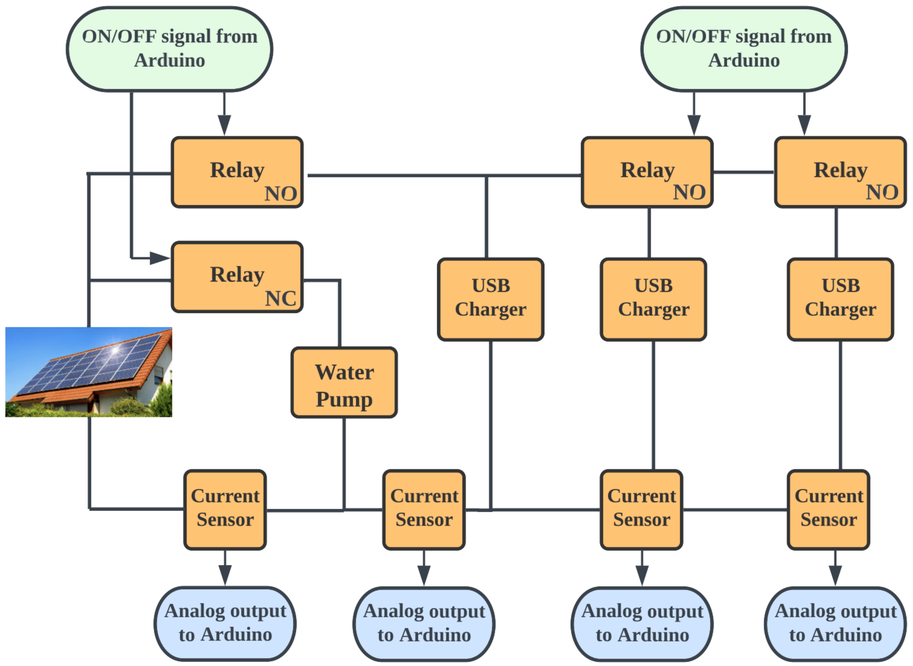
- For Solar Panel: Under STC: Wp=300W, Vamp=32.5V, Amp=9.1A. 1000W/m2, battery temperature 25°C, air quality AM1.5.
- Excess power is delivered to the auxiliary loads when more than the required amount is generated.
- Voltage to Arduino Uno should not exceed 5V.

DEVICE SHOULD BE:

- If failure, pump still receive power.
- Rugged, enduring water, weather, and dust.
- Lasts at least 10 years.
- Portable and user-friendly for target users.



IMPLEMENTATION



Current Sensor (ACS712):
The device measures real-time electrical current for precise power monitoring and control. This enables the microcontroller to detect excess power and efficiently distribute it to secondary loads.

Dual Channel Relay:
Device controls power flow between circuits, enabling selective routing to primary and secondary loads based on microcontroller signals and prioritization algorithm.

Arduino Microcontroller:
Device executes power management algorithms, coordinates component operations, and optimizes power distribution through relay switches based on current sensor inputs.

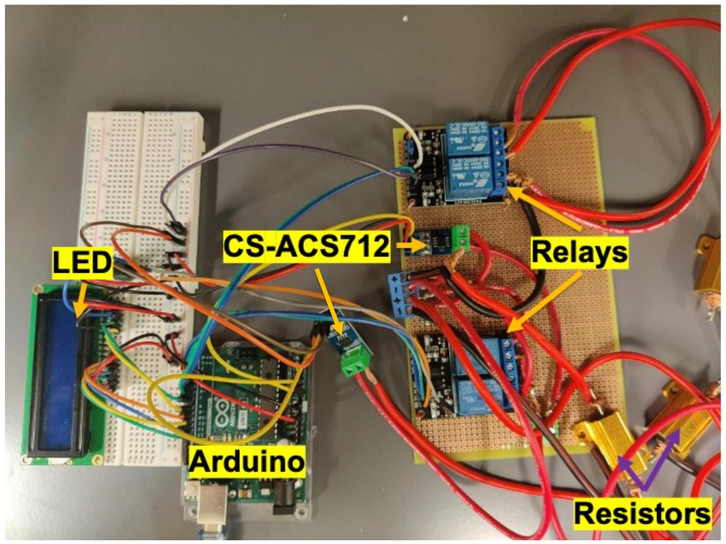
OLED Display:
Compact, high-resolution screen displays load status and receives signals from microcontroller for real-time monitoring in the prioritization device.

RESULT

- Our product aims to efficiently distribute solar energy to power water pumps and auxiliary loads, benefiting people living in barren environments.

Product Performance:

- Our system detects current and voltage to optimize energy distribution.
- OLED display shows branch energy levels for user-friendly understanding.



FUTURE PLAN, ACKNOWLEDEMENT & REFERENCES

- Optimized design ensures resilience against environmental conditions.
- Feasibility study on higher-capacity power source testing (2-3kW) for assessing performance in demanding conditions.
- Explore using excess power to charge external batteries, improving system efficiency.

Faculty: Sep Makhsous

Citation:

[1] Electro Peak. (n.d.). Interfacing 2.42-inch OLED SPI/I2C Display Module with Arduino. Retrieved from https://electropeak.com/learn/interfacing-2-42-inch-oled-spi-i2c-display-module-with-arduino/

[2] Trina Solar. (2018). Allmax M Plus Datasheet. Retrieved from https://static.trinasolar.com/sites/default/files/PS-M-0421%20Datasheet_Allmax%20M%20Plus_US_Apr2018_C.pdf

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