

Design of PJU-CAM Solar Cell Using ESP32-CAM to Increase the Availability of Lighting and Monitoring on the Mount Argopuro Evacuation Route

Risse Entikaria Rachmanita, S.Pd., M.Si. (*Thesis Supervisor*)

Muhammad Ridho Ardiansyah

Study Program of Mechatronic Engineering Technology

Engineering Department

ABSTRACT

Suci Village, located on the southern slopes of Mount Argopuro, faces limited lighting, especially on evacuation routes that are crucial for residents' mobility during emergencies. To address this issue, this study develops the PJU-CAM Solar Cell based on ESP32-CAM as a lighting and monitoring solution for the evacuation route. The system utilizes solar energy as its primary power source and is equipped with a PIR sensor for motion detection and an ESP32-CAM for image capture to enhance security. This research employs an experimental method with a quantitative approach. Testing was conducted at four installation points to evaluate the lighting performance and monitoring system. The results indicate that the LED lights on the PJU-CAM Solar Cell can produce illumination of 36–52 lux at a 0-meter distance and 15–22 lux at 1.5 meters, meeting the collector road standards. The PIR sensor detects motion within a range of 0–4 meters, while the ESP32-CAM captures images at a 2-megapixel resolution under adequate lighting conditions. The implementation of this system improves lighting availability and security along the evacuation route. By utilizing renewable energy, the PJU-CAM Solar Cell offers an eco-friendly and efficient solution, with the potential for application in other remote areas that lack electricity access.

Keywords : *ESP32-CAM, Evacuation Route, Public Street Lighting (PJU), Design and Development, Solar Cell.*