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RAK360-v2: SMART SOLAR DETECTOR

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ABSTRACT

Sunlight is an excessive source of energy and this energy can be harnessed successfully using solar photovoltaic (PV) panels and convert it into electrical energy. Therefore, the optimization of the solar system seems to be one of the biggest challenges as the static solar panel has limitations to charge the utmost number of battery life. Thus, the project development is to allow the maximum charging capability of the solar panel. To this end, this project main objective is to present a new approach to maximize solar energy generation and improving efficiency. Hence, to achieve the objectives, this project operated by two (2) solar trackers (Servo-1 and Servo-2) acted as a wheel and being installed to allow 360 degrees movement. The main solar system generates and charging the battery based on the quantity of radiation absorbs by the solar panel. By the flexible movement of the solar panel, the maximum output of the solar radiation can be optimized. Recognizing the gap of prior solar panel, internet of things (IoT) software IoT Solar Apps being installed to monitor the longevity of the battery through mobile phones. Notably, this project can be such as an alternative to reduced cost from electricity consumption and the usage can be induced including commercialization.

Keywords: solar energy, solar detector, solar tracking, internet of thing (IoT)

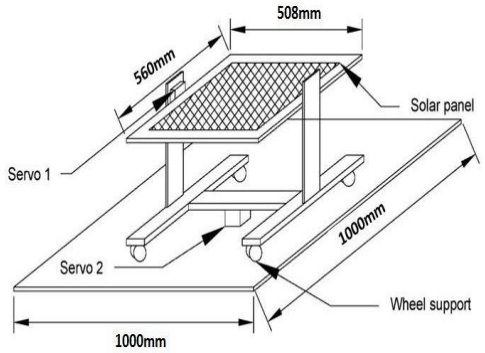
1. INTRODUCTION

Malaysia, as a tropical country has a very large intensity of solar irradiance and evenly distributed throughout the region. However, the energy has not been optimally utilized due to the absence of existing technology which unable to improve the efficiency of solar panels [1]. Since the amount of sunlight and the shading effect continuously change by the hour, a plan to maximize the amount of sunlight and minimize the shading effects to reduce power loss and increase the electricity generation must be established [2]. Hence, the proposed approach can provide the flexibility of sun tracking system control like cloud movements, obstacles and shadows detection, or measures of concentrated solar radiation, which can improve the system performance. Besides, the charging time required for the solar battery normally longer and needs manual monitoring that sometimes not a user- friendly. Therefore, to improve efficiency, a solar tracker with the installation of IoT comes into play. A similar project from the past [3] developed a Dual-Axis Solar Tracker also presents the advancements in the work of the solar tracking systems. However, the different designs and techniques imply demands higher maintenance costs and contain too complex design and control mechanisms.

2. MATERIAL AND METHOD

2.1. Details and Measurement

This project involved mechanical drives to orient the panel towards the sun's radiations by using the following components:



i. Solar Photovoltaic (PV) panel plate, approximate size: 508 mm (width) x 560 mm (length)
ii. Timber structure frame, approximate height: 750 mm
iii. SERVO Sensor (SERVO-1 & SERVO-2); to be attached or placed on side of solar panel and underneath/at the base of the equipment
iv. 360° wheels; to be synchronized and link with SERVO's sensors
v. Rechargeable Lithium-ion battery (12 volts)

Figure 1. RAK360's details measurement (not to scale)

2.2. Assembling Method

Figure 2 indicates the flow chart of the assembly process and the output of the project respectively.

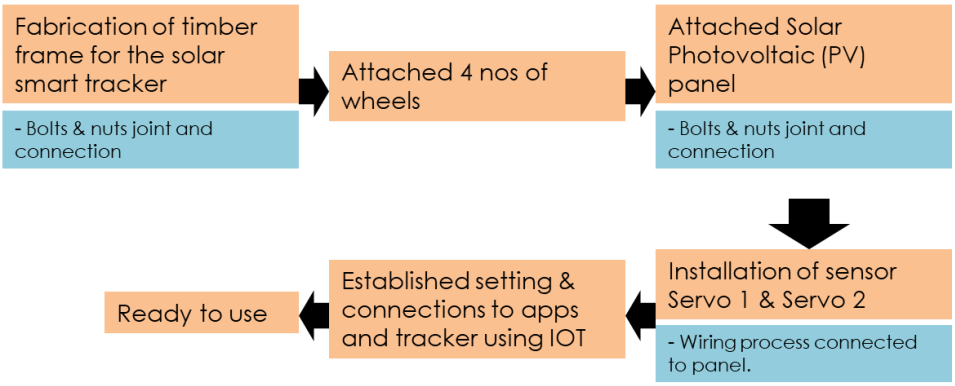


Figure 2. Flowchart of RAK360's assembly process

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