OPTIMISATION OF PHOTOVOLTAIC POWER GENERATION USING SOLAR TRACKING

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INTRODUCTION

In today's ever-connected world, the idea of Smart Cities is stepping into reality as the focus shifts from theory to actual development. Rapid rates of urbanisation and industrialisation have created a constant demand for energy. Renewable energy is becoming more popular day by day and the optimisation of energy harvest from these renewable sources would help us go a long way and support sustainability. IoT and data analytics help us bring forth a proposal to collect data in about real-time speed and build a system to reap the most out of the solar energy source we have today.

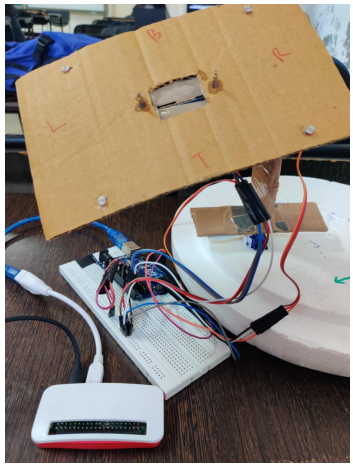
SCOPE OF PROJECT

- To obtain a solar panel that is able to obtain its maximum possible power for as long as possible.
- Enable a solar panel to track the sun and rotate and position itself accordingly such that no part of the solar array is covered by shade due to any obstructing factors.
- Implement a smart mechanical system to adjust the panel to a better angle and position to re-obtain maximum current and voltage therefore producing maximum power output.

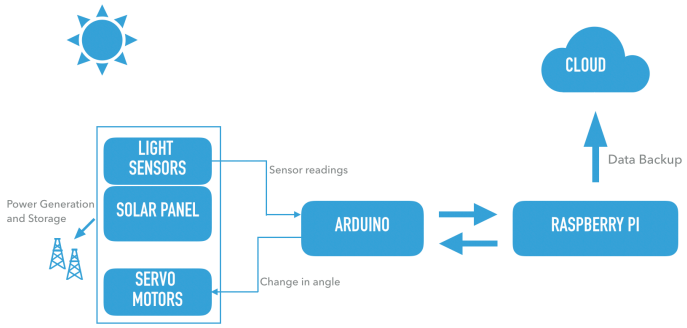
METHODOLOGY

An integrated system of an Arduino Uno interfaced with a Raspberry Pi is used to collect and process data. LDR readings from each corner of the solar panel are read and the average values of all four sides of the panel are calculated. The panel is adjusted such that the averages equalise.

Once a stable position is reached and a certain number of values are obtained a simple linear regression model is trained according to which the panel will continue to optimise its positioning to obtain maximum sunlight. If the power being generated unusually drops below the regular levels then the sensors start sensing again and the data collected is used to retrain the model for reconfiguration purposes.



IMPLENTATION ARCHITECTURE



RESULTS

A system is successfully built with a linear regressor model to adjust the positioning of the panel to obtain its maximum possible power throughout a time period and reconfiguring functionality successfully enables the panel to adapt to changing trends and optimise photovoltaic power generation.

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