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Bio-Inspired Smart Energy Harvesting with IOT Monitoring

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Abstract: Three mini solar power panels and a mini wind turbine with a power output of 5.5V are used to power various smart automation modules. They include a Smart Traffic Light Control System, a Traffic Density Detection System, an Automatic Street Light System, and a Smart Farming/Irrigation Module, controlled by Arduino Uno.

This project aims to provide a practical demonstration on efficient renewable energy resource harnessing, regulation, and effective dissemination to various low-power devices, as used in smart city and smart precision agriculture technologies.

Keywords: Bio-inspired system, IoT, Arduino Uno, Street Light, water pump, sensors.

1. INTRODUCTION

Climate change is one of the biggest challenges humanity faces in the 21st century. Rapid industrial growth, urban expansion, and a heavy reliance on fossil fuels have greatly increased greenhouse gas emissions. This rise results in global warming, air pollution, and extreme weather events. Scientists worldwide are discussing and researching ways to slow down and eventually reverse the harmful effects of climate change. As a result, the focus has shifted to sustainable development and using renewable energy sources.

2. Body of Paper

Bio-inspired smart energy tapping with an internet of things monitoring system is an innovative approach which mimics nature, such as trees and leaves, for effectively tapping renewable sources of energy available in the environment. This approach harvests energy available in the environment through sources such as sunlight, vibration caused by solar energy or wind energy, and the surrounding environment using solar panels and piezoelectric sensors deployed in a bio-inspired design. This harvested energy can then be processed by a microcontroller, which stores it efficiently in batteries or supercapacitors. This approach involves the use of the internet of things integrated with smart design principles which provide a cloud-based solution for real-time monitoring of energy tapping, energy storage, and various environmental conditions.

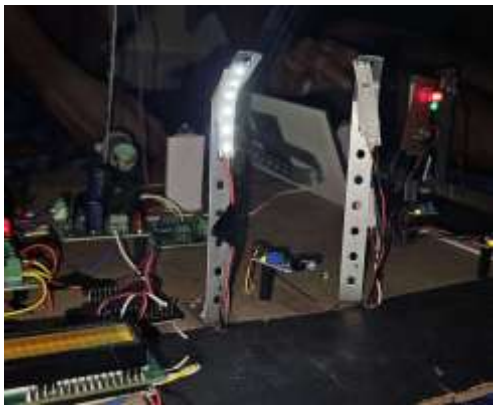


Figure 1: Street Lights

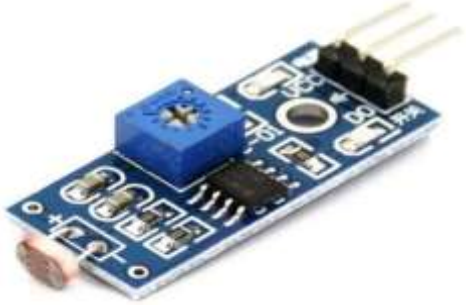
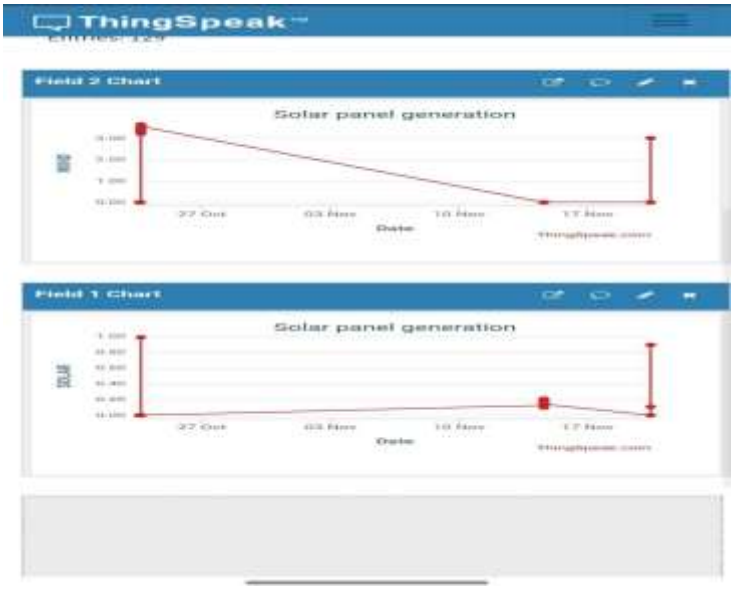


Figure 2: IR sensor



3. CONCLUSIONS

This particular technology has proven to have an appropriate and sustainable solution to the renewable challenges faced in the modern era. With the incorporation of solar and wind energy as well as IoT technology, the tree energy and light system is the sustainable and smart response to the traditional energy system. The technology not only has the ability to reduce the use of fossil fuels but also improves the efficiency of cities and the environment as well as the development of smart cities. Its numerous uses in the sector of transportation, environmental issues, and security make it a fundamental part of sustainability in development. Conclusion:

In conclusion, smart systems that rely on renewable energy sources find application in combating climate change and adopting renewable energy to develop resilient and smart environments.

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