

Waste-to-Electricity Generation System Using LoRa Technology

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Abstract: Plastic waste is one of the most rapidly growing environmental issues, with most going to landfill and being openly burned, creating significant air pollution. This research proposes a prototype to safely and cost-effectively convert unwanted plastic waste into desirable electricity, while simultaneously mitigating emissions and toxicity. The presented system utilizes a Thermoelectric Generator (TEG) to harvest heat from waste that is burned and convert it into electrical energy, which is captured in a LiFePO₄ battery. The stored energy can be utilized to operate small loads, such as fans, LED bulbs, and mobile chargers. Additionally, to minimize environmental impact, the emission of smoke from the waste being burned will be filtered and the carbon particles that are captured will then be processed into black ink, allowing a form of dual recycling. The system will utilize an Arduino UNO for system control and monitoring, while network connected IoT technology (LoRa tech) enables long-range wireless transmission of real-time data. The proposed solution demonstrates an aggregated approach to waste management, renewable energy, and IoT technology for urban and rural applications.

Keywords: Waste-to-Energy, Thermoelectric Generator (TEG), LoRa, IoT, Arduino, Pollution Control, Carbon Recycling, Renewable Energy

