

SUNPOD

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Proposed Solution

SUNPOD is a cloud-connected smart solar power system that provides affordable, reliable, and sustainable electricity for households, campuses, and businesses. Built from upcycled electronic waste materials, it supports green manufacturing and reduces environmental pollution. The system integrates RFID authentication, IoT monitoring, remote control, and AI-powered energy management to improve efficiency and security. SUNPOD reduces dependence on diesel generators, expands clean energy access, and creates youth employment through local manufacturing, installation, maintenance, and renewable energy entrepreneurship across Nigeria.

Technical Design

SUNPOD consists of a microprocessor, solar photovoltaic panels, a charge controller, lithium battery storage, and an inverter integrated into a smart energy station. The system uses RFID authentication for secure user access and IoT sensors to monitor voltage, current, battery health, and energy consumption in real time. A cloud platform enables remote monitoring and control through mobile devices. Artificial Intelligence algorithms analyze usage patterns, optimize load distribution, and predict battery performance. Upcycled electronic waste materials are incorporated into the housing

Economic Feasibility/Proposed Business Model

SUNPOD adopts a scalable business model that combines direct sales, leasing, and pay-as-you-go energy services for households, campuses, and small businesses. Revenue is generated through system sales, subscription-based monitoring, maintenance services, and installation support. By using upcycled electronic waste and local fabrication, production costs are reduced significantly. The model is commercially viable, affordable for end users, and supports long-term profitability. Strategic partnerships with local manufacturers and microfinance providers will enable rapid deployment, market expansion, and sustainable jobs.

Timeline for developing prototype/trial

- Week 1: System design, component sourcing, and collection of upcycled electronic waste materials
- Week 2: Hardware fabrication, solar assembly, RFID integration, and IoT setup
- Week 3: Software programming, AI integration, testing, and pilot trial deployment

Expected outcome: A functional SUNPOD prototype capable of secure energy access, cloud monitoring, remote control, and efficient clean energy delivery for target users. The pilot will serve selected campuses and communities, with scale-up in Nigeria through partnerships with clean energy investors.

Budget & Target User/Market/Scale

The estimated prototype budget for SUNPOD is ₦300,000. Target users include households, tertiary institutions, SMEs, and rural communities with limited electricity access.

References

- [1] Transmission Company of Nigeria. Nigeria's national grid recorded over 145 system collapses (2010–2024), highlighting persistent grid instability and the need for decentralized energy solutions.
- [2] International Telecommunication Union & UNITAR. Global E-waste Monitor 2024 reported 62 million tonnes of e-waste generated globally in 2022, emphasizing the importance of recycling and circular innovation.
- [3] <https://thelagosvoice.com/kwasu-student-develops-sunpod-to-tackle-nigerias-power-crisis/>. Report on SUNPOD as a student-led innovation from Kwara State University addressing Nigeria's power challenges.

Acknowledgements

Support from the Centre for Artificial Intelligence and Machine Learning Systems KWASU is acknowledged.

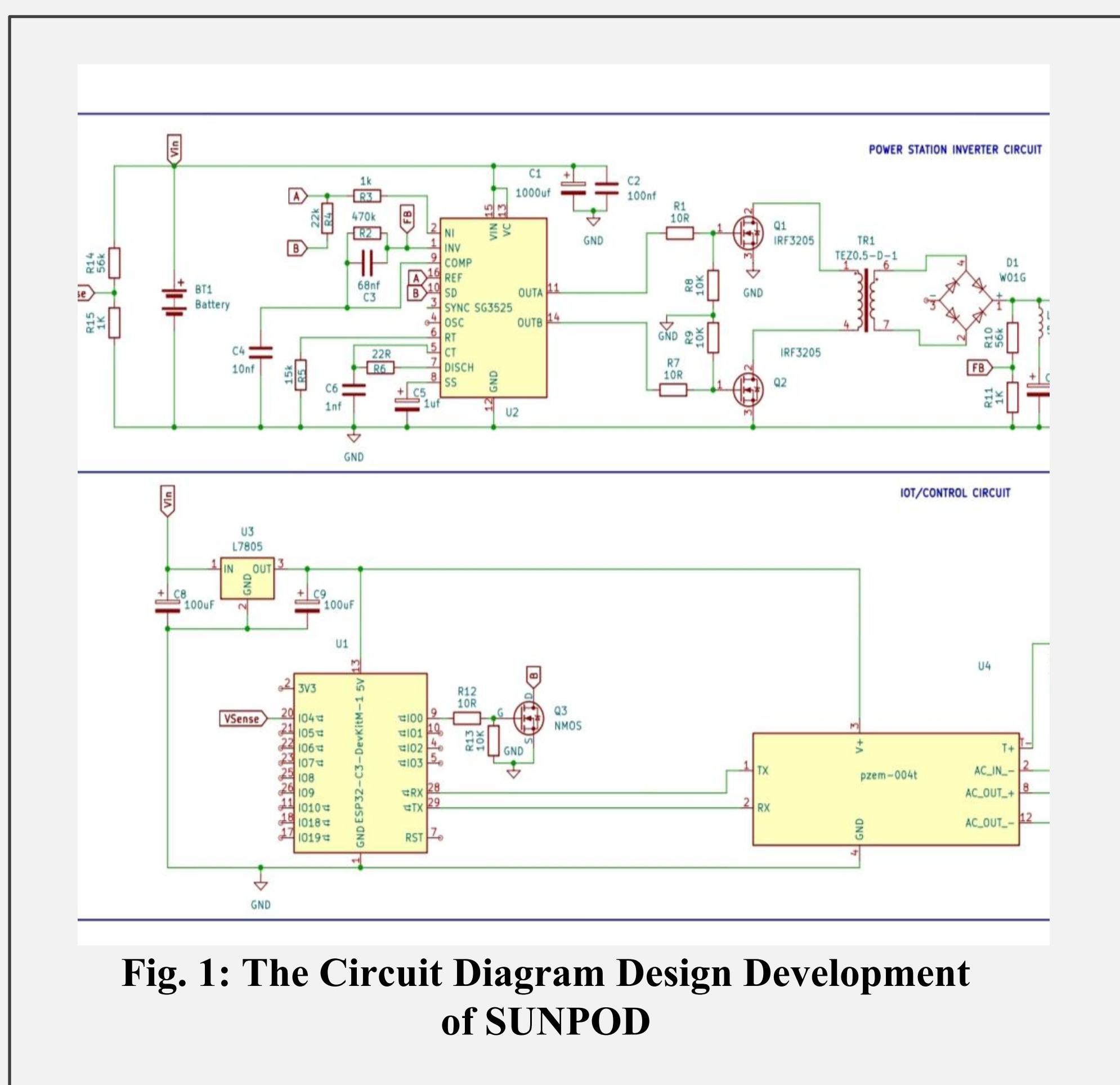


Fig. 1: The Circuit Diagram Design Development of SUNPOD