

Design, Development, Testing, and Implementation of a Cost-Effective Solar Automatic Transfer Switch

Jayasekara, A.N.K.^{1*}, Kabileswaran, Y.¹, Liyanage, G.L.L.S.¹, Jayasooriya, L.T.¹

¹*Department of Electrical and Electronic technology, Faculty of Technology,
Rajarata University of Sri Lanka.*

**ent1718050@tec.rjt.ac.lk*

This project focuses on developing a cost-effective *Solar-grid automatic transfer switch (ats)* across its entire life cycle, encompassing design, development, testing, and implementation. With the rising demand for *Sustainable energy*, solar power systems have gained attention, necessitating a reliable ATS for smooth transitions between solar and grid power. The project aims to advance renewable energy infrastructure economically and technologically. In the design phase, factors like reliability, efficiency, and compatibility are explored, incorporating *Smart technologies* for enhanced performance. The development phase integrates programmable logic controllers and advanced sensing technologies, ensuring real-time monitoring and control with a modular design for scalability. Testing adheres to international standards like IEC 60947, employing simulation-based methodologies to assess ATS performance under various scenarios. Implementation addresses challenges like grid synchronization and cybersecurity, proposing solutions such as machine learning for predictive maintenance. Economic viability is crucial, involving life-cycle cost analysis considering *Initial investment*, maintenance, and energy savings. Cost-effective design strategies, like using local materials, aim to make *Solar-grid* ATS financially accessible. Case studies provide insights into real-world implementations, contributing to sustainable and resilient energy infrastructure. The project aligns with the goal of optimizing renewable energy utilization through efficient ATS solutions as solar power systems progress.

Keywords: *Solar-Grid Automatic Transfer Switch (ATS); Sustainable energy; Smart technologies; Initial investment; Solar-grid*