

DESIGN AND PROTOTYPING OF AN IOT- INTEGRATED FLOOD MONITORING AND WARNING SYSTEM

By

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STATEMENT BY THE AUTHOR

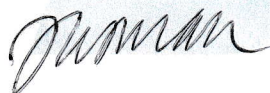
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ABSTRACT

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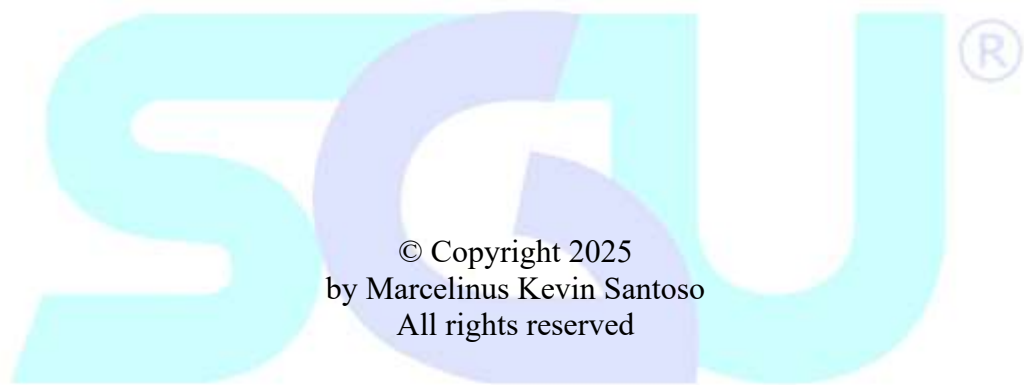
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This study presents the development and evaluation of a solar-powered, non-contact water level monitoring system utilizing LiDAR technology, real-time data logging, and cloud-based interfaces. Designed for remote deployment in small rivers and streams, the system integrates a TF Luna LiDAR sensor mounted over a stilling well to provide reliable distance measurements to a water surface. Data acquisition is managed by an ESP32 microcontroller, which transmits measurements to Firebase for persistent storage and to Blynk IoT for real-time visualization and control. The device features a robust aluminum frame with 3D-printed brackets, a waterproof enclosure, and a modular electrical system powered by a 20W solar panel charging dual 18650 lithium-ion batteries via TP4056 modules. Critical components include SX1306 boost converters for stable 5V and 12V outputs, and an alarm relay circuit triggered by threshold exceedance. Extensive testing was conducted to compare sensor performance in open-air and submerged conditions, leading to the selection of LiDAR paired with a float-based target for consistent readings in water. The system demonstrated reliable operation over multiple days, including successful remote monitoring, power autonomy through solar charging, and effective user interaction via the Blynk dashboard. The results validate the feasibility of a compact, scalable, and IoT-enabled solution for water level monitoring in flood-prone or resource-limited environments.

Keywords:

ESP32, LiDAR, TF Luna, IoT, water level monitoring, Firebase, Blynk, solar power, stilling well, non-contact sensor, remote sensing, flood monitoring



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DEDICATION

This thesis is dedicated to my beloved family and friends, whose unwavering support, encouragement, and understanding have been invaluable throughout the course of this work. Their constant presence and belief in my abilities provided the strength and motivation needed to overcome every challenge. This accomplishment would not have been possible without their patience, guidance, and enduring faith in my journey.



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