

GrowSmart - An Integrated IoT-AI Edge Device for Farmer Intelligence

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Abstract: *This research paper details the conceptualization, design, and functional analysis of GrowSmart, an integrated Internet of Things (IoT) and Edge Artificial Intelligence (AI) device aimed at enhancing agricultural productivity and sustainability, particularly for smallholder and commercial farms. Termed “A Device for Farmers’ Intelligence,” GrowSmart is a compact, affordable solution that provides real-time, data-driven insights by integrating soil quality testing, weather monitoring, crop recommendations, and emergency alerting. The system continuously monitors critical soil parameters (moisture, pH, and NPK nutrients) and environmental conditions, processing this data locally using embedded Machine Learning (ML) models to offer immediate, tailored recommendations and proactive risk mitigation alerts (e.g., for drought or frost). This decentralized approach, leveraging edge processing, ensures low latency, data privacy, and reliable on-site operation, supporting optimal resource use, higher yields, and climate resilience. The paper concludes that GrowSmart has significant potential for inclusive and scalable deployment, contributing to enhanced food security and sustainable agricultural practices*

Keywords: GrowSmart, IoT-AI Edge Device , Resource Optimization , Precision Agriculture

