

Abstract of “Design of a Graphic Interface for Precision Agriculture”.

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This thesis delves into the integration of sensor data from agricultural monitoring nodes, emphasizing the utilization of The Things Network Storage Integration to access historical data. It investigates the implementation of Grafana dashboards for comprehensive data visualization and leverages geospatial information for monitoring and actuation nodes. Central to the study is the creation of an interactive dashboard solution, combining high-resolution satellite imagery with GPX data to provide geographical context to sensor information. Authentication methods are explored, ensuring user-specific access to dashboard data. The research extends the temporal scope beyond the standard 30-day period by importing historical data, addressing the limitations commonly encountered in such systems.

By synthesizing IoT technology with advanced data visualization tools, this work aims to offer insights and practical solutions for precision agriculture. The amalgamation of historical data retrieval, geospatial visualization, and tailored user access control underscores the potential of IoT in optimizing agricultural practices. The WAPPFRUIT project serves as the practical application of these concepts, demonstrating the benefits of integrating real-time data with user-friendly interfaces for enhanced decision-making in irrigation practices.

The methodology involves analyzing data collected from microcontrollers and sensors deployed across three different farms, each equipped with six types of soil sensors. These sensors measure essential parameters like soil moisture, volumetric water content, and temperature at various depths. The collected data is visualized using Grafana, providing actionable insights for optimizing irrigation schedules.

The results show significant improvements in water conservation, with an average water savings of approximately 40% across different orchard sites compared to traditional irrigation methods. Despite reduced water usage, crop yields remained stable, highlighting the efficacy of IoT-based smart agriculture systems. The research also explores future directions, including the integration of artificial intelligence and machine learning for predictive analytics, and addressing challenges such as limited internet connectivity in rural areas.

This thesis not only demonstrates the technological advancements achieved through the WAPPFRUIT project but also provides a comprehensive framework for future research and development in precision agriculture. By integrating real-time data visualization into agricultural practices, this work contributes to more sustainable and efficient farming practices.

The WAPPFRUIT logo, shown in Figure 1.(a), represents the project's branding and visual identity. The system architecture, depicted in Figure 1.(b), illustrates the comprehensive layout of the integrated technologies and components used in the project. Additionally, the dashboard subsection shown in Figure 2 highlights the various features and data visualizations that are crucial for monitoring and managing agricultural data effectively.

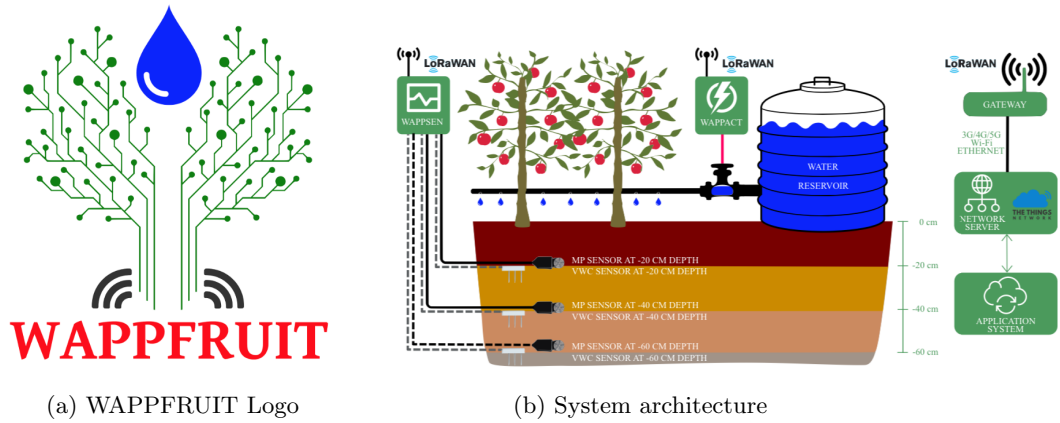


Figure 1: WAPPFRUIT Logo and System Architecture

