OptiAP: Optimizing Wireless Access Points Placement

Asherov Or

Faran Yanai

Golovanevsky Lion

Mentor: Dr. Binsky Hadar

The Challenge of Wireless Coverage in Small to Medium-Sized Areas

Core Problem

Poor Wi-Fi coverage in small to medium-sized areas due to suboptimal AP placement.

Who Might Struggle with This?

Small businesses, educational institutions, homes, and community centers—anyone needing reliable and affordable Wi-Fi coverage.

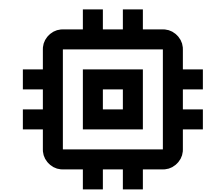# Our Solution: Optimizing Wi-Fi Signal Strength with OptiAP

What We Offer

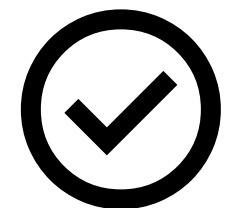A cost-effective, user-friendly method for better Wi-Fi coverage.

How It Works

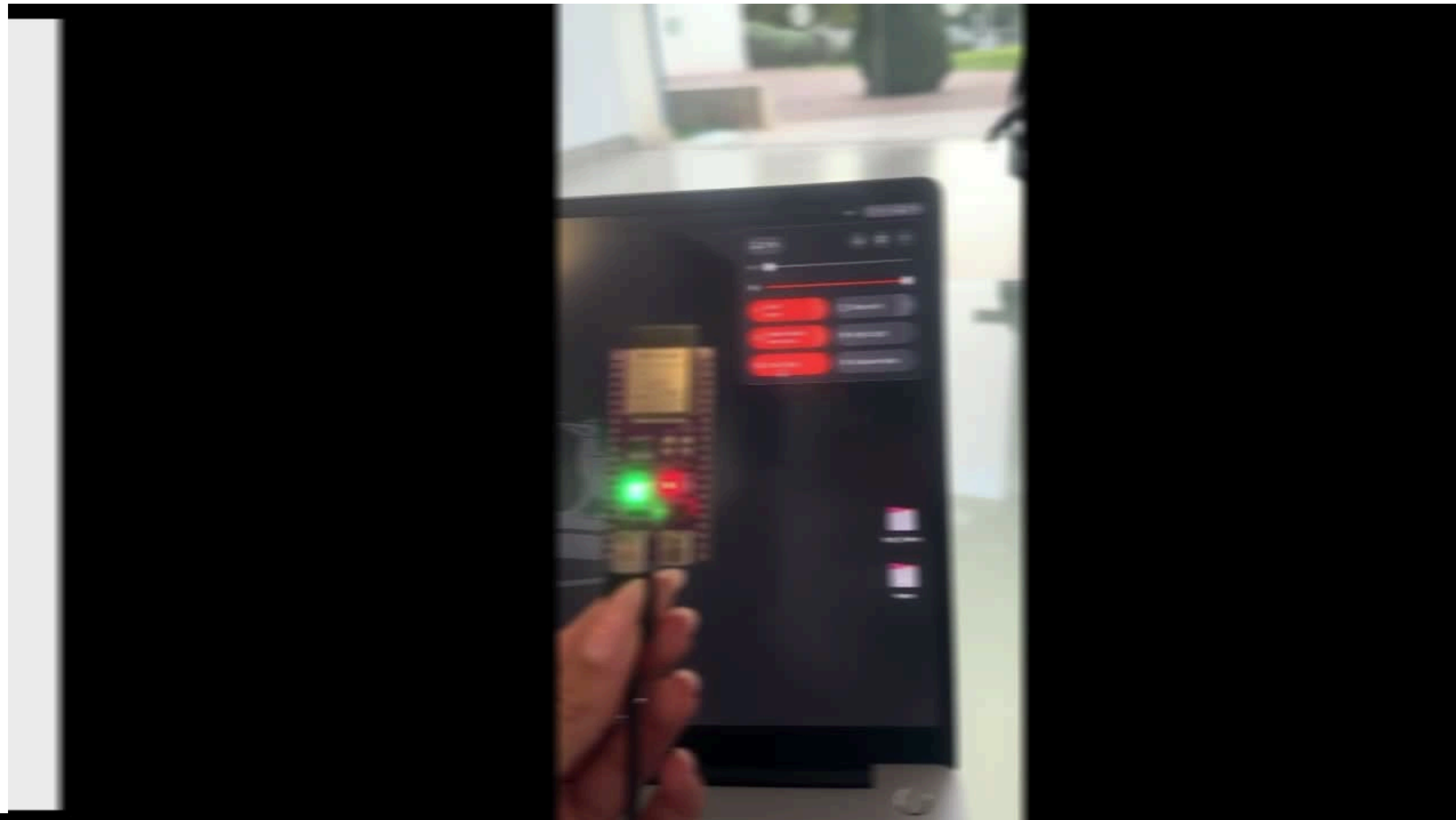ESP32 microcontrollers analyze your space to find the best AP placement.

Key Benefit

Affordable and tailored for small environments.
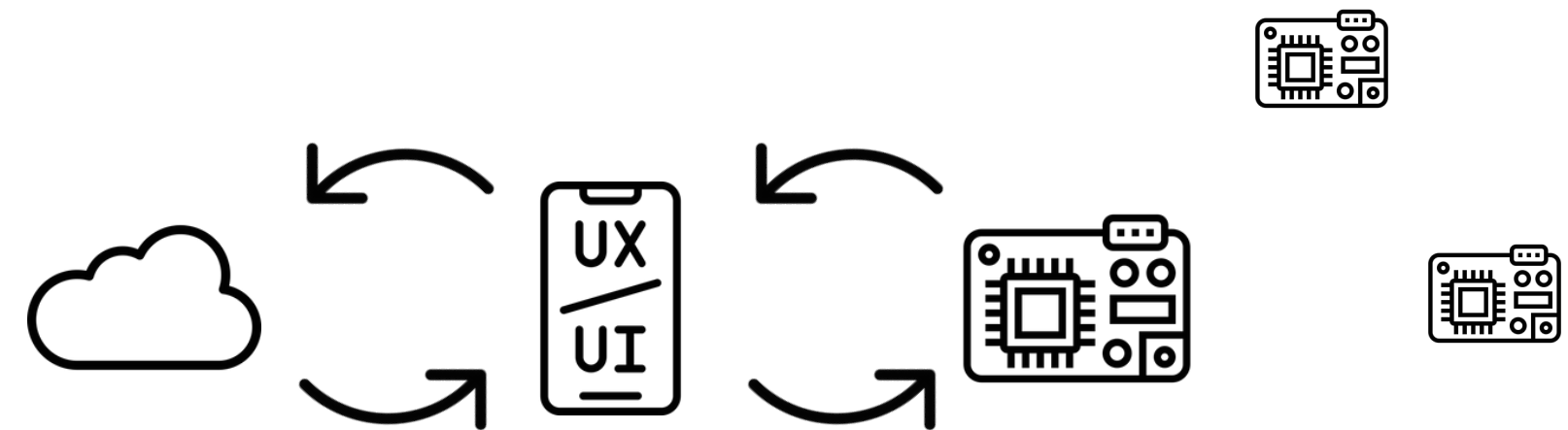
OptiAP in Action

https://drive.google.com/file/d/1c-zpw8CN3UVanmjcaBZHRTcrHKyt4ImD/view?usp=sharing

OptiAP Architecture (1)

Components

- ESP32 Microcontrollers (for data collection)
- Cloud Server (for data analysis and storage)
- User Interface (for displaying results)

Data Flow

- ESP32 collects signal data.
- Data is sent to the cloud for analysis and optimal AP placement calculation.
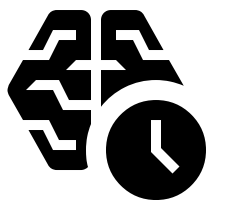- The user interface displays the results from the cloud.

FTM Protocol (Wi-Fi RTT)

Utilizes time-based measurements to estimate the distance between Wi-Fi entities, enabling location tracking for environmental data gathering.
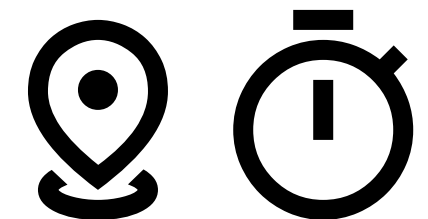
K-Means Algorithm

Clusters signal data to determine the best AP locations, ensuring efficient and data-driven Wi-Fi coverage.
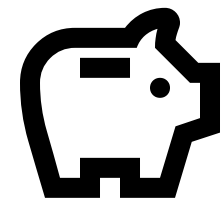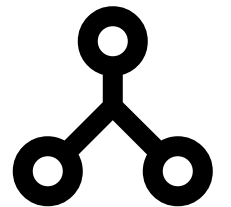
Comparison with Other Approaches

Costly Equipment and Professional Consultation

OptiAP Advantage: Cost-effective, user-friendly, no need for expensive tools or consultants.
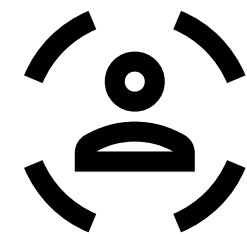
Centralized Placement - Uneven coverage, potential dead zones

OptiAP Advantage: Intelligent algorithms ensure comprehensive coverage, avoiding dead zones.

Manufacturer Recommendations - May not suit real-world environments

OptiAP Advantage: Tailored recommendations for optimal coverage specific to the environment.

Conclusion

OptiAP provides a **cost-effective** and user-friendly solution to optimize Wi-Fi coverage in small to medium-sized areas. By leveraging **ESP32 microcontrollers** for data collection and **cloud-based** analysis, OptiAP ensures **efficient** and **reliable** Wi-Fi access points placement.

This makes it an ideal choice for various environments, empowering individuals and small organizations to improve their wireless network coverage without extensive resources or external help.

Thank you