



Automation of Home Lighting with Learned BLE Positioning

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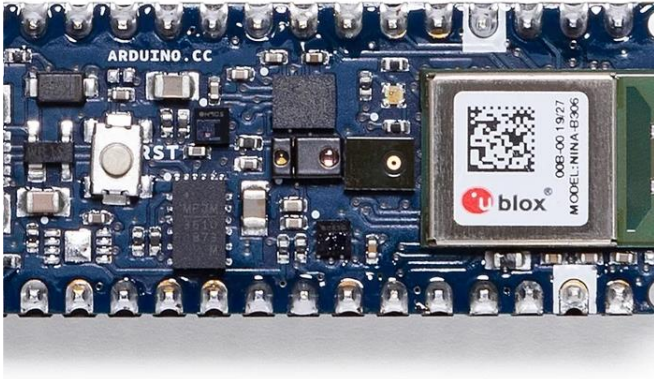
Project Motivation and Objectives

Eliminate manually
configured
automations

Minimize direct
interaction with
smart lights

The slide features a solid orange background. A large white circle is centered on the page. Inside this circle, the words "Technical" and "Approach" are written in a black, sans-serif font, stacked vertically. To the left of the white circle, a series of yellow dashed lines form a semi-circular arc. At the bottom right of the white circle, there is a small, solid blue circle.

Technical Approach

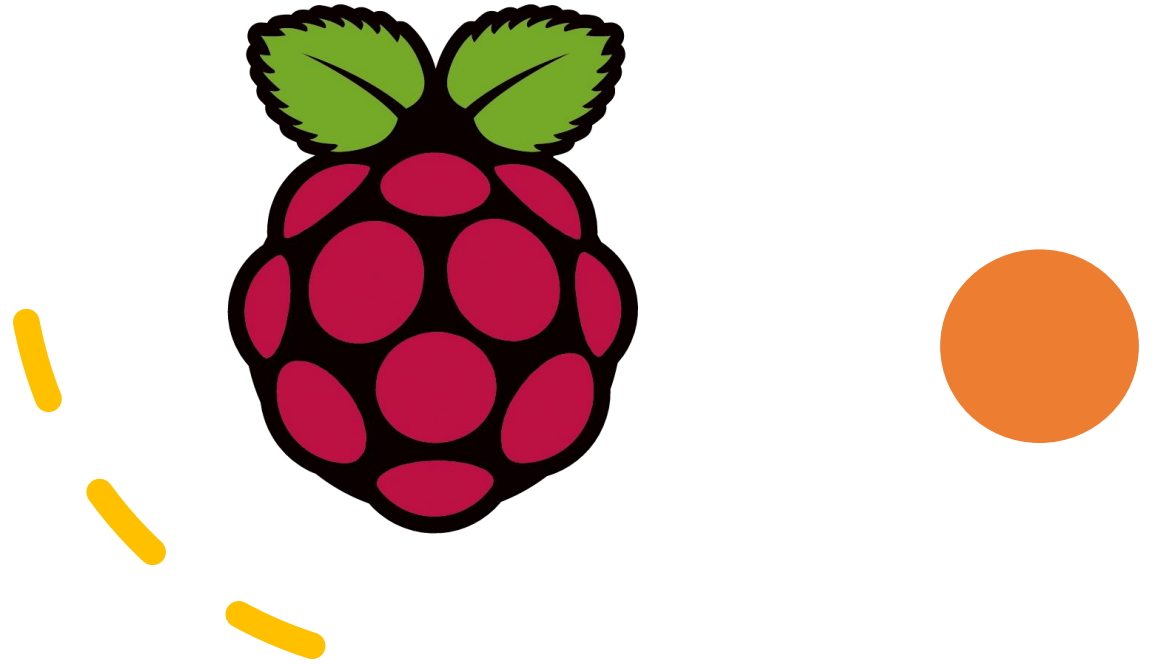


Technical Approach

- Arduino Nano RP2040 Connect
 - Requests scans from Nano 33 BLE Sense
 - Publishes results to MQTT topic
- Arduino Nano 33 BLE Sense
 - Scans for nearby BLE devices

Technical Approach

- Python script running on Raspberry Pi
- Lights controlled via Home Assistant API



Technical Approach

- Online supervised learning
 - Sample storage
 - Dynamic features
 - Changing MAC addresses



Demonstration


Results

Interval	Classifier Accuracy	Switching Method Accuracy
10 minutes	87%	100%
30 minutes	64%	100%
60 minutes	60%	100%

Novelty

- Using household BLE devices for localization
- Home automation with online supervised learning
- Neural network with dynamic features

Future Directions



Multi-user
support

Supporting
more rooms

Smartphone
app

Conclusion

- Great potential of BLE devices
- Path forward for smart home automation