harbor foot

Where harbor dreams come true.

INTRODUCTION

Harbor Foot replaces the red/green flip signs with an IoT solution that can be updated automatically and remotely while enabling timely collection of useful data.

berth

noun

1. a ship's allotted place at a wharf or dock.
   "the vessel had left its berth"

TEAM

EIGIL ALBÆK

Berth module

JONATHAN ULRICH

Case design & Display

LUCAS BRYLLE

Communications

THOMAS HEGELUND

Web server

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01

PAIN AND SOLUTION

PAIN

Unused berths due to missing marking
Hard to find available berths
Berth master

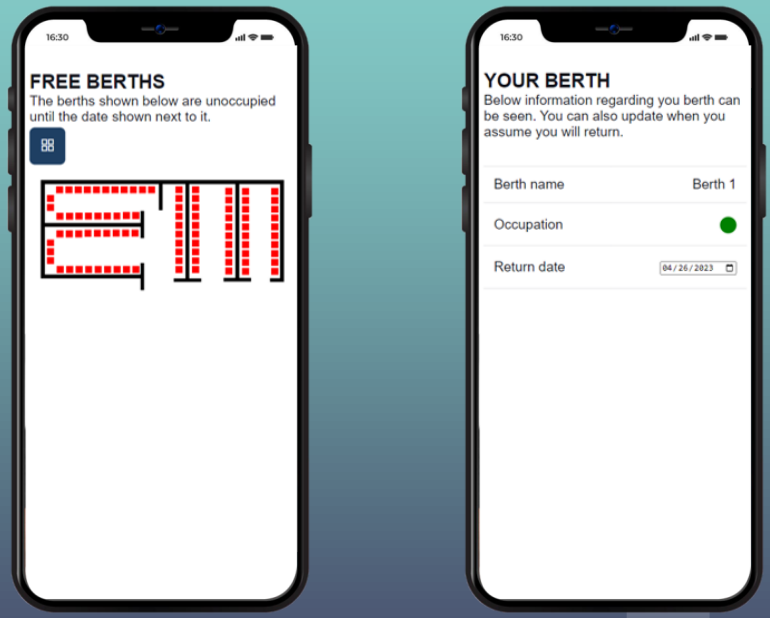
SOLUTION

Detection of a boat in the berth

Guest and owner friendly UI

Reminds the berth holder to set a return date

Easy payment overview for the Harbor master



02

TECHNOLOGY

Highlights and challenges

APPLICATION REQUIREMENTS

Capacity	• Bidirectional • Small package sizes • Low datarate
Coverage	• Outdoor, Marina • Generally no walls
Consumption	• Battery unnecessary • Latency tolerant
Cost	• Constrained customer budget
Additional specifics	• Star topology • Interferance tolerant • Environmental resilience

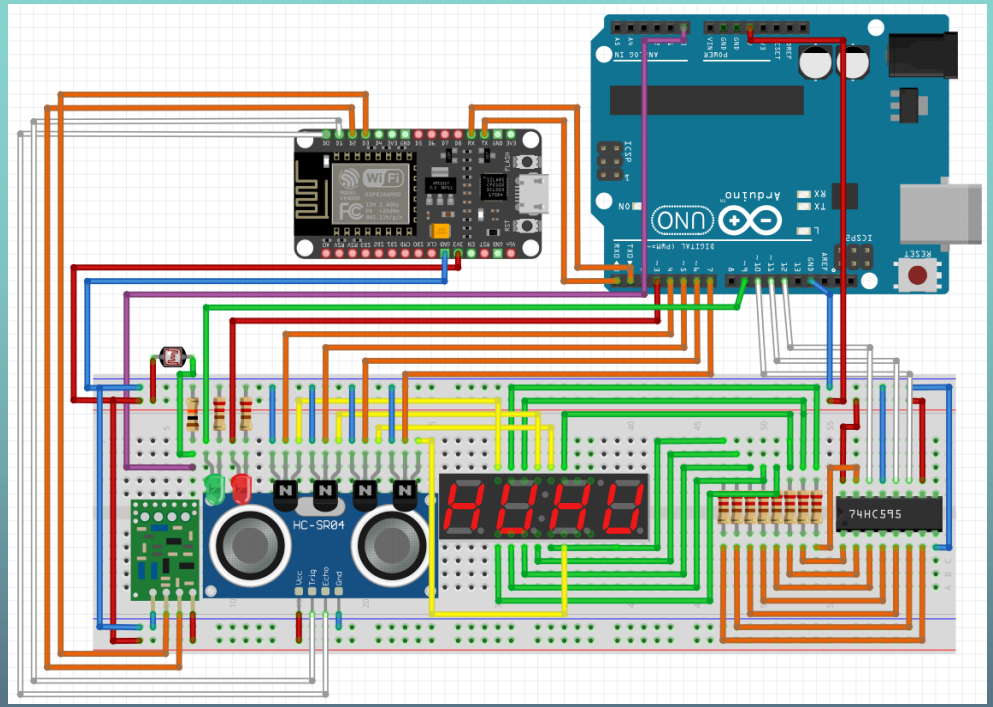
DATA FLOW

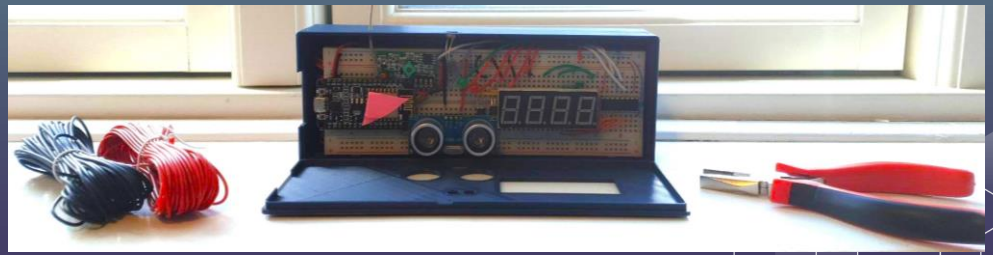
BOAT DEVICE

- A 433mHz transmitter with a small antenna hooked up to an Arduino
- Pulses a UUID at 433mHz to be received and processed by the unit at the berth
- Achieved a range of 30m

BERTH DEVICE

- Power supply
- Arduino uno controls displays
    - 4-digit 7-segment display
        - Shift register
    - Red & green LEDs
    - Ambient light detection
- ESP8266 reads data & communicates
    - Read from ultrasonic and receiver
    - Communicates with server
    - Forwards display info (RX/TX)
    - Dicisions made remotely





WEB SERVER

TECH STACK

Frameworks and languages

USER INTERFACE

Three different interfaces

RETURN CODE API

Calculation of state of berth device

TECH STACK

FRONT END

HTML, JavaScript, and CSS

DATABASE

SQL based, light weight

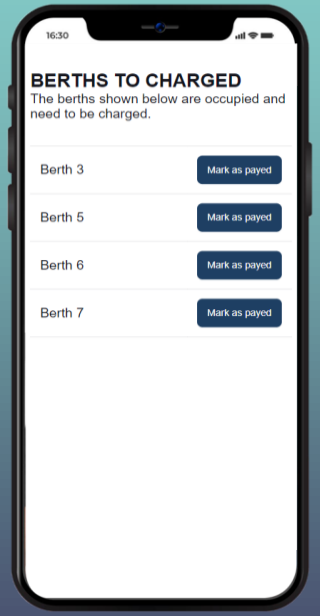
MEDIATOR

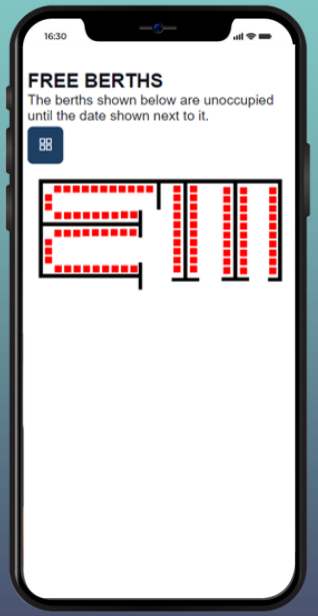
Getting data from backend to fronend

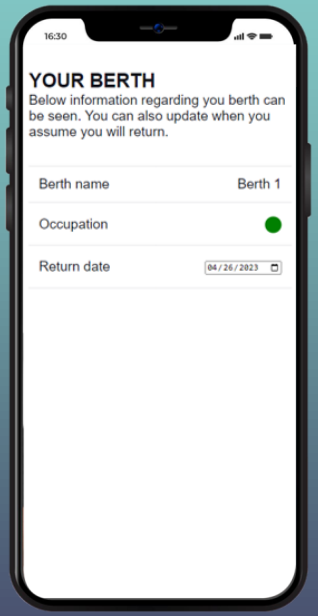
BACKEND

Python, easy setup, and documentation

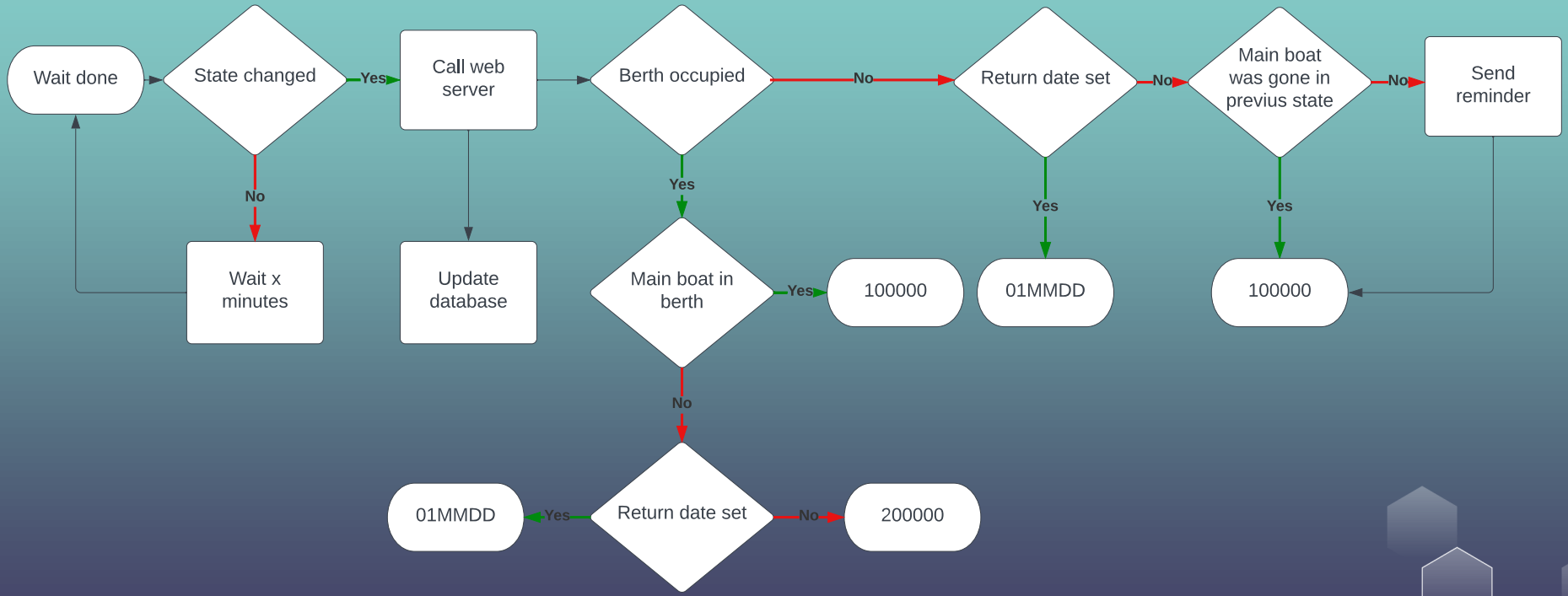
USER INTERFACE



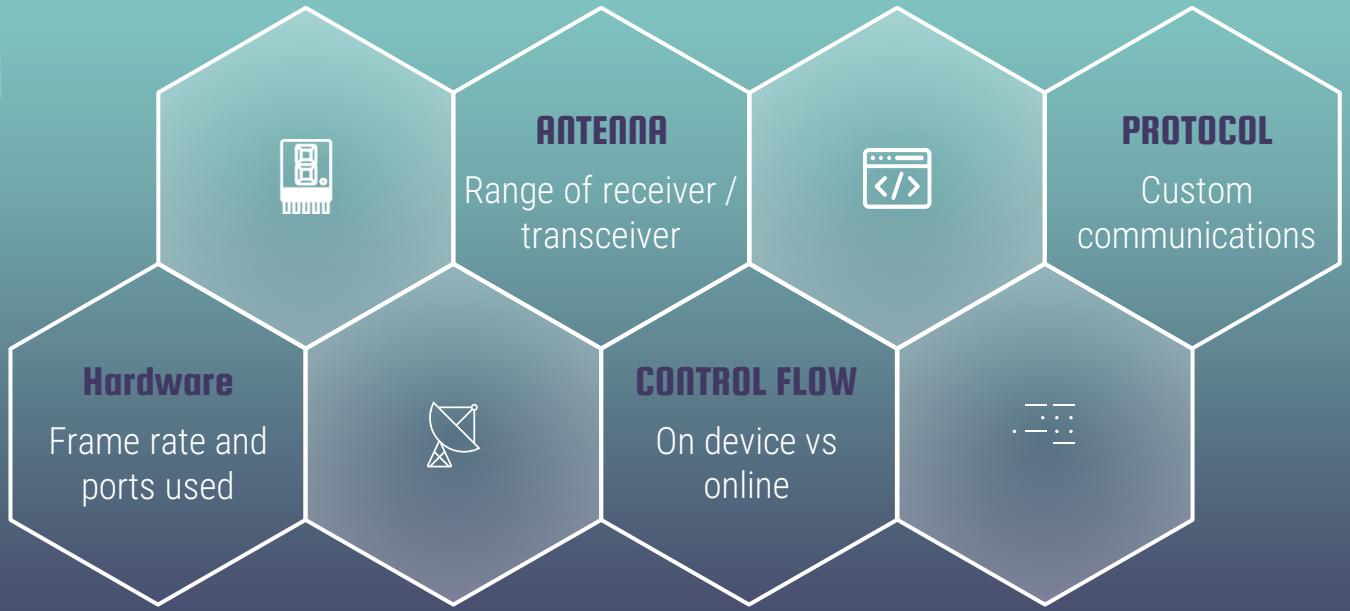




RETURN CODE API

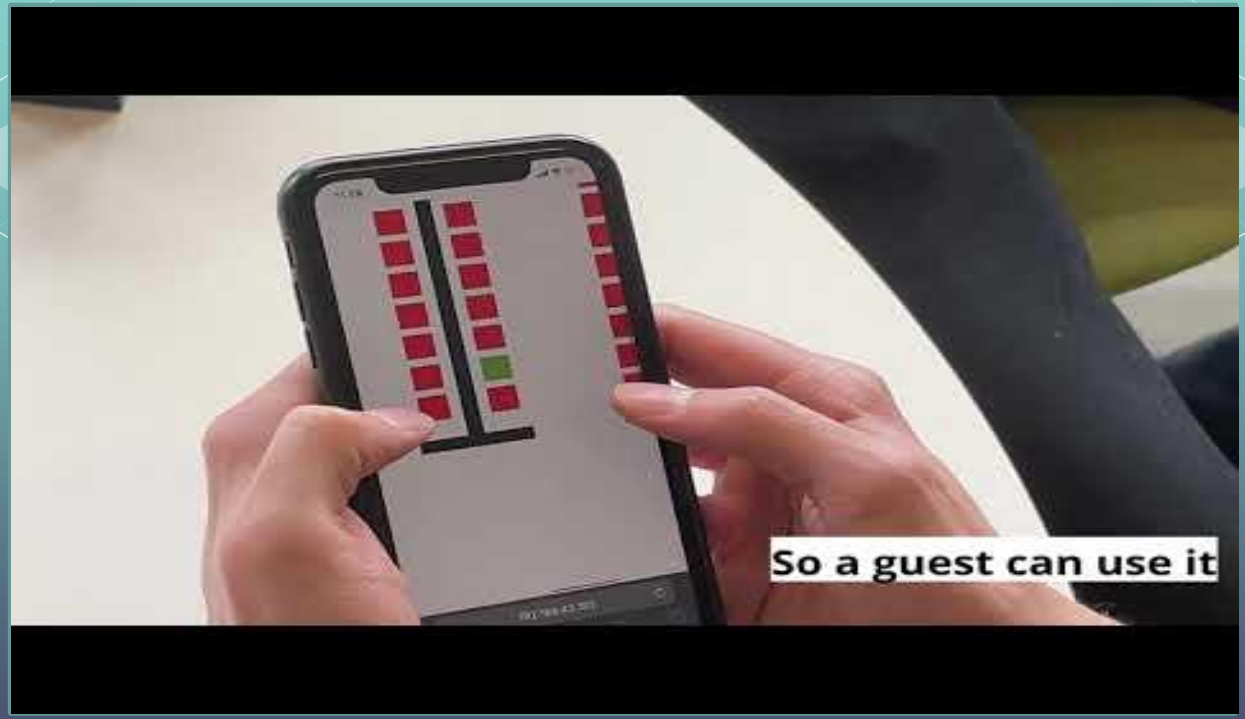


CHALLENGES


ANTENNA
Range of receiver / transceiver
PROTOCOL
Custom communications
Hardware
Frame rate and ports used
CONTROL FLOW
On device vs online

03

DEMO


So a guest can use it

04

FUTURE ENHANCEMENTS

FUTURE ENHANCEMENTS

PCB

Would make scalability easier

Low-power model

New components, lower refresh rate

Thread and matter

Low-power mesh, RF-tech, but provides IP connectivity

Home boat detection

Replace transmitter with RF-ID alternative.

Security

Encryption - ensuring no spoofing of signals between nodes.

Waterproof

Current casing and components are not waterproof.

END