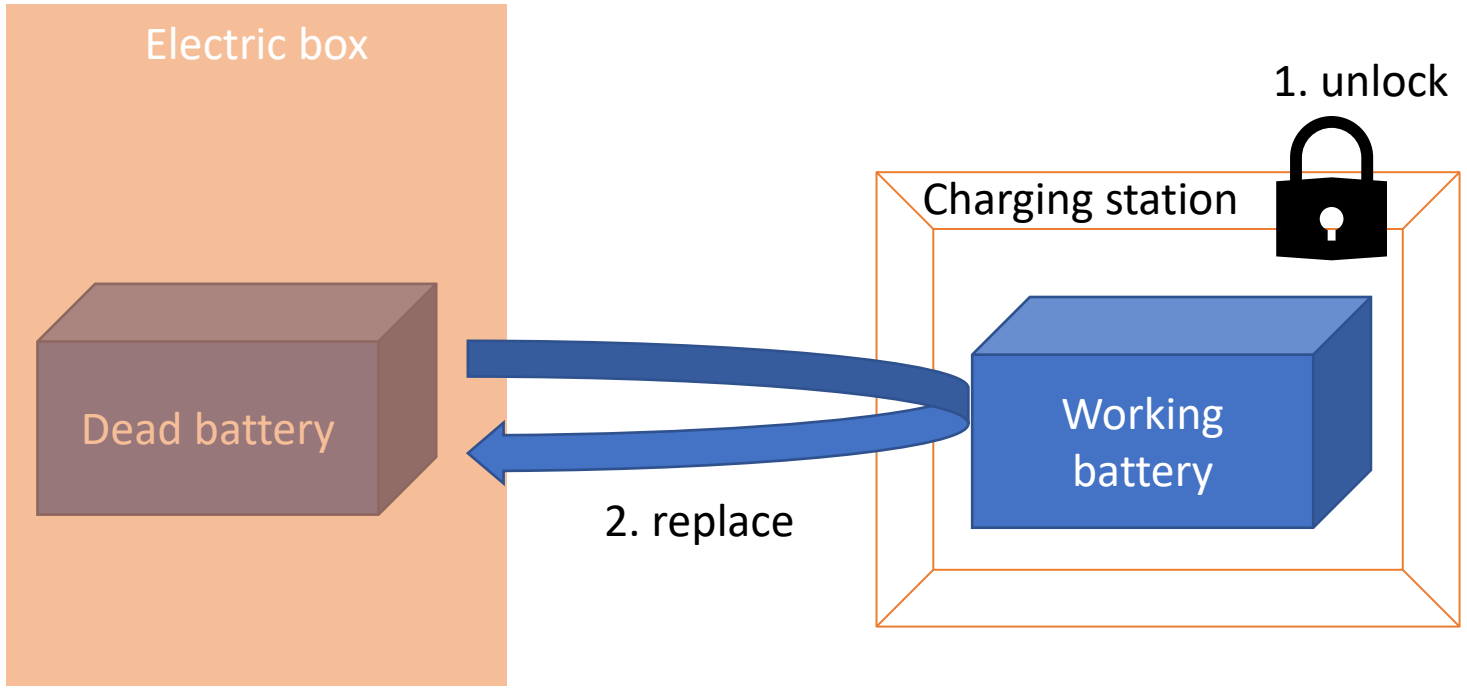
Backup Battery for Control Room

A more structured overview of puzzle #5

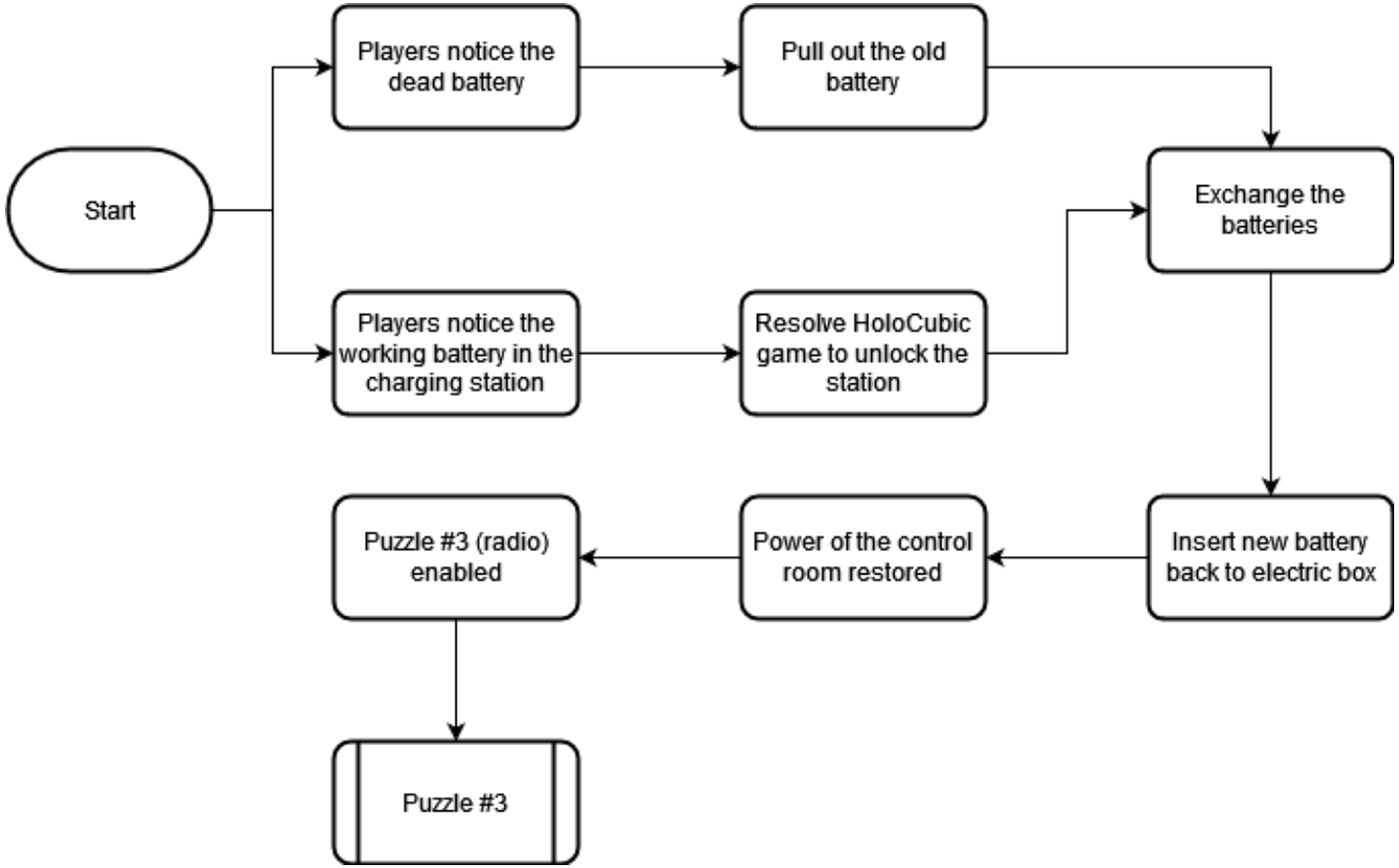
18.11.2021

Situation

- The backup power of the control room is not working
- Reason: battery is dead
- Another working battery is locked in a charging box
- Objective: Replace the battery



General Flow



Hardware: 2 Batteries

Simple rectangular boxes

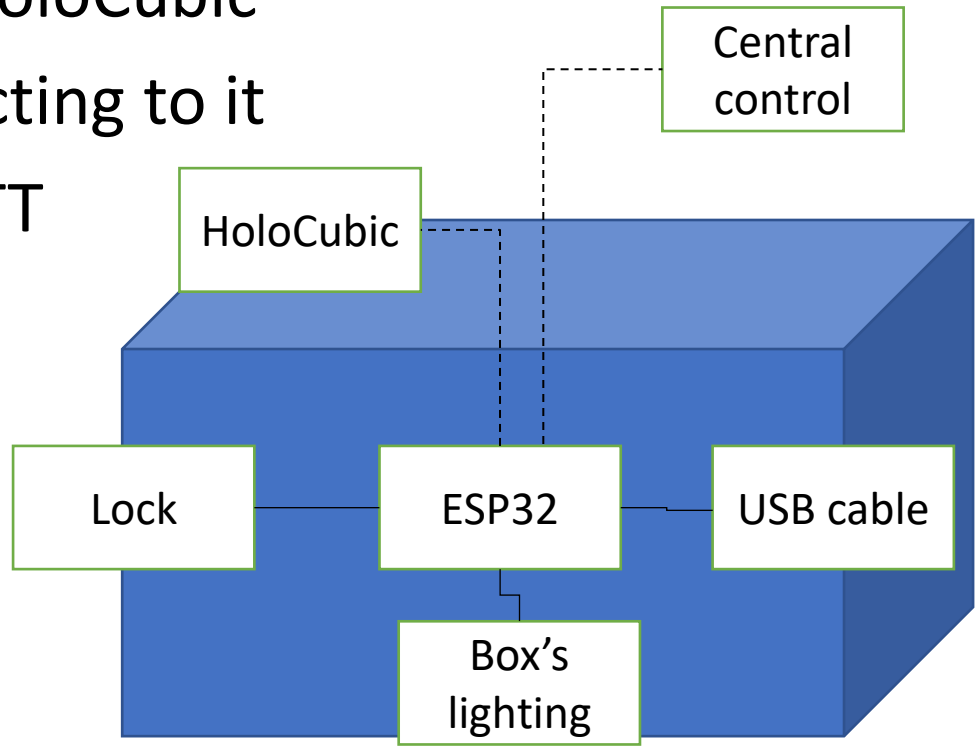
Identify itself to the electric box/ charging station by cable

Components:

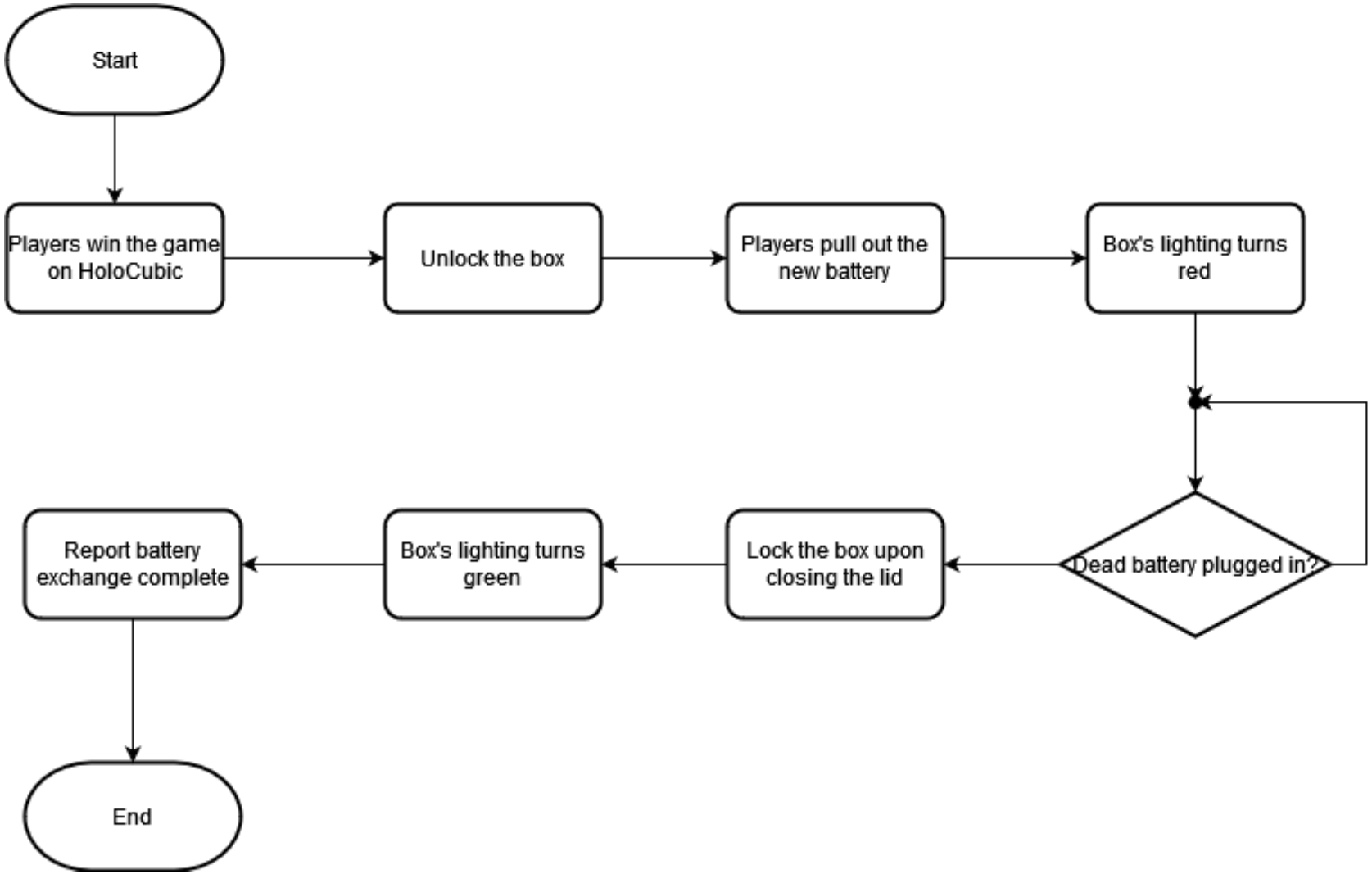
- ESP32
- USB port
- LED indicator

Hardware: The Charging Station

- A locked box
- Connected to a HoloCubic
- Unlock by finishing the 2048 game on HoloCubic
- Ability to detect which battery is connecting to it
- Report status to central control via MQTT



General Flow of the Charging Station



Hardware: Electric box

Simple box/ shelf

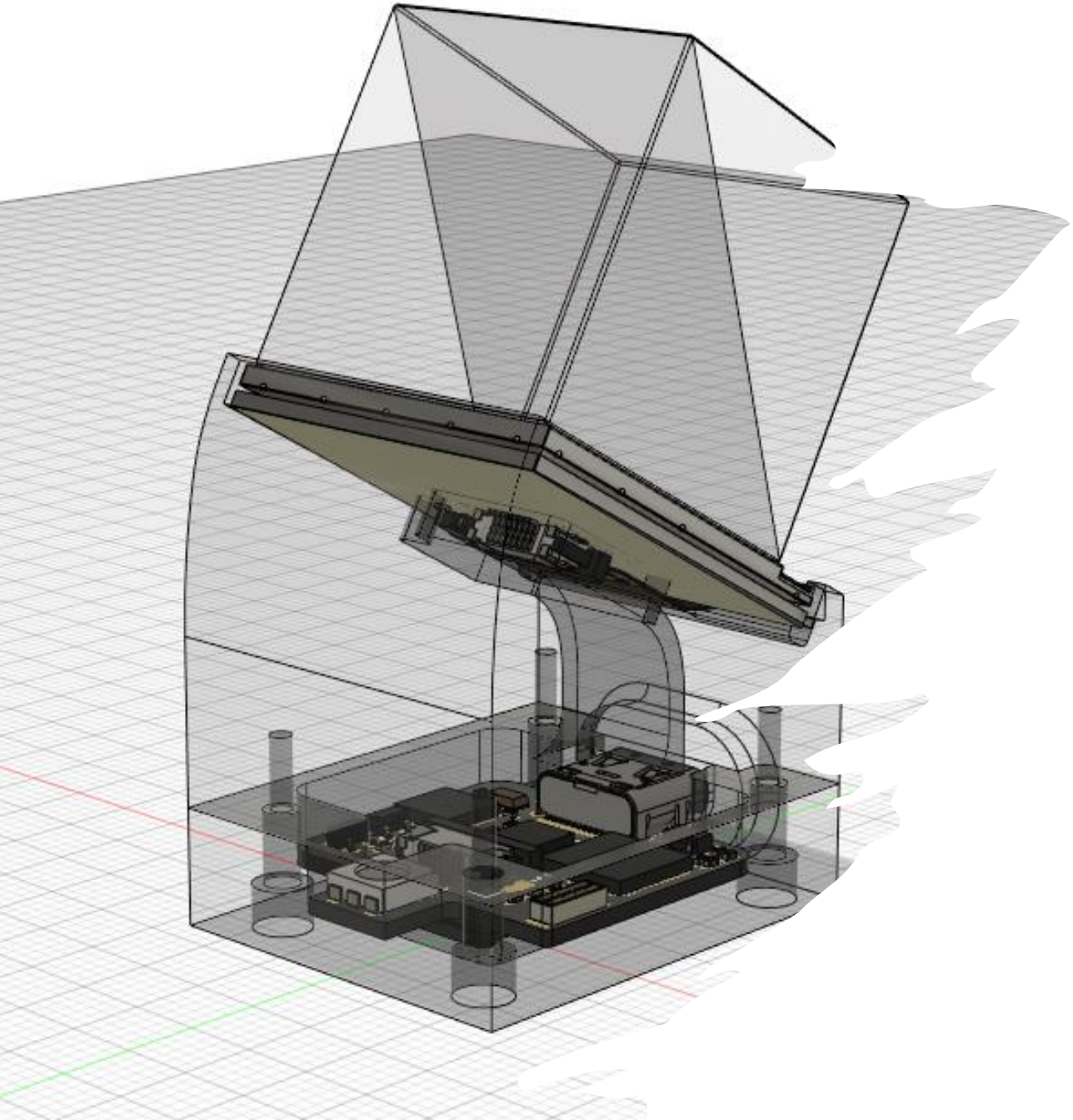
Identify which battery is connected

Set which battery to recognize (via MQTT)

Report status to central control (via MQTT) to continue (enable next puzzle)

Existing Safe Box

- Possibility to reuse the existing password-locked safe box?
- HoloCubic may show the password or input the password remotely



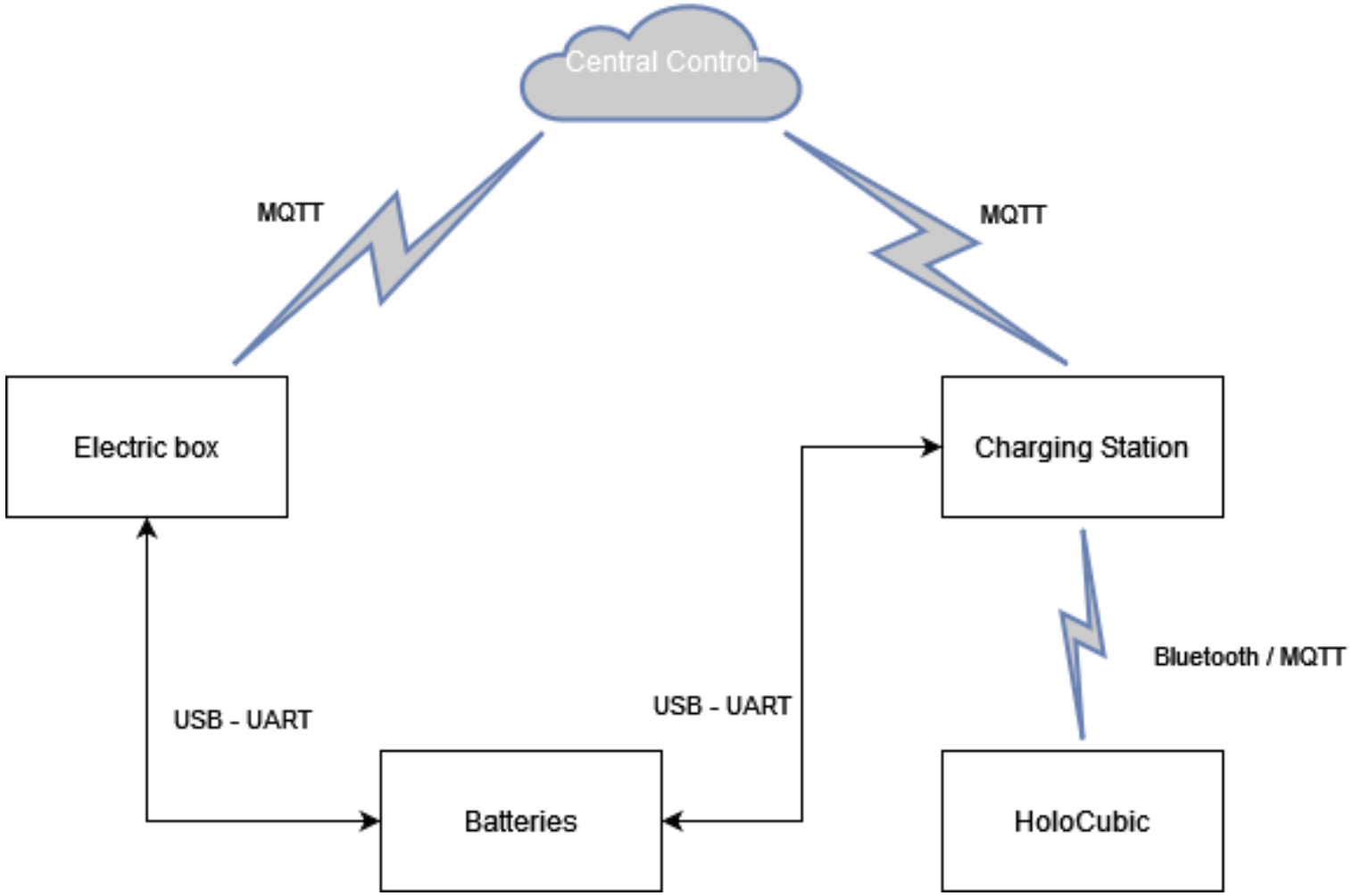
HoloCubic

- MCU: ESP32-PICO-D4
- 1.3” display, reflected by a prism
- MPU6050 IMU as HMI
- USB Type-C port
- MicroSD card storage
- Open-source design https://github.com/peng-zhihui/HoloCubic
- Challenges:
  - Build from PCB, source the raw parts
  - 3D-print the case
  - Re-program the firmware

2048 on Holocubic

- 3x3 grid
- Aim: 64
- Typically, can finish <2 mins
- Control by tilting the Holocubic
- Restart if game-over
- Unlock the charging station after winning:
    1. Display password
    2. Command the station to unlock via MQTT/Bluetooth

Overall Network Connection



BOM

- To be finallized: https://github.com/ubilab-ws21/puzzle-5/blob/BOM/BOM.xlsx