

The background features several white, three-dimensional spheres scattered across the frame. Each sphere is marked with a thin, pink line that forms a loop around it. These spheres are interconnected by a continuous, flowing pink line that meanders across the entire image, creating a complex, organic network. The overall aesthetic is clean and modern, with a focus on geometric and organic forms.

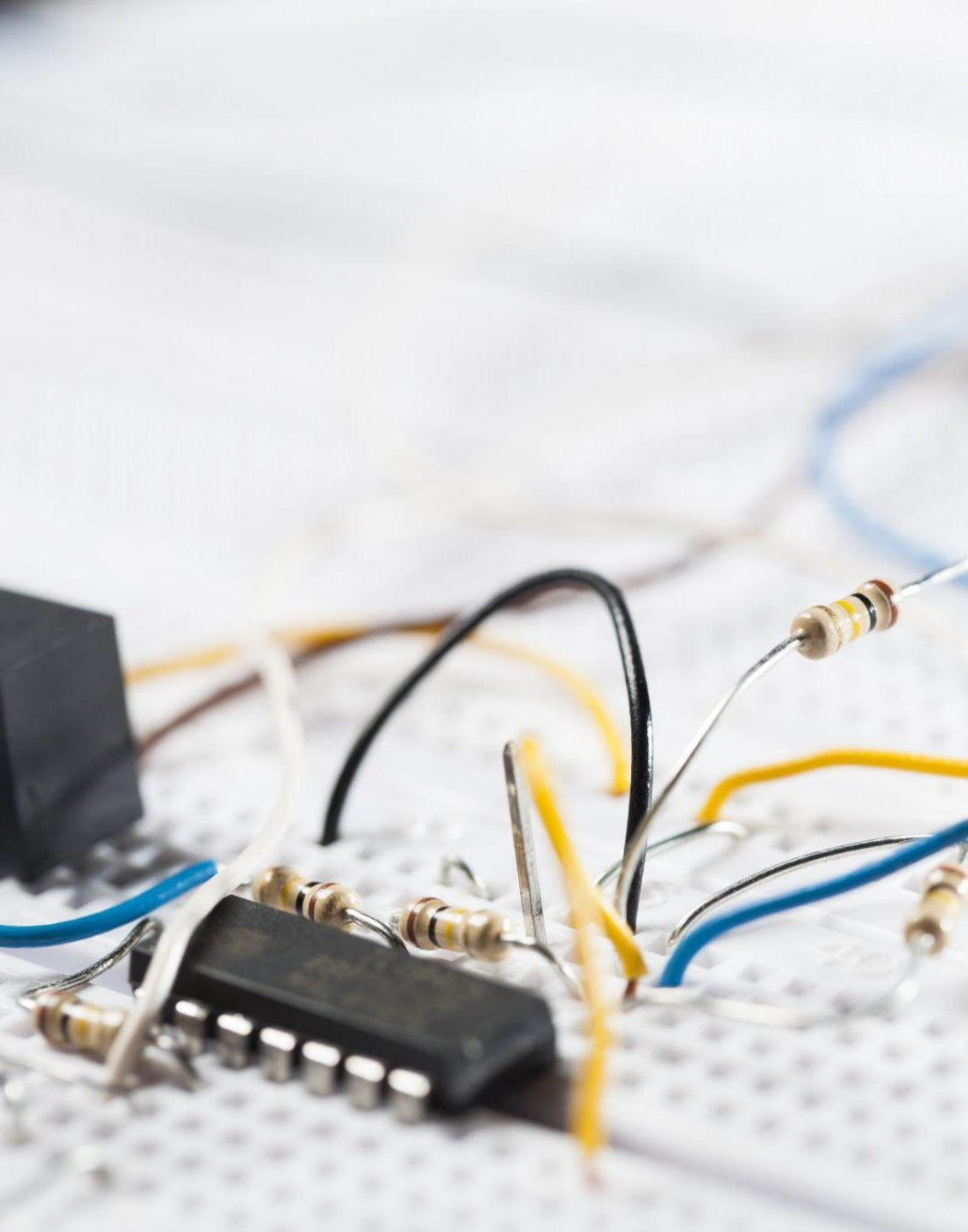
Integration of Tracing in any one of the made projects

Kamurasi Jordan Arthur.
Part 2 of meeting four

A low-angle, perspective view of a modern escalator with glass railings and illuminated handrails, leading upwards. The steps are dark and textured.

Elevator Implementation

STM32CubeIDE + USB-Device.



1) Initial Approach (PlatformIO + ST-LINK VCP)


- Connected STM32F4DISC1 via ST-LINK USB (Type-A to Mini-B)
- Tried USART2 (PA2/PA3) for serial via ST-LINK VCP
- Found ST-LINK VCP pins (U2 12 & 13) **not connected to STM32 USART**
- Possible alternatives:
 - External USB-Serial dongle
 - Flying wires to VCP pins
- **Both were inconvenient**

2) USB CDC Attempt (Still in PlatformIO)

- Discovered STM32F407 board has a native **USB OTG FS (Micro-AB)**
- Used a USB Micro-AB cable
- Manually copied **USB CDC source files** (usb_device, usbd_cdc_if.c, etc.) from STM32CubeIDE project into PlatformIO project
- Included them in platformio.ini, headers, and sources
- **But no COM port appeared** on PC

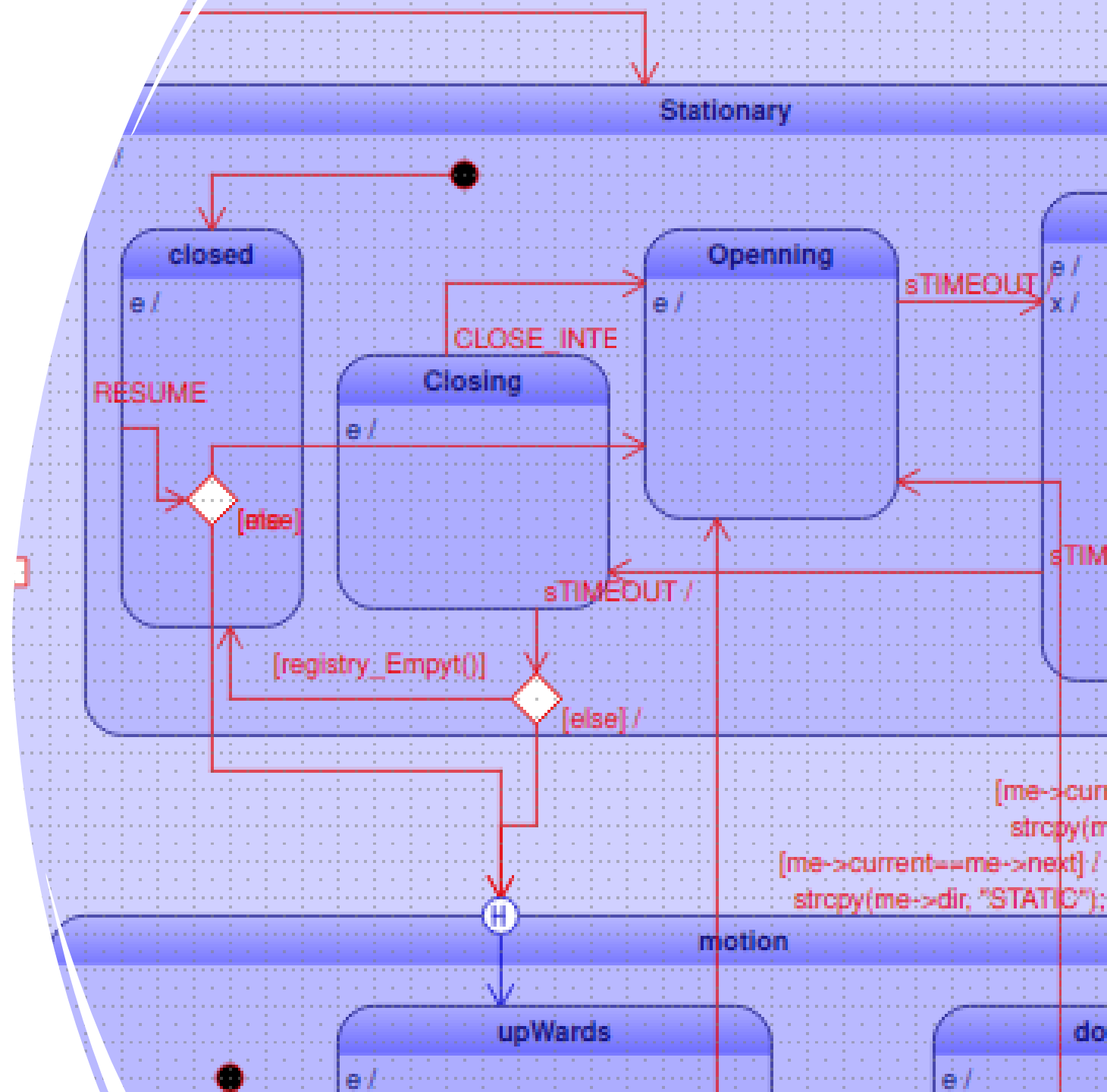


3) Migration to STM32CubeIDE = Success

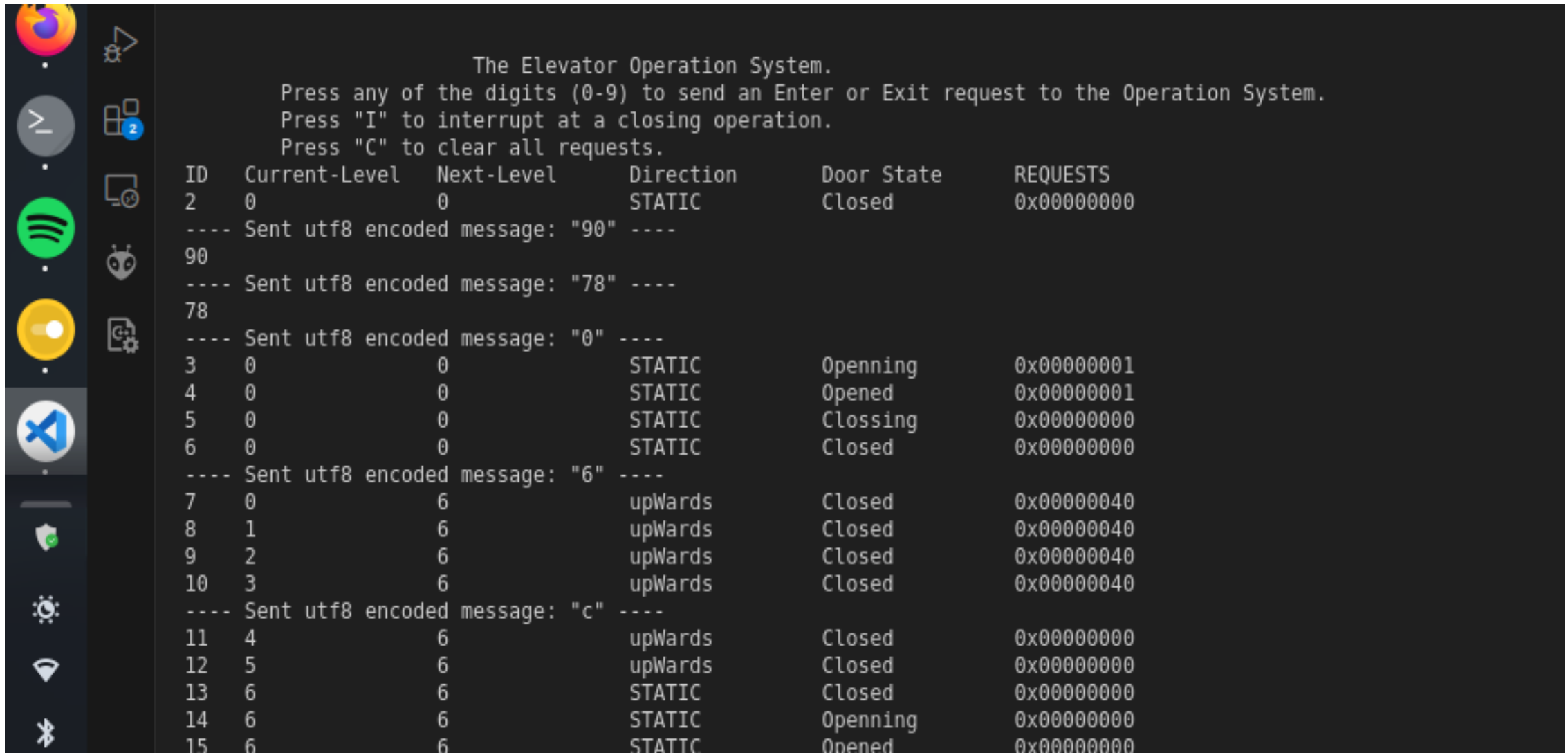
- Recreated project in **STM32CubeIDE**
- Configured USB Device stack as **CDC (Virtual COM Port)**
- Auto-generated correct descriptors and initialization
- Compiled and flashed – **USB port now detected on PC!**
-  Serial communication now works via USB CDC

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Illustration



The Elevator Operation System.

Press any of the digits (0-9) to send an Enter or Exit request to the Operation System.
Press "I" to interrupt at a closing operation.
Press "C" to clear all requests.

ID	Current-Level	Next-Level	Direction	Door State	REQUESTS
2	0	0	STATIC	Closed	0x00000000
---- Sent utf8 encoded message: "90" ----					
90					
---- Sent utf8 encoded message: "78" ----					
78					
---- Sent utf8 encoded message: "0" ----					
3	0	0	STATIC	Opening	0x00000001
4	0	0	STATIC	Opened	0x00000001
5	0	0	STATIC	Closing	0x00000000
6	0	0	STATIC	Closed	0x00000000
---- Sent utf8 encoded message: "6" ----					
7	0	6	upWards	Closed	0x00000040
8	1	6	upWards	Closed	0x00000040
9	2	6	upWards	Closed	0x00000040
10	3	6	upWards	Closed	0x00000040
---- Sent utf8 encoded message: "c" ----					
11	4	6	upWards	Closed	0x00000000
12	5	6	upWards	Closed	0x00000000
13	6	6	STATIC	Closed	0x00000000
14	6	6	STATIC	Opening	0x00000000
15	6	6	STATIC	Opened	0x00000000

Libre Solar BMS C1

```
typedef struct{  
    struct batteryManagementSystem,  
    struct compactVersion,  
} BMS;
```




Overview & Capabilities

- **Battery Support:** Manages 3–16 Li-ion cells (e.g., LiFePO_4 , NMC)
 - **Current Handling:** Continuous current up to 100A (with appropriate MOSFETs and heat sink)
 - **Microcontroller:** ESP32-C3 with Wi-Fi, Bluetooth LE, and CAN (TWAI)
 - **BMS IC:** Texas Instruments BQ76952
 - **Balancing:** Passive balancing up to 100 mA
 - **Protection:** Overvoltage, undervoltage, overcurrent, short circuit, and temperature protections
 -
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Communication & Firmware

- **Interfaces:**
 - CAN bus
 - USB (CDC-ACM)
 - UART
 - I2C
 - Bluetooth LE
 - Wi-Fi
 - **Protocol:** ThingSet for data exchange and configuration
 - **Firmware:**
 - Based on Zephyr RTOS
 - Supports SOC estimation via coulomb counting
 - Configurable for different battery chemistries and layouts
-



Installation & Operation

- **Connections:**
 - Power: M5 screw terminals
 - Signal: Molex Micro-Fit or Würth WR-MPC3 connectors
 - **Mounting:** Designed for attachment to a heat sink for thermal management
 - **Startup:**
 - Firmware flashing via USB or CAN
 - LED indicators for status monitoring
 - **Configuration:**
 - Set battery parameters (e.g., cell count, capacity, chemistry)
 - Adjust protection thresholds
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