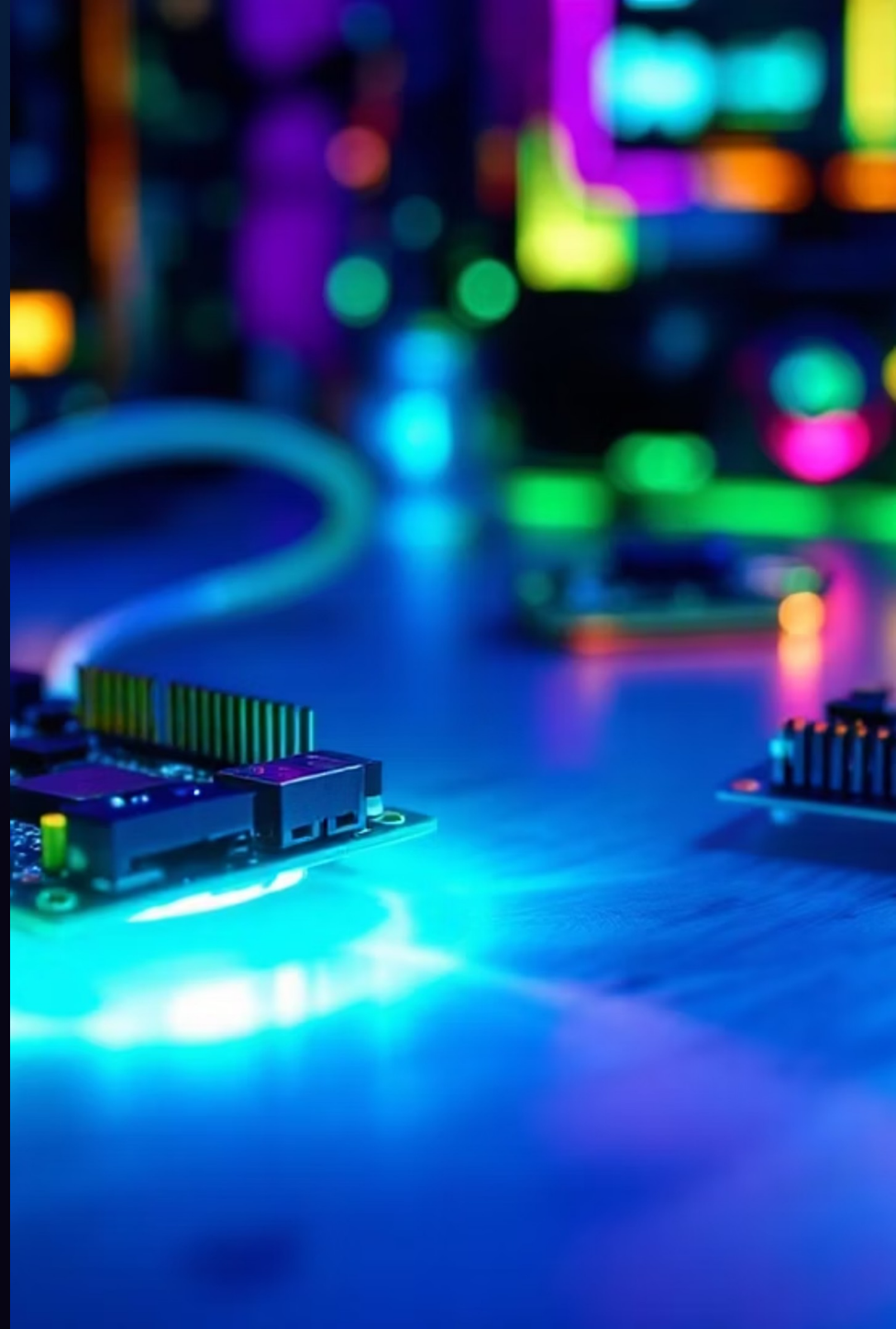
Zephyr Workshop – BLE

Two-board setup for hands-on BLE development



What is BLE?

- Bluetooth Low Energy = short-range, low-power wireless communication
- Used in wearables, sensors, smart home devices
- Optimized for brief data exchange sessions

BLE Roles in Zephyr

Peripheral

Broadcasts services

Advertises availability

Central

Scans for peripherals

Initiates connections

Data Exchange

Read/write/notify

GATT characteristics

Advertising & Scanning

- Peripheral broadcasts name & UUID
- Central scans and parses
- Power vs interval tradeoffs

Connection Process (GAP)

Advertising

Peripheral broadcasts availability

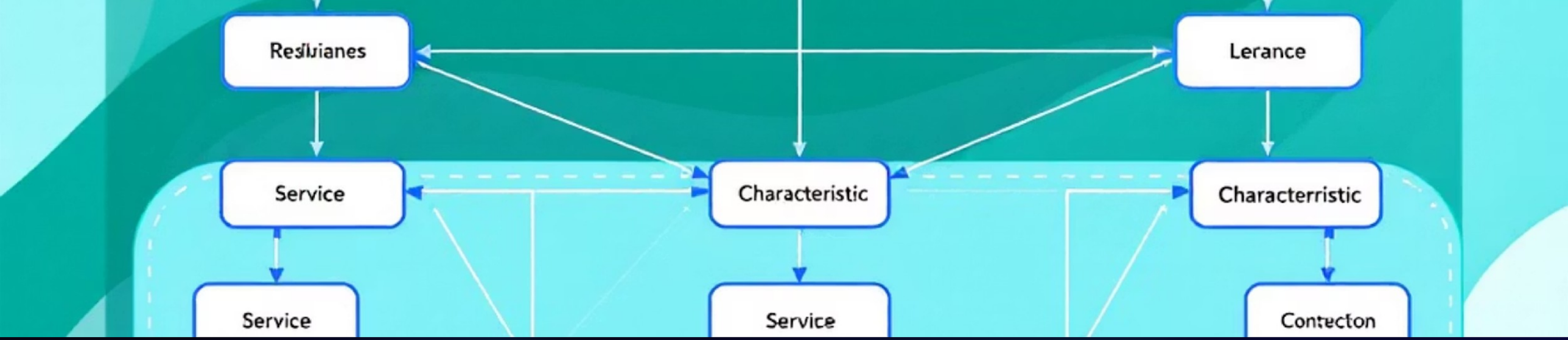
Parameters: interval, latency, timeout

CONNECT_REQ

Central initiates connection

Link Established

Data exchange begins



GAP and GATT Overview

GAP

Generic Access Profile

Handles discovery & connections

GATT

Generic Attribute Profile

Data structure: services & characteristics

Peripheral: Publishing data

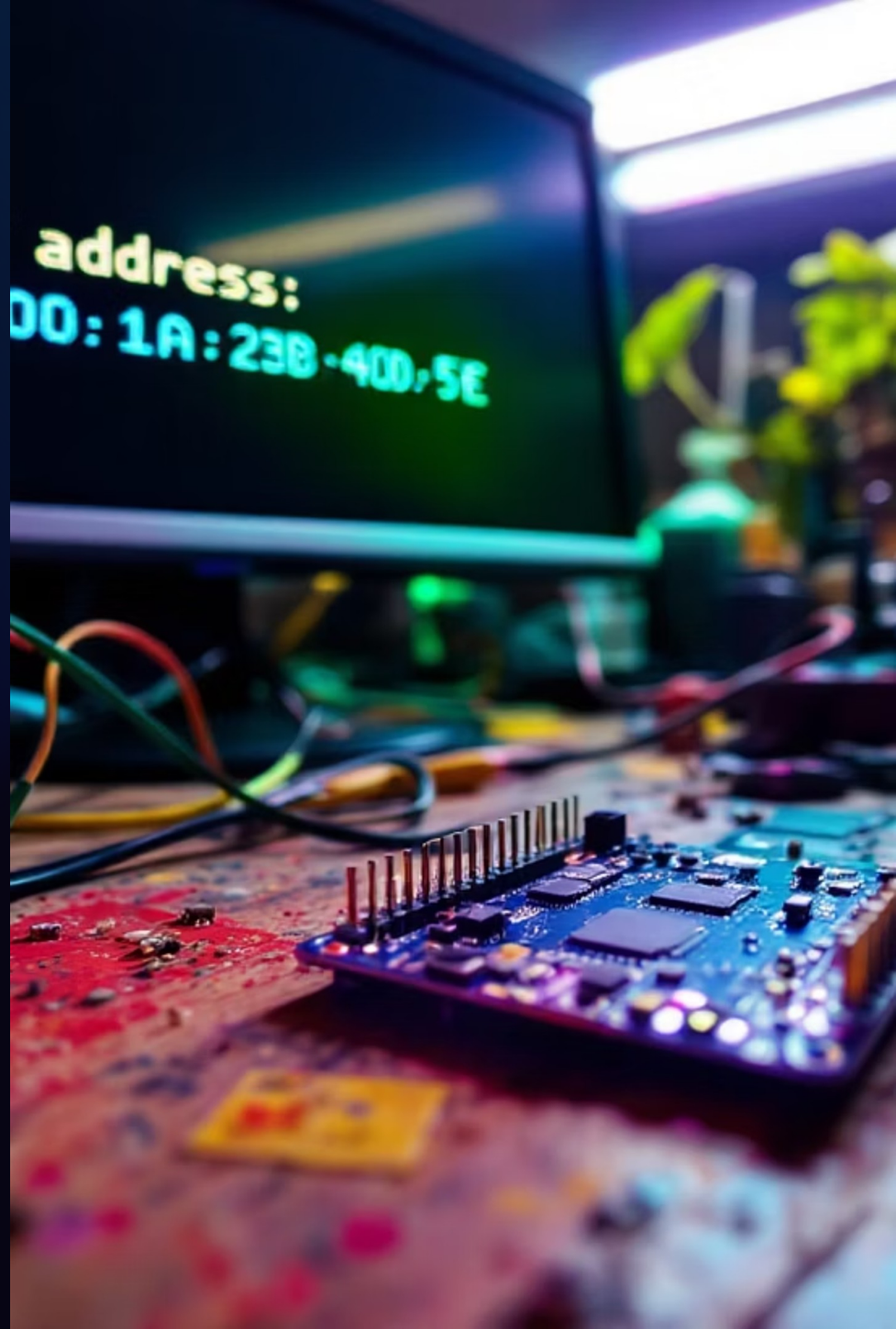
- Use GATT services
- Heart Rate Service example
- Notifications = async data push from server to client

BLE Sample: Peripheral HR

- Path: samples/bluetooth/peripheral_hr
- Board: nrf52dk/nrf52832

```
west build -b nrf52dk/nrf52832 samples/bluetooth/peripheral_hr
west flash
```

- Save the peripheral mac addr printed on the screen



Central: Receiving Data

1

Scan

Find Heart Rate Service advertisers

2

Connect

Establish link with peripheral

3

Discover

Find services & characteristics

4

Subscribe

Enable notifications

5

Receive

Process heart rate data

BLE Sample: Central HR

- Path: samples/bluetooth/central_hr
- Board: nrf52840dk/nrf52840

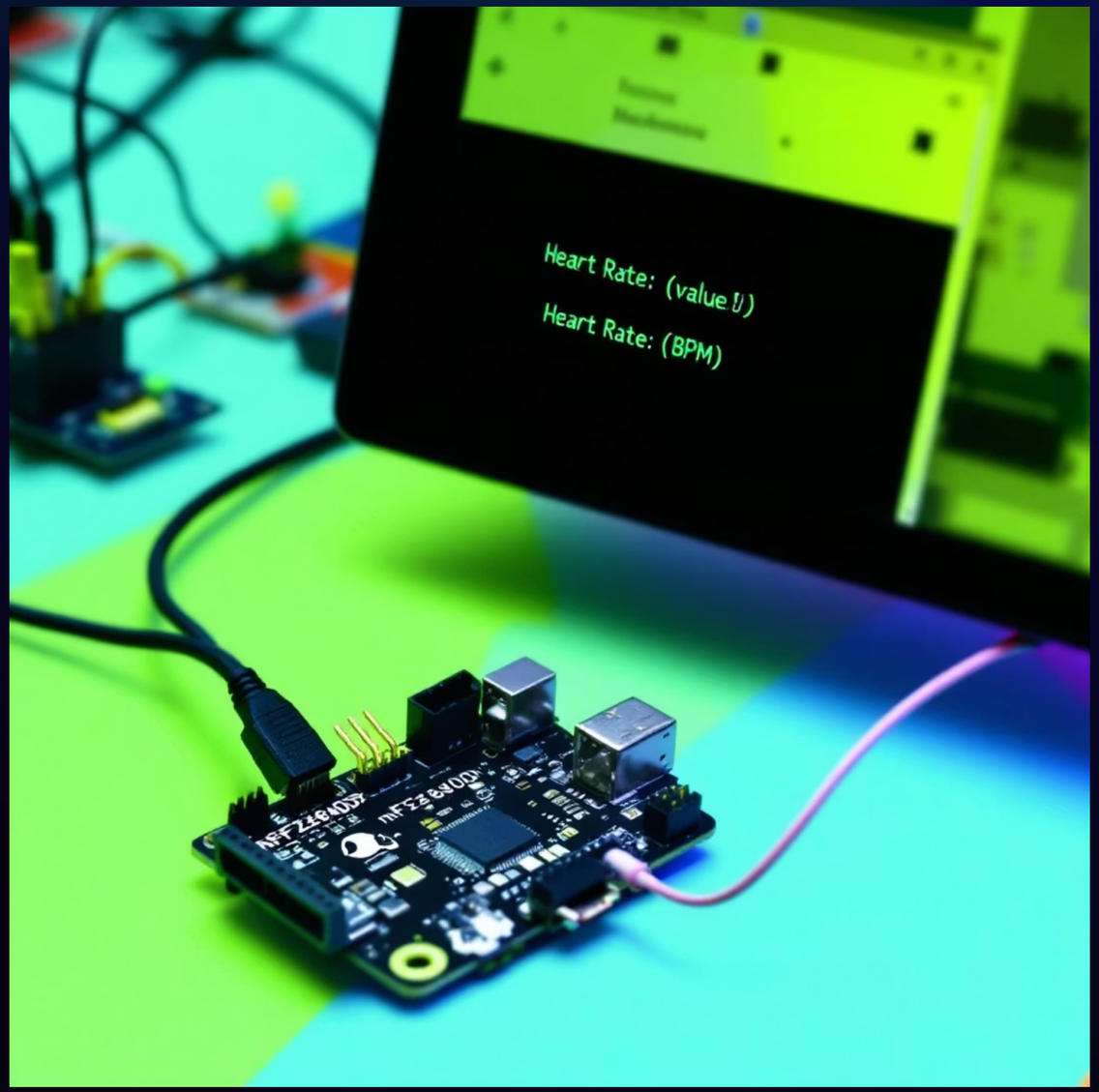
In **device_found** after the print add:

```
if (strncmp(dev, PERIPH_ADDR, 17) != 0)
 {
   printk(" (not ours)\n");
   return;
}

 printk("\n");
```

In **notify_func**:print the data[1] instead of data

- Build and flash



Exercise Demo Steps

1. Connect both boards to USB
2. Flash peripheral_hr to nRF52DK
3. Flash central_hr to nRF52840DK
4. Open two terminals (e.g., minicom)
5. Observe advertisement, connection, and data transfer