Course Title
IoT Wireless & Cloud Emerging Technologies

❖ **Modules**

- 1. IoT Business & Products
- 2. IoT Architecture & Technologies
- 3. IoT Networks
- 4. **Wi-Fi & Bluetooth**
  - 4.3 Bluetooth ~ 4.4 Bluetooth Standards
- 5. Cloud Technology
- 6. **IoT Bluetooth & Wi-Fi and EC2 Cloud Projects**

IoT Bluetooth & Wi-Fi and
EC2 Cloud Projects
Bluetooth Scan
Project

Bluetooth Scan Project

❖ **Bluetooth Scan Project (Android)**

- Scan 'Classic Bluetooth' and 'Bluetooth Low Energy' packet
  - Estimate Bluetooth version of the device
- Find distance based on the RSSI (Received Signal Strength Indication)

	App. 1		App. 2
	BLE Scanner		Bluetooth 4.0 Scanner
	Available at Play store https://play.google.com/store/apps/details?id=com.macdom.ble.blescanner		Available at Play store https://play.google.com/store/apps/details?id=com.bluemotionlabs.bluescan

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Bluetooth Scan Project

❖ **Bluetooth Scan 1**
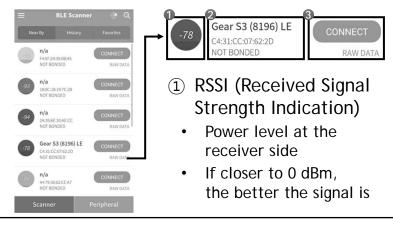
- With 'BLE Scanner' application, you can scan BLE advertising message (after Bluetooth 4.0)

Bluetooth Scan Project

❖ Bluetooth Scan 1

- With 'BLE Scanner' application, you can scan BLE advertising message (after Bluetooth 4.0)

① RSSI (Received Signal Strength Indication)

- Power level at the receiver side
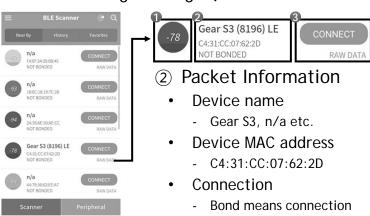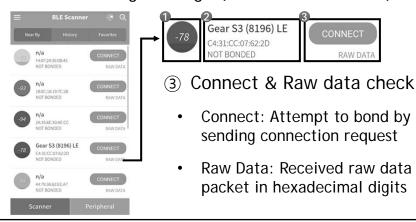- If closer to 0 dBm, the better the signal is

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Bluetooth Scan Project

❖ Bluetooth Scan 1

- With 'BLE Scanner' application, you can scan BLE advertising message (after Bluetooth 4.0)

② Packet Information

- Device name
  - Gear S3, n/a etc.
- Device MAC address
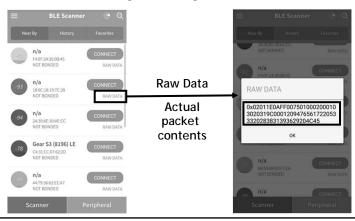 - C4:31:CC:07:62:2D
- Connection
  - Bond means connection

Bluetooth Scan Project

❖ Bluetooth Scan 1

- With 'BLE Scanner' application, you can scan
  BLE advertising message (after Bluetooth 4.0)

③ Connect & Raw data check

- Connect: Attempt to bond by
  sending connection request

- Raw Data: Received raw data
  packet in hexadecimal digits

Bluetooth Scan Project

❖ Bluetooth Scan 1

- With 'BLE Scanner' application, you can scan
  BLE advertising message (after Bluetooth 4.0)

Raw Data

Actual
packet
contents

RAW DATA

0x02011E0AFF007501000200010
3020319C0001209476561722053
33202838313936329204C45

OK

Bluetooth Scan Project

❖ **Bluetooth Scan 1**

- Estimate distances from your device

- Larger the RSSI is,
  the closer the device is

Bluetooth Scan Project

❖ **Bluetooth Scan 2**

- You scan a Bluetooth packet into a
  different Bluetooth version
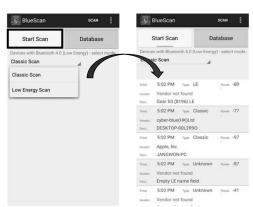 - Classic Bluetooth ➜ Before Bluetooth v4.0
  - BLE ➜ After Bluetooth v4.0

Bluetooth Scan Project

❖ Bluetooth Scan 2

- After choosing one of the modes,
  press 'Start Scan' to start scanning

Bluetooth Scan Project

❖ Bluetooth Scan 2

- After choosing one of the modes,
  press 'Start Scan' to start scanning
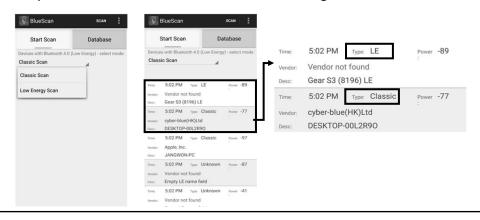
Bluetooth Scan Project

❖ Bluetooth Scan 2

- After choosing one of the modes,
  press 'Start Scan' to start scanning
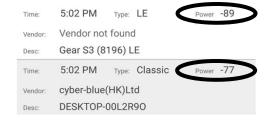

Bluetooth Scan Project

❖ Bluetooth Scan 2

- Received packet contains Vendor
  and Description (device name)

Bluetooth Scan Project

❖ **Bluetooth Scan 2**

- Received packet contains Vendor and Description (device name)

- Power (RSSI) can be read from the receiver

Time:	5:02 PM	Type: LE	Power -89
Vendor:	Vendor not found		
Desc:	Gear S3 (8196) LE		
Time:	5:02 PM	Type: Classic	Power -77
Vendor:	cyber-blue(HK)Ltd		
Desc:	DESKTOP-00L2R9O		

Bluetooth Scan Project

❖ **Bluetooth Scan project (iPhone)**

- Scan only BLE packets and read the RSSI
  - Visualize the RSSI and averaged RSSI in a plot
- Show whether the advertising packet is connectable or not
- Show which PHY channel the packet is using

Application
BLE Discovery
Available at Apple App Store
https://itunes.apple.com/us/app/ble-discovery/id821826273?mt=8

Bluetooth Scan Project

❖ **Bluetooth Scan in iPhone**

- With the 'BLE discovery' application,
  you can scan BLE advertising messages

Bluetooth Scan Project

❖ **Bluetooth Scan in iPhone**

- With the 'BLE discovery' application,
  you can scan BLE advertising messages

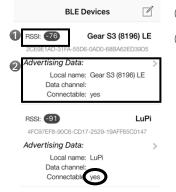## Bluetooth Scan Project

❖ Bluetooth Scan in iPhone 📶

- With the 'BLE discovery' application, you can scan BLE advertising messages

BLE Devices ✎

❶ RSSI: -76   Gear S3 (8196) LE
2CE9E1AD-31FA-55D6-0AD0-68BA62ED39D5

❷ *Advertising Data:*   >
    Local name: Gear S3 (8196) LE
    Data channel:
    Connectable: yes

RSSI: -91   LuPi
4FC97EF8-90C6-CD17-2529-19AFF65C0147

Advertising Data: >
    Local name: LuPi
    Data channel:
    Connectable: yes

① RSSI: Received Power

② Advertising Data
- Local Name: Device Name
- Data channels can be the 37, 38, or 39th channel
- If the message is a connectable message ➔ yes
- Otherwise, shows no ➔ Only an advertising message

Bluetooth Scan Project

❖ Bluetooth Scan in iPhone 📶

- RSSI Plot
  - Shows real-time RSSI and averaged RSSI

IoT Bluetooth & Wi-Fi and
EC2 Cloud Projects
References

References

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- https://aws.amazon.com