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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEER



## **Application Based Internet of Things Report**

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HỒ CHÍ MINH CITY

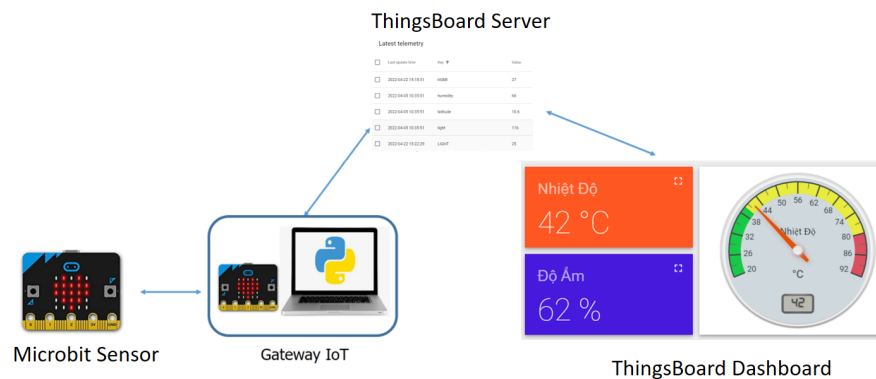


## Content

<b>1</b>	<b>Introduction</b>	<b>2</b>
<b>2</b>	<b>Implementation</b>	<b>2</b>
2.1	Main Microbit . . . . .	2
2.2	Sensor Microbit . . . . .	3
<b>3</b>	<b>Report</b>	<b>4</b>
3.1	Main Microbit Program . . . . .	4
3.2	Sensor Microbit Program . . . . .	5
3.2.1	Extra points . . . . .	6

## 1 Introduction

In this lab, students are supposed to deploy a wireless sensor network for an IoT application. A microbit board is used to play the roles of a sensor node (reads sensory data and receives commands from the gateway). The second microbit is connected to the Python source code to support wireless communications with the sensor node. The block architecture of the system is presented bellow.



Hình 1: *Structure of the wireless sensor network*

Following the architecture, the main microbit (connected to the gateway python) is just an adapter, to forward commands from python to sensor nodes and sensory data from sensors, to the python gateway.

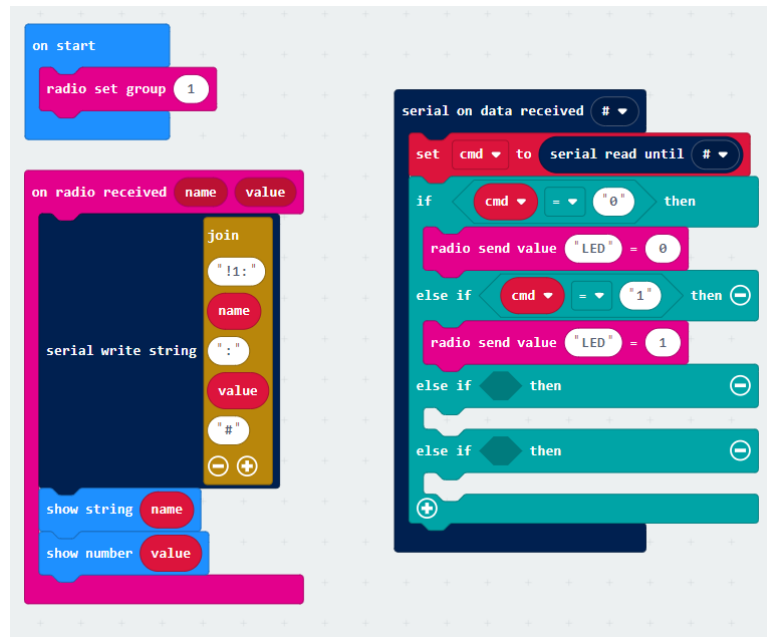
## 2 Implementation

### 2.1 Main Microbit

The main microbit now is an data adapter, having 2 connection:

- Serial: Receive commands from python and send sensory data to python
- Radio: Send command to sensor nodes and receive sensory data.

In order to use the Radio, the group of microbits must be the same. The block **radio send value** is recommended in this lab. A propose to implement the source code is depicted as follows:



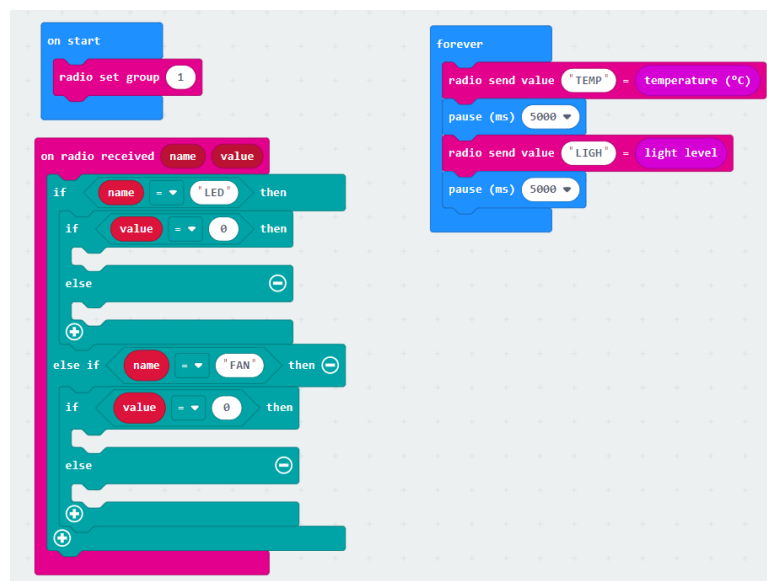
Hình 2: Main Microbit Program

The link for this source code is public following:

[https://makecode.microbit.org/\\_iguEFf83AHJH](https://makecode.microbit.org/_iguEFf83AHJH)

## 2.2 Sensor Microbit

The sensor code is now, move to the second Microbit. The implementation is similar to LAB 3. However, the communication is wirelessly by Radio. The proposed source code for this part is presented as follow.



Hình 3: Main Microbit Program

The link for this source code is public bellow:

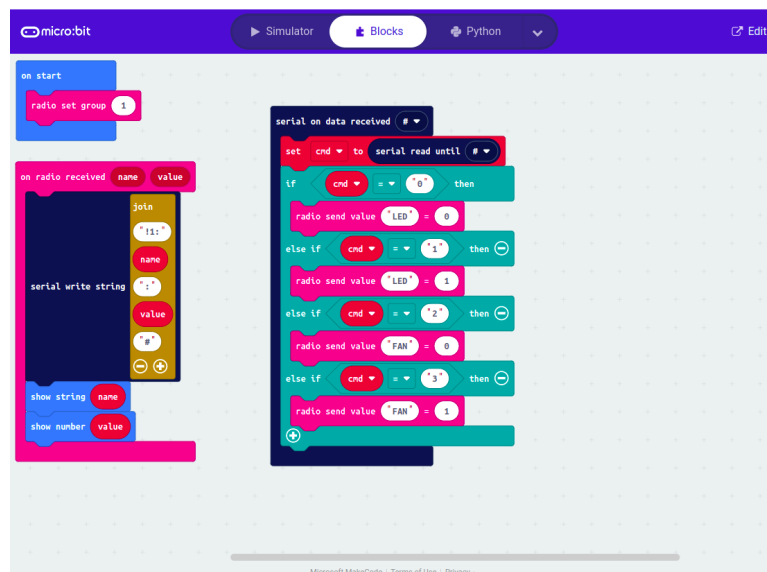
[https://makecode.microbit.org/\\_T7s75m337h7L](https://makecode.microbit.org/_T7s75m337h7L)

## 3 Report

### 3.1 Main Microbit Program

**Report :** The picture of your source code is required to present here in this report. A sharable link from MakeCode is also required to present here. To finalize your program, at least 4 commands are supported (for 2 buttons on the dashboard).

**Picture :**



Hình 4: Main Microbit Edit

**Source code python :**

```

1 def on_data_received():
2     global cmd
3     cmd = serial.read_until(serial.delimiters(Delimiters.HASH))
4     if cmd == "0":
5         radio.send_value("LED", 0)
6     elif cmd == "1":
7         radio.send_value("LED", 1)
8     elif cmd == "2":
9         radio.send_value("FAN", 0)
10    elif cmd == "3":
11        radio.send_value("FAN", 1)
12    serial.on_data_received(serial.delimiters(Delimiters.HASH), ↵
        on_data_received)
13
14 def on_received_value(name, value):

```

```

15     serial.write_string("!1:" + name + ":" + str(value) + "#")
16     basic.show_string(name)
17     basic.show_number(value)
18 radio.on_received_value(on_received_value)
19
20 cmd = ""
21 radio.set_group(1)

```

The link for this source code :

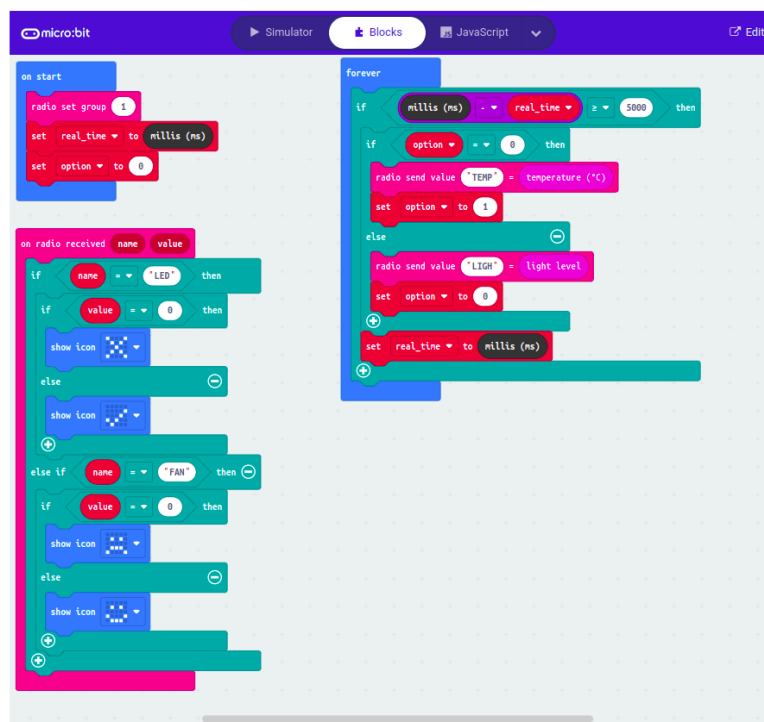
[https://makecode.microbit.org/\\_TVuf0sTjaWFH](https://makecode.microbit.org/_TVuf0sTjaWFH)

### 3.2 Sensor Microbit Program

**Report :** The picture of your source code is required to present here in this report. A sharable link from MakeCode is also required to present here.

To finilize your program, at least 4 commands are received and process in the block **on radio received name value** (for 2 buttons on the dashboard).

**Picture :**



Hình 5: *Sensor Microbit Edit*

Source code python :

---

```
1 def on_received_value(name, value):
2     if name == "LED":
3         if value == 0:
4             basic.show_icon(IconNames.NO)
5         else:
6             basic.show_icon(IconNames.YES)
7     elif name == "FAN":
8         if value == 0:
9             basic.show_icon(IconNames.SAD)
10        else:
11            basic.show_icon(IconNames.HAPPY)
12 radio.on_received_value(on_received_value)
13
14 radio.set_group(1)
15 real_time = control.millis()
16 option = 0
17
18 def on_forever():
19     global option, real_time
20     if control.millis() - real_time >= 5000:
21         if option == 0:
22             radio.send_value("TEMP", input.temperature())
23             option = 1
24         else:
25             radio.send_value("LIGH", input.light_level())
26             option = 0
27         real_time = control.millis()
28 basic.forever(on_forever)
```

---

The link for this source code :

[https://makecode.microbit.org/\\_183F0EfUY9HC](https://makecode.microbit.org/_183F0EfUY9HC)

### 3.2.1 Extra points

Students can have extra points if one of following issues is proposed and implemented successfully:

- 2 microbits are used for the sensors node, to send the data and receive commands to/from the gateway
- 2 peripheral devices are connected to the microbit sensor node (LED, BUZZER or a RELAY).



Please explain your solution in this report and provide the source code by a sharable link from MakeCode. For the first option, explain how the ID can be used in the network. For the second one, please indicate the connection pins between the microbit sensor and the devices.