Embedded Systems
MQTT

1. Serialise your sensor data into a byte-encoded JSON message
    a. Convert it to Python types `int`, `float`, `string` or `Boolean`, grouped into `list` or `dict` if necessary.
    b. Package it into a single Python `dict` with suitable keys to label each field
    c. Convert it to a JSON message with function `dumps()` from micropython module `ujson`
2. Connect to the EEERover WiFi network
    a. Set up connection in micropython

    ```
    ap_if = network.WLAN(network.AP_IF)
    ap_if.active(False)

    sta_if = network.WLAN(network.STA_IF)
    sta_if.active(True)
    sta_if.connect('EEERover', 'exhibition')
    ```

    b. Check if the connection is successful with method `isconnected()`
3. Send your JSON message to the MQTT broker
    a. See commands from lecture slides
        i. Choose a suitable MQTT topic
        ii. Address of the broker is `192.168.0.10`
    b. Check the broker monitor to see if your message was received
4. Fetch the message on your laptop
    a. (optional) Install mosquitto to publish and subscribe to MQTT messages
        i. https://mosquitto.org/download/
        ii. Installation complicated in Windows!
    b. Install Paho library for Python
        i. `pip install paho-mqtt`
        ii. https://pypi.python.org/pypi/paho-mqtt/
    c. Retrieve the message and extract the content
5. (optional) Send a message to the IoT device
    a. Check micropython MQTT documentation https://github.com/micropython/micropython-lib/tree/master/umqtt.simple
    b. Define a suitable callback function to respond to a message on the ESP8266 (e.g. print via serial terminal) with `set_callback()`
    c. Subscribe to a topic with `subscribe()`
    d. Publish a message and check the response