

# IoT1

## IoT1 mqtt interface using guide

Programme for Sustainable Growth and Jobs

Leverage from  
the EU  
2014–2020



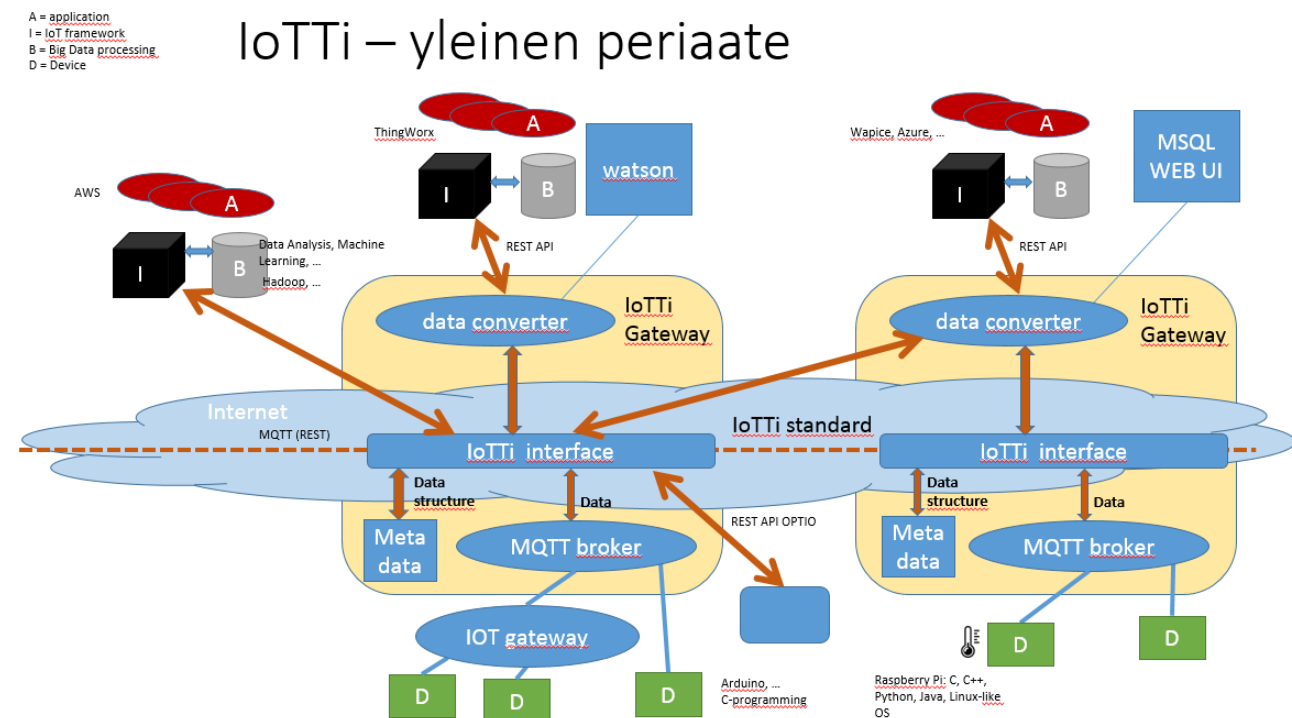
European Union  
European Social Fund

# 1 loTTi open interface to support loTTi educational co-operation process.

loTTi interface is designed to for support educational co-operation, so for IoT-related trainings it is possible to pick demonstration data from any of loTTi member.

All available data from members can be cross-used by any of member. Metadata document descripts the data structure of sensores. Document can be get from mqtt broker.

Below is idea loTTi interface. loTTi protocol standard is MQTT. loTTi members keep Metadata information updated by them self. Each member is responsible to produce data from they own environment. Each member with platform that they are using for daily education also does data-analysis and visualization.



## 1.1 Reading data from IoTi interface

By subscribing to mqtt broker, it is possible to get Metadata info and all available measurements.

Subscribe is standard mqtt operation. Authentication is not needed.

Metadata can get from topic: Metadata/metadata

Metadata info defines all topics for IoTi measurement data.

Measured data information is also in metadata, so reading metadata info will tell what kind of measurements are available from each member.

Metadata info is in JSON format.

Below are IP numbers and port numbers to IoTi brokers.

TAMK IoTi measurements:

IP: 193.167.167.59

Port number: 10887

Metadata topic: Metadata/metadata

HAMK IoTi measurements

Host address: iot.research.hamk.fi

Port: 1883,8883

Metadata topic: Metadata/metadata

## 1.2 Examples how to use IoT interface

Below is example how read metadata and measurements

Read metadata from TAMK broker.

Raw metadata data.

```
pi@raspberrypi:~ $
pi@raspberrypi:~ $ mosquitto_sub -h 193.167.167.59 -t "Metadata/metadata" -p 10887
{"topic": "ICT_out_2018", "schema": {"$schema": "http://json-schema.org/draft-04/schema#", "type": "object", "description": "Roof sensors", "properties": {"S_path": {"type": "string", "description": "Sensor path - absolute", "S_name": {"type": "string", "description": "Sensor name", "properties": {"wind speed": {"type": "string", "description": "Wind speed in m/s", "properties": {"S_value": {"minimum": 0.0, "type": "float number", "description": "measured value at roof A3"}}, "humidity in": {"type": "string", "description": "Humidity inside lab A3-16", "properties": {"S_value": {"max": 100, "minimum": 0, "type": "float number", "description": "measured value in A3"}}, "temperature": {"type": "string", "description": "Temperature at roof A3", "properties": {"S_value": {"max": 30, "minimum": -20, "type": "float number", "description": "measured value roof A3"}}, "light": {"type": "string", "description": "Light level at roof A3", "properties": {"S_value": {"max": 100, "minimum": 0, "type": "float number", "description": "measured value roof A3"}}, "wind direction": {"type": "string", "description": "Wind direction by numbers 1-8 1=North", "properties": {"S_value": {"max": 8, "minimum": 1, "type": "integer number", "description": "measured value at roof A3"}}, "DHT11 hum 1": {"type": "string", "description": "Humidity at wall A3", "properties": {"S_value": {"max": 100, "minimum": 0, "type": "float number", "description": "measured value wall A3"}}, "DS1820 temp 1": {"type": "string", "description": "Temperature at wall A3", "properties": {"S_value": {"max": 150, "minimum": -50, "type": "float number", "description": "measured value wall A3"}}, "BMP temp 1": {"type": "string", "description": "Temperature at wall A3", "properties": {"S_value": {"max": 150, "minimum": -50, "type": "float number", "description": "measured value wall A3"}}, "humidity out": {"type": "string", "description": "Humidity at roof A3", "properties": {"S_value": {"max": 100, "minimum": 0, "type": "float number", "description": "measured value roof A3"}}, "Air pres 1": {"type": "string", "description": "Air pressure at roof A3", "properties": {"S_value": {"max": 1050, "minimum": 890, "type": "float number", "description": "measured value roof A3"}}, "title": "Lab A3-16"}}
```

Metadata shown by JSON reader

```
{
  "topic": "ICT_out_2018",
  "schema": {
    "$schema": "http://json-schema.org/draft-04/schema#",
    "type": "object",
    "description": "Roof sensors",
    "properties": {
      "S_path": {
        "type": "string",
        "description": "Sensor path - absolute",
        "S_name": {
          "type": "string",
          "description": "Sensor name",
          "properties": {
            "wind_speed": {
```

```

    "type": "string",
    "description": "Wind speed in m/s",
    "properties": {
      "S_value": {
        "minimum": 0.0,
        "type": "float number",
        "description": "measured value at roof A3"
      }
    }
  },
  "humidity_in": {
    "type": "string",
    "description": "Humidity inside lab A3-16",
    "properties": {
      "S_value": {
        "max": 100,
        "minimum": 0,
        "type": "float number",
        "description": "measured value in A3"
      }
    }
  },
  "temperature": {
    "type": "string",
    "description": "Temperature at roof A3",
    "properties": {
      "S_value": {
        "max": 30,
        "minimum": -20,
        "type": "float number",
        "description": "measured value roof A3"
      }
    }
  },
  "light": {
    "type": "string",
    "description": "Light level at roof A3",
    "properties": {
      "S_value": {
        "max": 100,
        "minimum": 0,
        "type": "float number",

```

```

        "description":"measured value roof A3"
    }
}
},
"wind_direction":{
    "type":"string",
    "description":"Wind direction by numbers 1-8 1=North",
    "properties":{
        "S_value":{
            "max":8,
            "minimum":1,
            "type":"integer number",
            "description":"measured value at roof A3"
        }
    }
},
"DHT11_hum_1":{
    "type":"string",
    "description":"Humidity at wall A3",
    "properties":{
        "S_value":{
            "max":100,
            "minimum":0,
            "type":"float number",
            "description":"measured value wall A3"
        }
    }
},
"DS1820_temp_1":{
    "type":"string",
    "description":"Temperature at wall A3",
    "properties":{
        "S_value":{
            "max":150,
            "minimum":-50,
            "type":"float number",
            "description":"measured value wall A3"
        }
    }
},
"BMP_temp_1":{
    "type":"string",

```

```

    "description": "Temperature at wall A3",
    "properties": {
      "S_value": {
        "max": 150,
        "minimum": -50,
        "type": "float number",
        "description": "measured value wall A3"
      }
    }
  },
  "humidity_out": {
    "type": "string",
    "description": "Humidity at roof A3",
    "properties": {
      "S_value": {
        "max": 100,
        "minimum": 0,
        "type": "float number",
        "description": "measured value roof A3"
      }
    }
  },
  "Air_pres_1": {
    "type": "string",
    "description": "Air pressure at roof A3",
    "properties": {
      "S_value": {
        "max": 1050,
        "minimum": 890,
        "type": "float number",
        "description": "measured value roof A3"
      }
    }
  }
},
"humidity_in": {
  "type": "string",
  "description": "Humidity at wall A3",
  "properties": {
    "S_value": {
      "max": 100,
      "minimum": 0,
      "type": "float number",
      "description": "measured value wall A3"
    }
  }
},
"Air_pres_2": {
  "type": "string",
  "description": "Air pressure at wall A3",
  "properties": {
    "S_value": {
      "max": 1050,
      "minimum": 890,
      "type": "float number",
      "description": "measured value wall A3"
    }
  }
}
},
"title": "Lab A3-16"
}
}

```

### 1.3 Example of measured data

TAMK weather station data example.

```
pi@raspberrypi:~ $  
pi@raspberrypi:~ $ mosquitto_sub -h 193.167.167.59 -t "ICT_out_2018" -p 10887  
IOTJS={"S_path":"ch1","S_name":"light","S_value":104.98}  
IOTJS={"S_path":"ch1","S_name":"temperature","S_value":15.52}  
IOTJS={"S_path":"ch1","S_name":"wind_direction","S_value":5.00}  
IOTJS={"S_path":"ch1","S_name":"rain","S_value":8236.36}  
IOTJS={"S_path":"ch1","S_name":"wind_speed","S_value":5.15}  
IOTJS={"S_path":"ch1","S_name":"humidity_in","S_value":46.17}  
IOTJS={"S_path":"ch1","S_name":"humidity_out","S_value":1.00}  
IOTJS={"S_path":"ch1","S_name":"light","S_value":104.83}  
IOTJS={"S_path":"ch1","S_name":"temperature","S_value":16.40}  
IOTJS={"S_path":"ch1","S_name":"wind_direction","S_value":4.00}  
IOTJS={"S_path":"ch1","S_name":"rain","S_value":8236.36}  
IOTJS={"S_path":"ch1","S_name":"wind_speed","S_value":6.01}  
IOTJS={"S_path":"ch1","S_name":"humidity_in","S_value":46.17}  
IOTJS={"S_path":"ch1","S_name":"humidity_out","S_value":1.00}  
IOTJS={"S_path":"ch1","S_name":"light","S_value":104.98}  
IOTJS={"S_path":"ch1","S_name":"temperature","S_value":15.37}  
IOTJS={"S_path":"ch1","S_name":"wind_direction","S_value":8.00}  
IOTJS={"S_path":"ch1","S_name":"rain","S_value":8236.36}  
IOTJS={"S_path":"ch1","S_name":"wind_speed","S_value":4.46}  
IOTJS={"S_path":"ch1","S_name":"humidity_in","S_value":46.17}  
IOTJS={"S_path":"ch1","S_name":"humidity_out","S_value":1.00}  
^C  
pi@raspberrypi:~ $ █
```