Group project: A distributed architecture for ADL recognition

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Chapter 1

File Index

1.1 File List

Here is a list of all documented files with brief descriptions:

Chapter 2

File Documentation

2.1 scripts/adapter_template.py File Reference

This file contains the template used to simulate an IMU sending data on a topic.

Functions

- def adapter_template.adapter ()

  Publish a sample on the topic at a fixed frequency.

Variables

- adapter_template.samplePub = None

  ROS publisher.
- adapter_template.sample = ImuSample()

  IMU sample message definition.

2.1.1 Detailed Description

This file contains the template used to simulate an IMU sending data on a topic.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

23 March 2021

2.1.2 Function Documentation

2.1.2.1 adapter()

```
def adapter_template.adapter ( )
```

Publish a sample on the topic at a fixed frequency.

The sensors publish data with a 30 ms sampling time, so the frequency will be 33.33 Hz. This node sends the contents of a csv file sample by sample using the `ImuSample.msg` custom message format.

Note

Once the node has published all the file's contents, it will shutdown.

2.2 scripts/back_IMU_adapter.py File Reference

This file contains the back IMU adapter.

2.2.1 Detailed Description

This file contains the back IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.

2.3 scripts/final_classificator.py File Reference

This file represents the final component of the architecture, which publishes the system's classification of a sliding window.

Functions

- def final_classificator.backCallback (message)

  Callback function for the `sensor/back_IMU_label` topic.
- def final_classificator.llaCallback (message)

  Callback function for the `sensor/lla_IMU_label` topic.
- def final_classificator.luaCallback (message)

  Callback function for the `sensor/lua_IMU_label` topic.
- def final_classificator.rlaCallback (message)

  Callback function for the `sensor/rla_IMU_label` topic.
- def final_classificator.rtCallback (message)

  Callback function for the `sensor/rt_IMU_label` topic.
- def final_classificator.ruaCallback (message)

  Callback function for the `sensor/rua_IMU_label` topic.
- def final_classificator.writeOnCsv (startingTimestamp, endingTimestamp, label, confidenceCoefficient)

  Write the output on the csv file if the user specified it in the launch file.
- def final_classificator.classify ()

  Output the system's classification on the `system_classification` topic and eventually on a user-defined csv file.

Variables

- final_classificator.classificationPub = None

  ROS publisher.
- final_classificator.backSub = None

  Back sensor module ROS subscriber.
- final_classificator.llaSub = None

  Left lower arm sensor module ROS subscriber.
- final_classificator.luaSub = None

  Left upper arm sensor module ROS subscriber.
- final_classificator.rlaSub = None

  Right lower arm sensor module ROS subscriber.
- final_classificator.rtSub = None

  Right thigh sensor module ROS subscriber.
- final_classificator.ruaSub = None

  Right upper arm sensor module ROS subscriber.
- final_classificator.backReceived = threading.Event()

  Threading event.
- final_classificator.llaReceived = threading.Event()

  Threading event.
- final_classificator.luaReceived = threading.Event()

  Threading event.
- final_classificator.rlaReceived = threading.Event()

  Threading event.
- final_classificator.rtReceived = threading.Event()

  Threading event.
- final_classificator.ruaReceived = threading.Event()

  Threading event.
- list final_classificator.labels = [ ]

  Labels list.

- list final_classificator.startingTimestamps = [ ]

  Starting timestamps list.
- list final_classificator.endingTimestamps = [ ]

  Ending timestamps list.
- list final_classificator.confCoeffs = [ ]

  Sensor modules' confidence coefficients list.
- final_classificator.sysClass = Classification()

  System classification message definition.

2.3.1 Detailed Description

This file represents the final component of the architecture, which publishes the system's classification of a sliding window.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

2.3.2 Function Documentation

2.3.2.1 backCallback()

```
def final_classificator.backCallback (
             message )
```

Callback function for the `sensor/back_IMU_label` topic.

Parameters

message	The message sent by the back sensor module.

2.3.2.2 classify()

```
def final_classificator.classify ( )
```

Output the system's classification on the `system_classification` topic and eventually on a user-defined csv file.

Wait for all the sensor modules to publish their message then verify that both the starting and ending timestamps are coherent: if so, get the starting and ending timestamps of the overall sliding window, compute the average confidence coefficient, create the message, send it on the topic and start the thread to write it on the csv file; otherwise, simply notify that an invalid classification has been detected.

2.3.2.3 llaCallback()

```
def final_classificator.llaCallback (
              message )
```

Callback function for the `sensor/lla_IMU_label` topic.

Parameters

message	The message sent by the left lower arm sensor module.

2.3.2.4 luaCallback()

```
def final_classificator.luaCallback (
              message )
```

Callback function for the `sensor/lua_IMU_label` topic.

Parameters

message	The message sent by the left upper arm sensor module.

2.3.2.5 rlaCallback()

```
def final_classificator.rlaCallback (
              message )
```

Callback function for the `sensor/rla_IMU_label` topic.

Parameters

message	The message sent by the right lower arm sensor module.

2.3.2.6 rtCallback()

```
def final_classificator.rtCallback (
              message )
```

Callback function for the `sensor/rt_IMU_label` topic.

Parameters

message	The message sent by the right thigh sensor module.

2.3.2.7 ruaCallback()

```
def final_classificator.ruaCallback (
             message )
```

Callback function for the `sensor/rua_IMU_label` topic.

Parameters

message	The message sent by the right upper arm sensor module.

2.3.2.8 writeOnCsv()

```
def final_classificator.writeOnCsv (
             startingTimestamp,
             endingTimestamp,
             label,
             confidenceCoefficient )
```

Write the output on the csv file if the user specified it in the launch file.

Parameters

starting_timestamp	The starting timestamp (ms since midnight) of the sliding window.
ending_timestamp	The ending timestamp (ms since midnight) of the sliding window.
label	The label representing the final output of the system.
confidence_coefficient	The number in the range [0, 1] representing the confidence on the output label: high value means high confidence.

2.4 scripts/lla_IMU_adapter.py File Reference

This file contains the left lower arm IMU adapter.

2.4.1 Detailed Description

This file contains the left lower arm IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.

2.5 scripts/lua_IMU_adapter.py File Reference

This file contains the left upper arm IMU adapter.

2.5.1 Detailed Description

This file contains the left upper arm IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.

2.6 scripts/rla_IMU_adapter.py File Reference

This file contains the right lower arm IMU adapter.

2.6.1 Detailed Description

This file contains the right lower arm IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.

2.7 scripts/rt_IMU_adapter.py File Reference

This file contains the right thigh IMU adapter.

2.7.1 Detailed Description

This file contains the right thigh IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.

2.8 scripts/rua_IMU_adapter.py File Reference

This file contains the right upper arm IMU adapter.

2.8.1 Detailed Description

This file contains the right upper arm IMU adapter.

Author

Davide Piccinini <piccio98dp@gmail.com>

Date

24 March 2021

Note

See `adapter_template.py` for more documentation.