S5_2019

Demonstration and evaluation of localization mechanisms with Bluetooth Low Energy

Prerequisites

Software for desktop development

- SimpleLink CC13X2-26X2 SDK 3.20 or SimpleLink CC13X2-26X2 SDK 3.40
- Python 3.7 or higher

Hardware

This module requires the following kits:

- 3x SimpleLink™ CC26x2R LaunchPad™
- 1x BOOSTXL-AoA

Installation and basics

How to install Simplelink-CC2640R2-SDK 3.20.00.21

Go to http://www.ti.com/tool/download/SIMPLELINK-CC2640R2-SDK/3.20.00.21

Then, download Linux Installer

Go to download folder in terminal and give permissions to file typing in terminal:

```
$ chmod +x simplelink_cc2640r2_sdk_3_20_00_21.run
```

Run in terminal

```
$ simplelink_cc2640r2_sdk_3_20_00_21.run
```

Look for the rtls_monitor tool located in :

> ti/simplelink_cc2640r2_sdk_3_20_00_21/tools/blestack/rtls_agent

Give permissions to file typing in terminal

```
$ chmod +x requirements.txt
```

Install the requirements in the *.txt file

```
$ pip3 install -r requirements.txt
```

> If error with windows-curses [windows-curses is not necessary on Python 3.7] comment such line.

Once Install virtualenv typing :

```
$ sudo pip3 install virtualenv
```

Execute virtualenv typing :

```
$ virtualenv -p python3 .venv
#or you can use
$ python3 -m venv .venv
```

Activate virtualenv typing :

```
$ . .venv/bin/activate
#or you can use
$ source .venv/bin/activate which does exactly the same thing
```

Give permissions to file typing in terminal :

```
$ chmod +x rtls_agent_cli
```

Now you can run the RTLS Agent

```
$ python3 agent/rtls_agent_cli.py
```

To run again the virtual environment

Execute virtualenv typing :

```
$ virtualenv -p python3 .venv
#or you can use
$ python3 -m venv .venv
```

Activate virtualenv typing :

```
$ . .venv/bin/activate
#or you can use
$ source .venv/bin/activate which does exactly the same thing
```

Give permissions to file typing in terminal :

```
$ chmod +x rtls_agent_cli
```

Now you can run the AoA agent

```
$ python3 rtls_example.py
```

How to install Simplelink-CC2640R2-SDK 3.40.00.10

Go to http://www.ti.com/tool/download/SIMPLELINK-CC2640R2-SDK/3.20.00.21

Then, download Linux Installer

Go to download folder in terminal and give permissions to file typing in terminal :

```
$ chmod +x simplelink_cc2640r2_sdk_3_40_00_10.run
```

Run in terminal

```
$ simplelink_cc2640r2_sdk_3_40_00_10.run
```

Look for the rtls_agent directory :

> /ti/simplelink_cc2640r2_sdk_3_40_00_21/tools/blestack/rtls_agent

Give permissions to file typing in terminal

```
$ chmod +x package.sh
```

File package.sh has been created as a script for Windows env and then ported over to run on a Unix environment so we need to type :

```
$ sed -i -e 's/\r$//' package.sh
```

Run de package file :

```
$ ./package.sh -c -b -u -i
```

Go to *rtls_ui* directory :

> ti/simplelink_cc2640r2_sdk_3_40_00_10/tools/blestack/rtls_agent/rtls_ui

Give permissions to file typing in terminal :

```
$ chmod +x rtls_ui
```

Run the RTLS Graphic Interface :

```
$ ./rtls_ui
```

Flashing CC2640R2 in AoA mode

Instructions

Reminder

- For the case of our cards :
- Passive <L5000IZO>
- Master <L5000J02>
- Slave <L5000IZP>

  This is a tutorial to activate AOA in Code Composer Studio using LAUNCH CC2640R2 cards

In the master and slave : right click on the *_app project and then in properties

- In <Build/XDCtools> Make sure the XDC TOOL is 3.20.0.21

In the master and slave : double click on the *.ccxml file <app project/targetConfigs/CC2640R2F.ccxm>

- Decrease the JTAG operating frequency to 2.5 MHz DECREASE THE JTAG OPERATING FREQUENCY TO 2.5 MHz

In the master and slave : go to TOOLS folder <app project/TOOLS>

- Double click on <build_config.opt>
- Go to the end of the file and uncomment the line defining : <RTLS_LOCATIONING_AOA>
- Save and flash

In the passive : right click on the *_app project and then in properties

- In <Build/XDCtools> Make sure the XDC TOOL is 3.20.0.21

Double click on the *.ccxml file <app project/targetConfigs/CC2640R2F.ccxm>

- Decrease the JTAG operating frequency to 2.5 MHz

Go to project properties (Right click)

- <app project/CCS Build/ARM Compiler/Predefined Symbols>
- Click add and type <RTLS_LOCATIONING_AOA>
- Apply and close
- Save and flash

AOA Format (RTLS)

- {"originator": "Nwp", "type": "AsyncReq", "subsystem": "RTLS", "command": "RTLS_CMD_AOA_RESULT_ANGLE", "payload": {"angle": -59, "rssi": -47, "antenna": 2, "channel": 22}}

AOA Format (our codes)

- "payload": {"angle": -19, "rssi": -66, "antenna": 2, "channel": 26, "time": 1581951429.8088975, "distance": "4", "position": "-15"}

RTLS using SDK 3.20

Instructions

Prerequisites

- Follow the instructions for installing SDK 3.20
- Flash the Passive, Master and Slave
- Python 3.7 or higher