

EE23B022RprtLab5

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1 Introduction:

I am Deepak Charan S (Roll No: EE23B022) and this is my report for the Fifth assignment of Microprocessor Lab, which I had done on 1/10/24.

2 Objective:

- * To demonstrate M2M communication of two AVR-IoT boards through MQTT protocol using Mosquitto broker (server).
- * AVR-IoT board A publishes and AVR-IoT board B subscribes to and sends message sent by Board A (B is connected to an LCD Board)
- * To run Mosquitto Broker in your laptop and connect two mobiles to that broker and transmit data (in the form of text) from one device to another.

3 Equipments/Software Required:

1. 2 AVR-IoT WG boards
2. 2 USB (B-type) cables, power cables, potentiometer and an LCD monitor
3. Laptop/desktop for configuring it as a mosquitto broker
4. MQTT libraries, mosquito software and MPLAB IDE platform
5. 2 mobile phones with MyMQTT app installed

4 Blinking LED through AVR IoT boards

4.1 General Procedure:

- Install and configure all the necessary software (Mosquitto server, MQTT libraries, MPLab IDE)

- In MPLab IDE, set up the Pin Module, WINC and MQTT properties (IP Address, hotspot and its password) as per the handout provided in Moodle
- Set up Mosquitto broker using command prompt
- Connect AVR IoT Board A using the USB cable to the laptop
- Generate an example Source file and replace *main.c* and *mqtt_example.c* with '*mainPublishCmmntd.c*' and '*M2M-MQTT-MosquitoPblshM-Cmmntd.c*' respectively (Both these codes are uploaded in Moodle).
- Program the board using this project
- Repeat the same procedure for Board B (using '*mainSubscribeCmmntd.c*' and '*M2M-MQTT-MosquitoSbscrbeM-Cmmntd.c*' codes)
- Observe Board B and responses in Mosquitto Server (We would see LEDs in Board B light up periodically and see how many bytes are published and subscribed to by the boards)

4.2 Photos:



Figure 1: Output shown on Moqsuitto broker

5 Showing Subscribed Info On LCD Monitor

5.1 General Procedure:

- ◆ Repeat the same procedure as above for burning codes into the boards (We can reuse the publisher board but use *mainSubscribeLuxLCD.c* and *M2M-MQTT-MosquitoSubscribeMdle.c* respectively instead for subscriber board)

- ◆ Connect the LCD board to the subscriber board with the right connections (using the help of a breadboard and potentiometer)
- ◆ Power the boards and change resistance of potentiometer until you observe the message received from publisher
- ◆ (Alternate: We also sent a message from our phone through *MyMQTT* app and observed the text on the monitor)

5.2 Photos

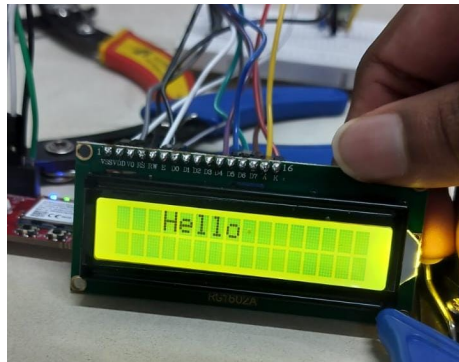


Figure 2: Message sent from Publisher Board

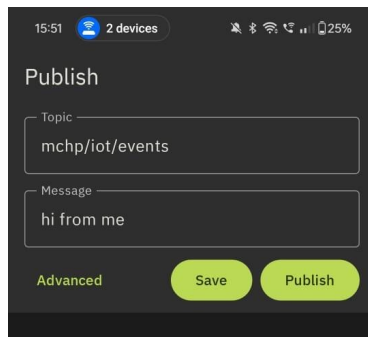


Figure 3: Sent from mobile

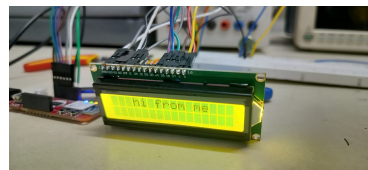


Figure 4: Received on Monitor

6 Receiving and displaying light sensor data

6.1 General Procedure:

- ✧ Repeat the same procedure as above for burning codes into the boards (We can reuse the subscriber board and LCD connections but use *mainPublishLuxADC-*

Mdle.c and *M2M-MQTT-MosquittoPublish* respectively instead for publisher board)

- ✧ Power the boards and change resistance of potentiometer until you observe the message received from publisher
- ✧ We would observe the light sensor data received from the publisher board on the LCD (Which increased by a massive amount when you shined a flashlight on it)



Figure 5: Lux Value

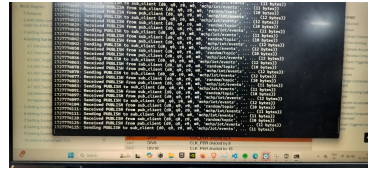


Figure 6: Received on Monitor

7 M2M communication between 2 phones

7.1 General Procedure:

- Download and Install the MyMQTT app in two mobiles.
- Set up the Mosquitto Broker on laptop as well.
- Connect all the three devices under the same wifi network (using personal hotspot).
- Launch the mosquitto broker on laptop.
- Find the Broker address of the Mosquitto Broker, which can be found by typing 'ipconfig' in the cmd terminal (for Windows).
- Enter the Broker Address in the MyMQTT apps of both the mobiles in the Host textbox and leave other settings to default.
- Now, We can Publish a message from one mobile to the other ('Hello' in this case).

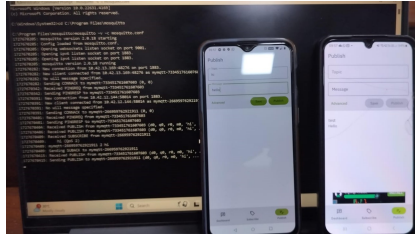


Figure 7: Subscribed to 'hi' topic

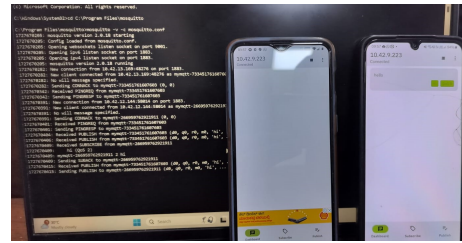


Figure 8: Message received by subscriber

8 Interpretations of result

M2M communication between 2 AVR IoT Boards and between 2 mobile phones were demonstrated in this experiment.

We can send any kind of messages (ranging from simple texts to sensor datas) between two boards through the internet (and a broker)

Note: I programmed the publisher board to send "Hello" to the subscriber and also later programmed it to send light sensor data

9 References:

- Handouts, Sample Code and Instruction Manual of AVR IoT board provided in moodle
- [For LCD connections](#)
- [For Filling in the LCD Code](#)
- [For Filling in the ADC Code](#)