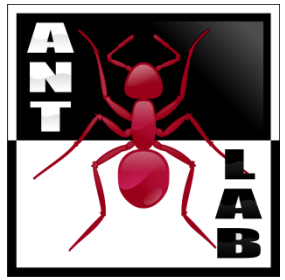
Politecnico di Milano

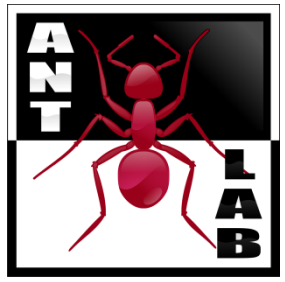
Advanced **N**etwork **T**echnologies **Lab**oratory



Internet of Things

Hands on activities

https://politecnicomilano.webex.com/meet/edoardo.longo



Challenge

Home challenge #3:

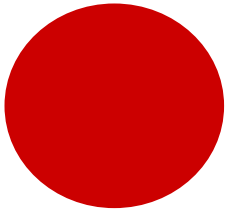
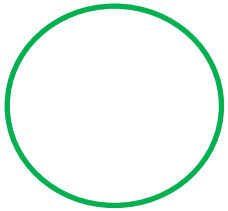
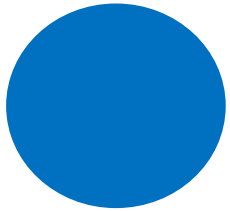
TinyOS + Node-Red + Thingspeak

Home Challenge #3

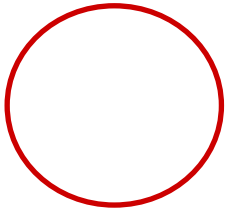
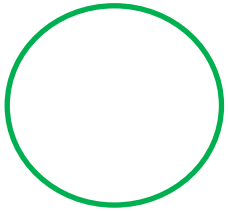
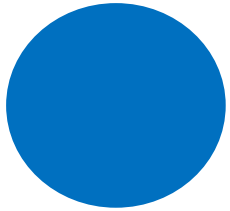
- Goal of the challenge: send data from a mote to thingspeak using MQTT
- Data to send: current status of the three LEDs of the mote in three different field.
  - led0 = field0
  - led1 = field1
  - led2 = field2
- Send one data per minute: please dont't DDOS Thingspeak's servers!
- Challenge evaluated 0 points and thingspeak blocks your account

Status example

- e.g. led0 led1 led2

1 (on) 0 (off) 1 (on)

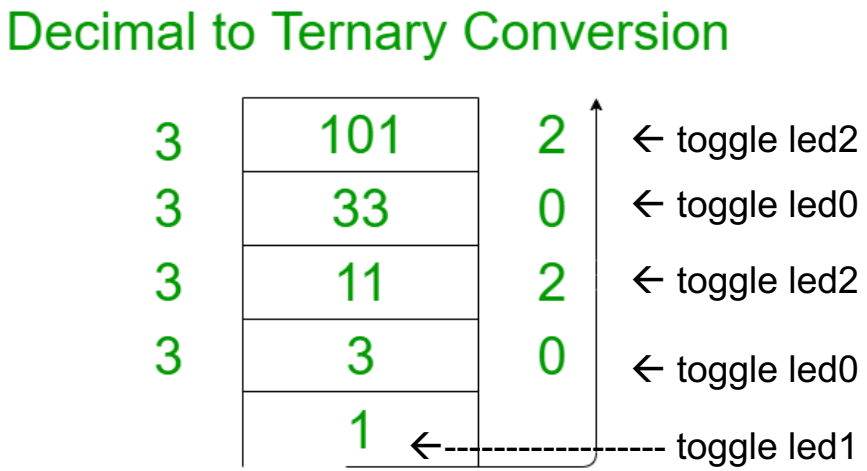




0 0 1

Determine LEDs status

- Convert your **person code** (first team member) in **ternary** (base 3).
- Every converted digit toggle its correspondent LED

Eg:



$101_{10} = 10202_3$

TinyOS steps

- Store your person code
- Start a periodic timer of 1 minute
- Every iteration of the timer:
  - do a step of the ternary conversion
  - according to the remainder of the iteration, toggle the correspondent LED
- When the ternary conversion is done (quotient = 0), stop the timer
- **N.B. the conversion must be done in TinyOS**

Cooja/Node-Red steps

- Create a mote on Cooja
- Start the serial socket
- Read from Node-Red the LEDs status
- Every iteration of the conversion done on the mote, send to Thingspeak via MQTT the LEDs status

- led0 on
- led1 off
- led2 off

Field0: 1
Field1: 0
Field2: 0

Ternary conversion iterations example

- $10410164_{10} = 201120220001122_3$

- 10410164 / 3 = 3470054 remainder: 2
- 3470054 / 3 = 1156684 remainder: 2
- 1156684 / 3 = 385561 remainder: 1
- 385561 / 3 = 128520 remainder : 1
- 128520 / 3 = 42840 remainder : 0
- 42840 / 3 = 14280 remainder : 0
- 14280 / 3 = 4760 remainder : 0
- 4760 / 3 = 1586 remainder : 2
- 1586 / 3 = 528 remainder : 2
- 528 / 3 = 176 remainder : 0
- 176 / 3 = 58 remainder : 2
- 58 / 3 = 19 remainder : 1
- 19 / 3 = 6 remainder : 1
- 6 / 3 = 2 remainder : 0
- 2 / 3 = 0 remainder : 2

What to deliver

- Form: https://forms.office.com/r/WCanibW4EU
  - List of values from the three requested fields corresponding to the three LEDs
- Zip content:
  - Source code folder:
    - fileNameC.nc
    - fileNameAppC.nc
    - Other files, if needed
  - Node-Red flow
- Small project report (max 1 page)
    - Your names + person code on top of the report
    - Thingspeak channel ID and link
    - Git repository link (if used)

Homework Rules

- Max 2 people in a group
- Deadline: 9/5/2021 - 23:59
- Score: max 1 point

- Folder Consegne-> Challenge #3 on WeBeep

- File name:

<personal_code1>_<personal_code2>.zip

Hints

1. Start from a clean folder with clean files
2. Identify the interfaces to use
3. Wire the interfaces in the AppC.nc file
4. Write the logic in the C.nc file

- Use Blink and Printf examples as reference
- Compile often the code checking if all the interfaces are okay
- Debug node is your friend! -> check what you are doing