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**Challenge 03 – Internet of Things**

ThingSpeak channel ID: 1727149

ThingSpeak channel link: <https://thingspeak.com/channels/1727149>

First, we created two files with TinyOS named “Challenge3C” and “Challenge3AppC”. In the first one we implemented a periodic (1 minute) timer that starts when the system boots, as requested, and we created some variables to store the person code, the remainder for each conversion and the current status for each led (at the beginning all led are off). We modified the event “Timer.fired()” so that every time that the event is called we perform a step of the conversion from base 10 to base 3, saving the remainder and the new quotient. Then, based on the value of the remainder, we toggle the correspondent led and we change its status in the correspondent variable. Once the quotient becomes 0, we stop the timer. Then we use “printf” to print at each iteration the status of the 3 led.

In Cooja, we created a new simulation with a Sky mote with as firmware the app we compiled and we opened a serial socket server to create a tcp connection in order to send the result of each “printf” to Node-Red.

In Node-Red we used a tcp inut port connected to the server port created in Cooja to receive a message for each “printf”, a function node to split the input string in 3 variables (1 for each led status) and to set up all the parameters needed to create a mqtt message, a debug node to debug the application and finally a mqtt node connected to the ThingSpeak channel to send the current status of each led to the channel.

In ThingSpeak we simply created a new public channel and 3 field chart, one for each led, to view how each led status changes with time, as requested.