



**POLITECNICO**  
**MILANO 1863**

SCUOLA DI INGEGNERIA INDUSTRIALE  
E DELL'INFORMAZIONE

# IoT Challenge #1, Wokwi and Power Consumption

INTERNET OF THINGS

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# 1 | Code explanation



## 2 | Energy consumption estimation

Power consumption estimation Deep sleep duration: 48 s Average Idle duration: 833.6985294117648 uS => 833.70 uS Average Measurement duration: 18647.79411764706 uS => 18647.79 uS Average WiFi duration: 188640.86842105264 uS => 188640.86 uS Average Sending duration: 59.6044776119403 uS => 59.60 uS

Battery size 18593 J

Average power consumption Average power consumption deep sleep: 59.66093555093555 mW => 59.66 mW Average power consumption idle: 322.62464743589743 mW => 322.62 mW Average power consumption measurement: 465.18097744360904 mW => 465.18 mW Average power consumption WiFi on: 724.5793571428571 mW => 724.58 mW Average power consumption transmission at 2dBm: 797.2942857142858 mW => 797.29 mW

$$E_{idle} = P_{idle} \cdot T_{idle} = 322.62 \text{ mW} \cdot 833.70 \text{ } \mu\text{S} = 2.69 \times 10^{-4} \text{ J}$$

$$E_{measurement} = P_{measurement} \cdot T_{measurement} = 465.18 \text{ mW} \cdot 18647.79 \text{ } \mu\text{S} = 8.67 \times 10^{-3} \text{ J}$$

$$E_{WiFi} = P_{WiFi} \cdot (T_{WiFi} - T_{transmission}) = 724.58 \text{ mW} \cdot (188640.86 \text{ } \mu\text{S} - 59.60 \text{ } \mu\text{S}) = 0.136642 \text{ J}$$

$$E_{transmission} = P_{transmission} \cdot T_{transmission} = 797.29 \text{ mW} \cdot 59.60 \text{ } \mu\text{S} = 4.7518484 \times 10^{-5} \text{ J}$$

$$E_{deepsleep} = P_{deep\_sleep} \cdot T_{deep\_sleep} = 59.66 \text{ mW} \cdot 48 \times 10^6 \text{ } \mu\text{S} = 2.86386 \text{ J}$$

$$E = E_{idle} + E_{measurement} + E_{WiFi} + E_{transmission} + E_{deep\_sleep} = 3.00931 \text{ J}$$

6.87168 7.65929 8.15501





## 3 | Improvements



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