

Internet of Things Course

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Group Project Fish Farming Water Monitoring

Course of Internet of Things

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## **Fish Farming Water Monitoring**

Performances Presentation – Estimation of  
consumption



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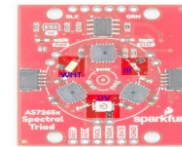
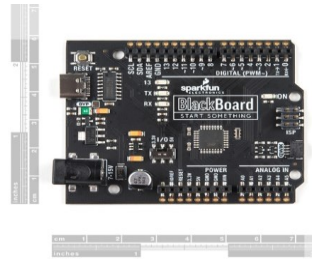
## Architecture and Devices

### Smart Buoy





## Architecture & Devices





## Instruments , Devices and energy consumption

- **A) b-1072z-1rwan**

Trasmitting/Receiving Mode > consumption of Tx (38mA) and Rx (11mA)

Sleep Mode consumption 1mA (down to about 4 uA with right settings)

- **B) Arduino uno blackboard**

With the last innovations **power consumption** of the **Arduino Uno** is reduced by 88.37% from 98.43mA to 11.45mA. Using on-board circuit changes, selective replacement of components and the use of microcontroller sleep mode can reduce the continuous idle power usage of an Arduino UNO to only **5%** of the default draw (6 micro ampere).



## Instruments , Devices and energy consumption

- C) LED

Consumption is 2mA

- D) Small Solar Panel 55x70mm 0.5W.

Typical current: 100mA, Typical voltage: 5.5V

- E) Lithium Ion Battery - 400mAh

- F) ILS - Due bit tre vie Elettrovalvola valvola controllo elettronico Piccolo scarico valvola sfiato DC 5V DC6V

The nominal current:<60MA

The nominal power : 0.4-0.7W

Pression: 0-350mmhg

Velocità: <3S (100cc from 300mmHg to 15mmHg time)



## Instruments , Devices and energy consumption

- G)

DC 3-12V Mini autoadescante Pompa ad ingranaggi Pompa di pompaggio ad acqua Pompa elettrica con motore RS-360SH,  
Current 5 V - 2 A (indication not precise )  
Pump motor RS-360SH . Maximum raise 1,5 meters.

- H)

AS7265x Spectrometer

UV Led 20 mA

IR LED 20 mA

White LED 30-60 mA

Operating current 5mA



## Consumption in sleep mode

- **Performances**

### **1) Full Sleep mode**

The performance of the whole system in sleep mode is consumption of 4 micro ampere, plus 6 micro ampere. Total 10  $\mu\text{A}$ .

1.0mAh can last about 400 hours with 400 mAh battery. That means more than 16 days in sleep mode. That is making the hypothesis that battery solar recharging has not taken place for this period.





## Consumption in normal mode

- **Performances**

- 1) Normal Mode**

- The performance of the whole system in normal mode, making the hypothesis of 6 daily water measurements (one every 4 hours) , and real time transmissions of data , also taking into consideration that we must enclose in this calculation 6 pump water loads, and 6 pump water drains, and also consumption of 10 LEDs for nocturne buoy visibility, is :



## Consumption in normal mode

- **Performances**

- 1) Normal Mode**

- Consumption

- 6 x Tx (38mA) x 2 sec      2b-1072z-lrwan
- 11.45mA x 1 minute      BlackBoard Arduino board
- 6x2 x 20mA x 1 sec      2 LED      AS7265x
- 6x1 x 45mA x 1 sec      1 LED      AS7265x
- 5 mA x 1 minute      operating current AS7265x
- 6 x 2A x 10 sec      pump loading water
- 6 x 60mA x 10 sec      pump drain water
- 10 x 2mA x 6/2 hours      Buoy Night Leds



## Consumption in normal mode

- **Performances**

- 1) Normal Mode**

- Power (Watt) = voltage (volt) x current (Ampere)
- Power (Watt) = 3.3 v x current (Ampere)
  1. 3.3 v x 6 x Tx (38mA) x 2 sec
  2. 3.3 v x 11.45mA x 1 minute approx
  3. 3.3 v x 6x2 x 20mA x 1 sec
  4. 3.3 v x 6x1 x 45mA x 1 sec
  5. 3.3 v x 5 mA x 1 minute approx
  6. 3.3 v x 6 x 2A x 10 sec
  7. 3.3 v x 6 x 60mA x 10 sec
  - 8 3.3 v x 10 x 2mA x 6/2 hours



## Consumption in normal mode

- **Performances**

- 1) Normal Mode**

- $3600 \text{ sec} \times 24 = 86400 \text{ sec}$
- $1 \text{ sec} = 1 \text{ day} / 86400 = 0.00001157407$
- $1 \text{ sec} = 1 \text{ hour} / 3600 = 0.000277777777$



## Consumption in normal mode

1.  $76 \text{ mA} \times 0.00001157407 = 0.00087962932 \text{ mAday}$
2.  $0.00069444 \text{ mAday}$
3.  $240 \text{ mA} \times 0.00001157407 = 0.0027777768 \text{ mAday}$
4.  $270 \text{ mA} \times 0.00001157407 = 0.003125 \text{ mAday}$
5.  $0.03472221 \text{ mAday}$
6.  $1.388888 \text{ mAday}$
7.  $0.041666 \text{ mAday}$
8.  $2.5 \text{ mAday}$
- -----
- $0.397 \text{ A / day}$

**That is total consumption of  $3.3 \text{ v} \times 0.395 \text{ A} = \underline{1.30 \text{ watt / day}}$**



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## Capacity Planning

- It seems that they will be necessary 4 solar panels and 4 lithium ion battery for the actual normal mode.

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# Grazie per la Vostra Attenzione!



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