INTERNSHIP STUDENT

OVERVIEW

During my 6 month as an intern in a local agricultural company, I had the opportunity to develop a prototype in order to provide precise measurements of crop irrigation.

EXPERIENCE

Intern student | Cultivos Bellavista sas | February 2021 – July 2021

Innovation IoT proyect to visualize in real time through Mathworks platform (ThingSpeak) mesuraments of water flow (Lts/s) that waters the different rice crops of the company.

CONTEXT

"We had the need to establish measurement and control of water. In the past we had some offers from local companies, but we considered expensive, and we wanted to be appropiated of the technology" … "In just a few months, Juan David developed this wonderful tool, with wich we can now see the information we needed through our phones using open hardware technologies"

-Enrique Rodriguez (General Manager Cbsas)

ESPECIFICATIONS

Ultraflow is a prototype of IoT for agriculture. It was made in professional PCB and the program was loaded directly to an atmega328p using arduino as ISP, every step aimed to consume less energy, sleepmode was also considered. Energy supplied by solar system. SIM800L was selected to send data with a 2g simcard to a server in ThingSpeak platform to create data analysis of water consumption monthly in four key points (different locations) of the company and also can be visualized in smartphones through thingview app in four different channels.

Note: Aditional info in presentation below

PERSONAL OBJETIVES

- Develop expertise in IoT devices and technologies, especially hardware.
- Provide a smart solution by culture of innovation
- Understand important concepts such as APIs, cloud and HTTP methods.

self-sufficient system, Solar charge controller

Prototype +8 times cheaper than local companies

ARDUINO

Fast implementation with free code

ThingView-ThingSpeak MathWorks tools

IMPROVED SKILLS

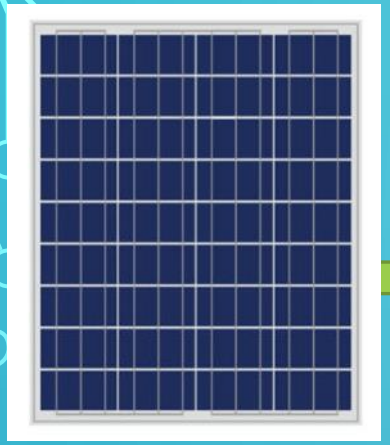
- C++ language
- Object-oriented programming
- Profesional electronic design (Eagle software)
- Calculus for electrical efficency
- API's to upload info in the cloud

Juan David Rodriguez – Physical engineer

ULTRAFLOW V.1

IOT PROTOTYPE FOR FLOW MEASUREMENT IN OPEN CHANNELS.

SECOND PRESENTATION

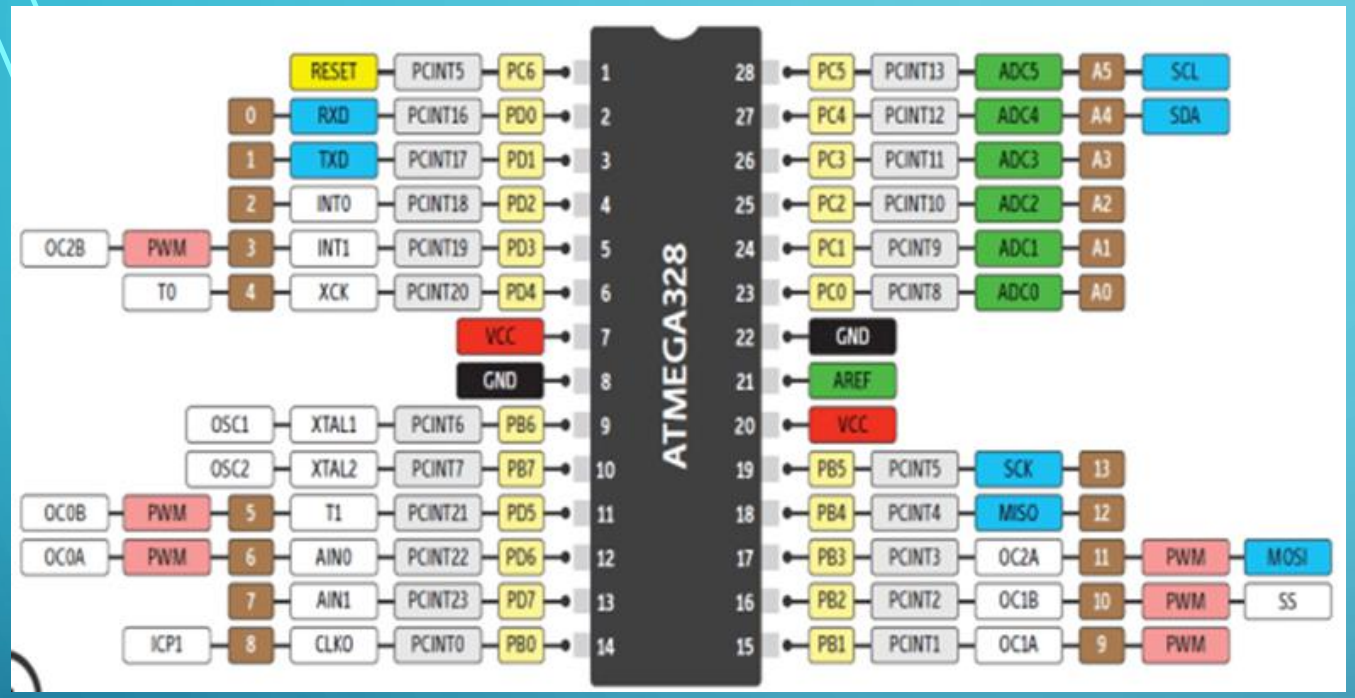


SOLAR PANEL 20W 1.1A

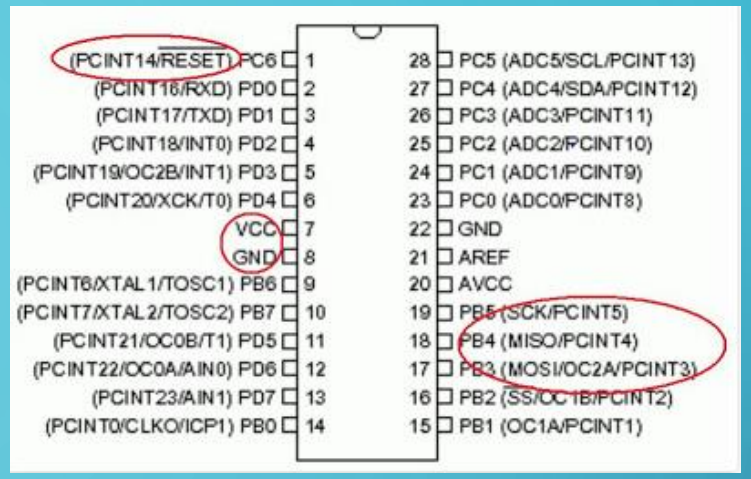
PROTECTION BOX IP65

CAMOUFLAGE FOR SENSOR JSN-SR04 T

PIN DIAGRAM

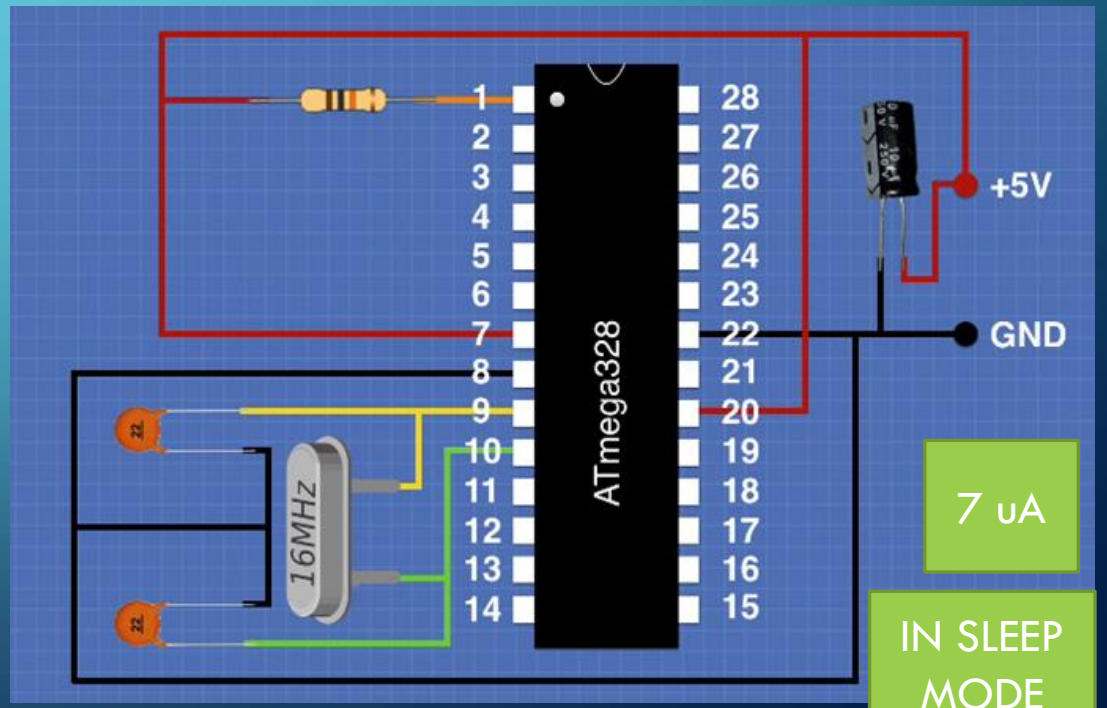


The Arduino as ISP principle is implemented. (In-system-programmer)The bootloader is loaded into the microcontroller.



4 FREE PINS TO PROGRAM DIRECTLY ON THE PCB

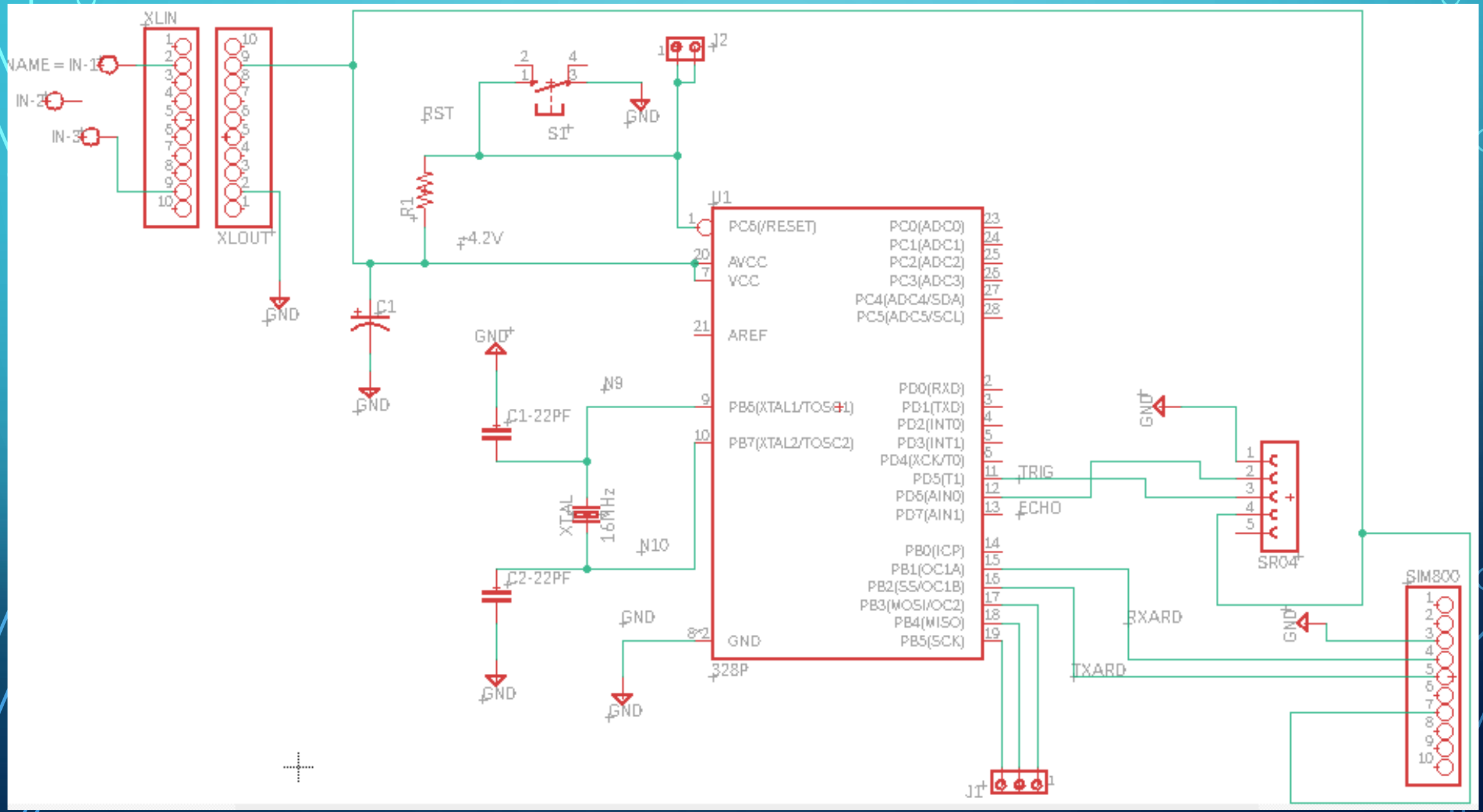
BASIC CIRCUIT

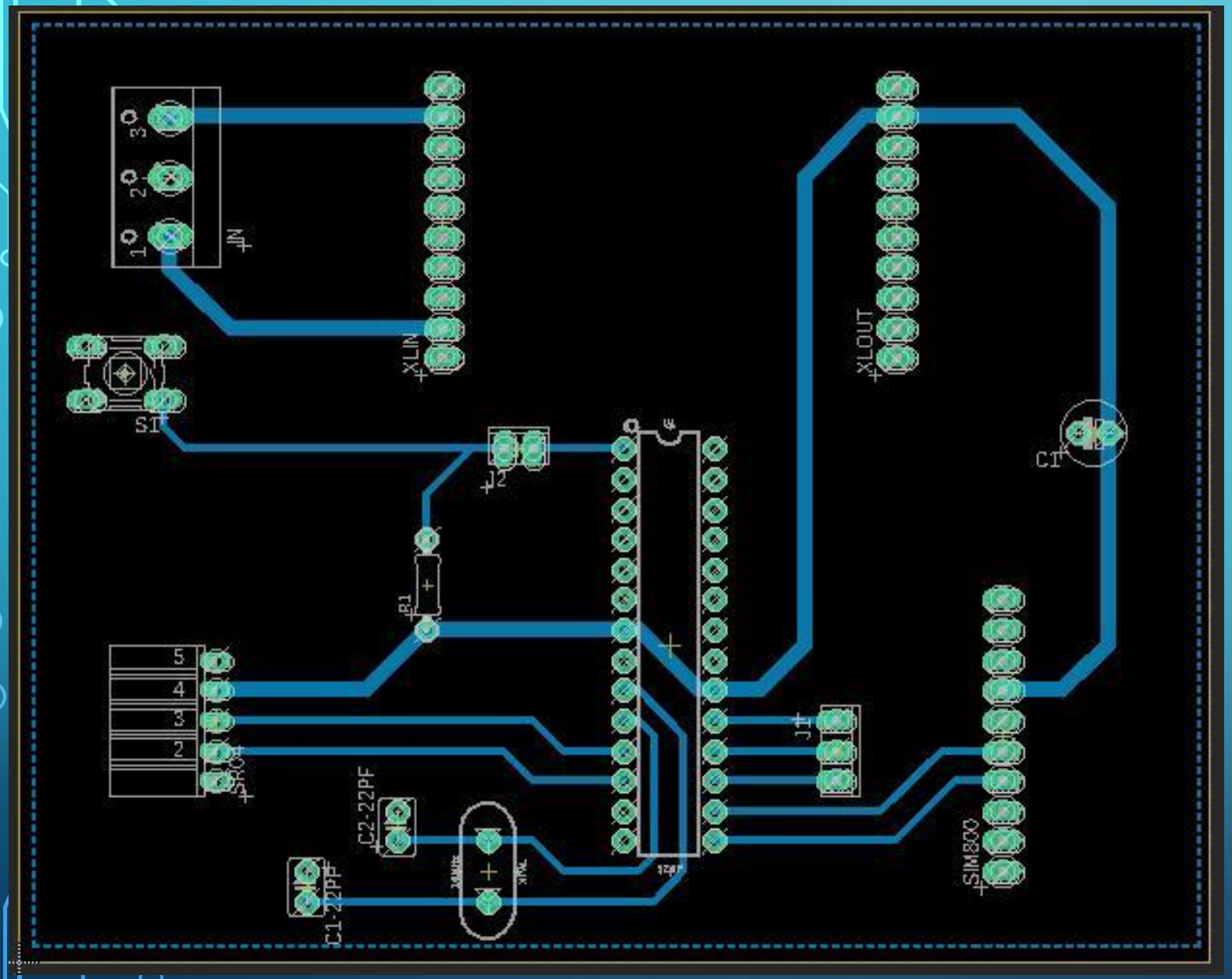


7 uA

IN SLEEP MODE

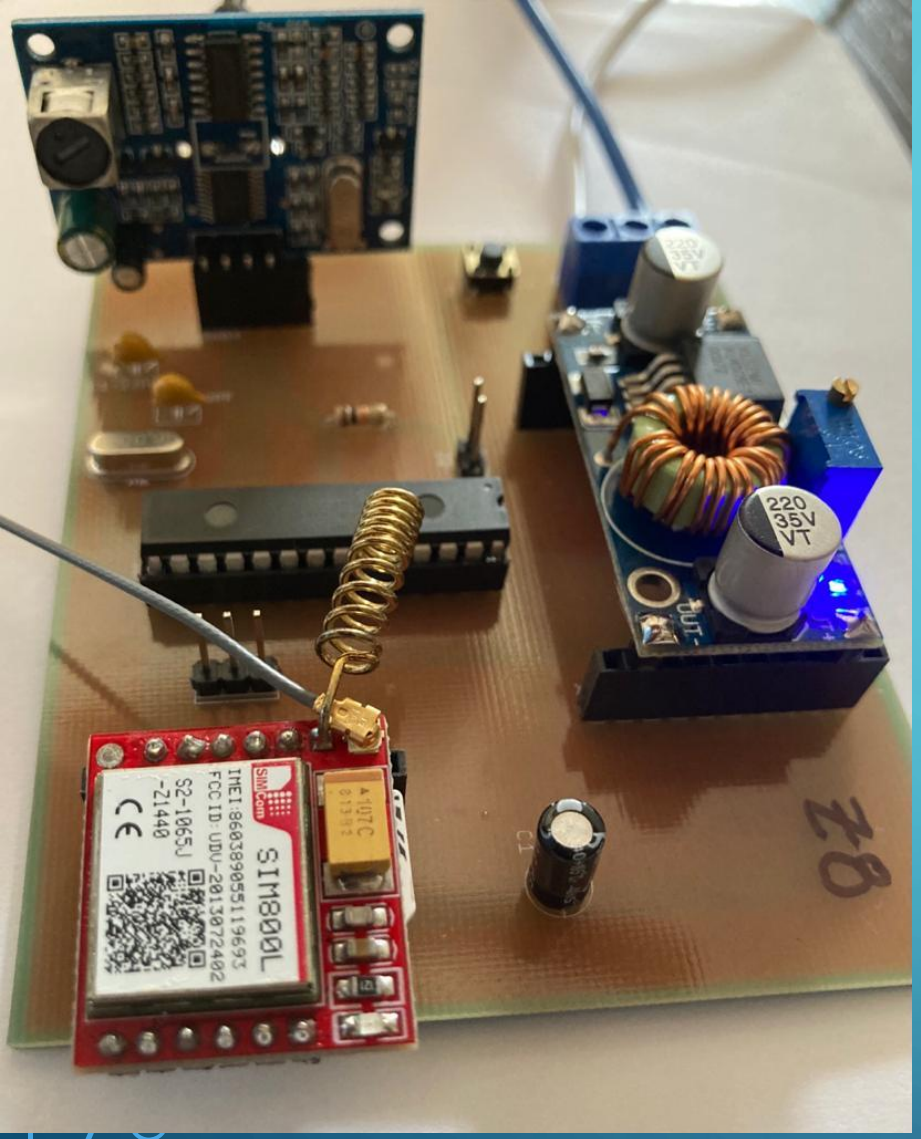
EAGLE SCHEMATIC



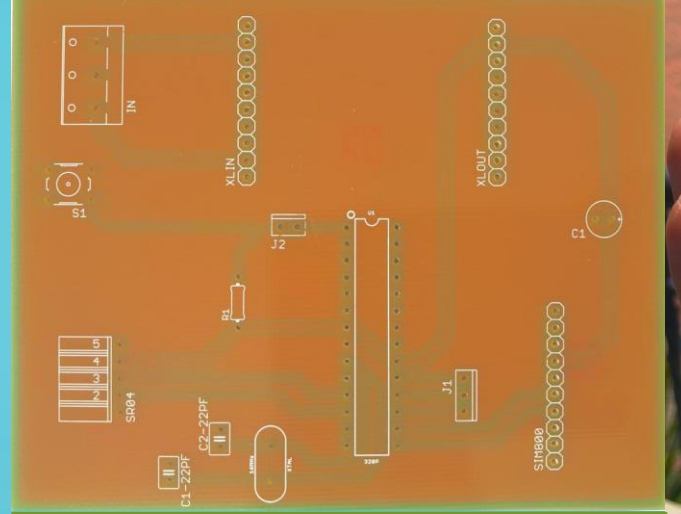


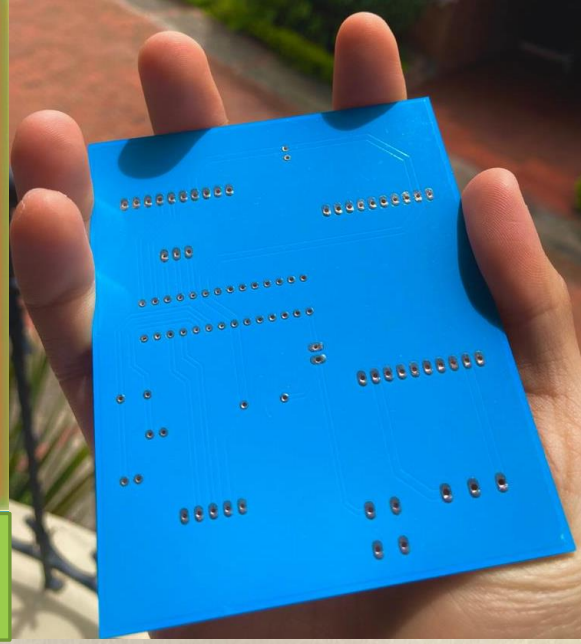
Given the requirements of the SIM800C Chip, it is necessary to guarantee a minimum current flow of 2 A in the power circuit.

0.6096 mm was chosen for the control circuit and 1.27mm for the power circuit. Calculation of runway width in detail, see Annexes.



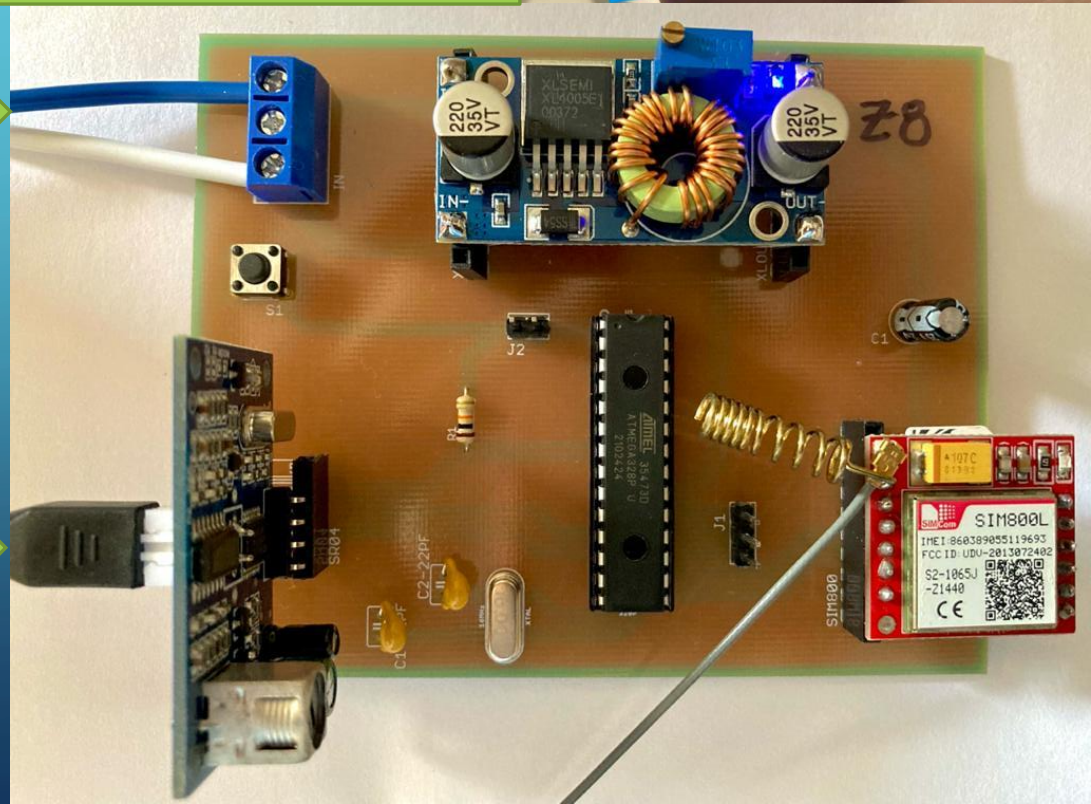
Note: An improvement in the precision of the sensor measurement is implemented from the software





ULTRAFLOW
V.1

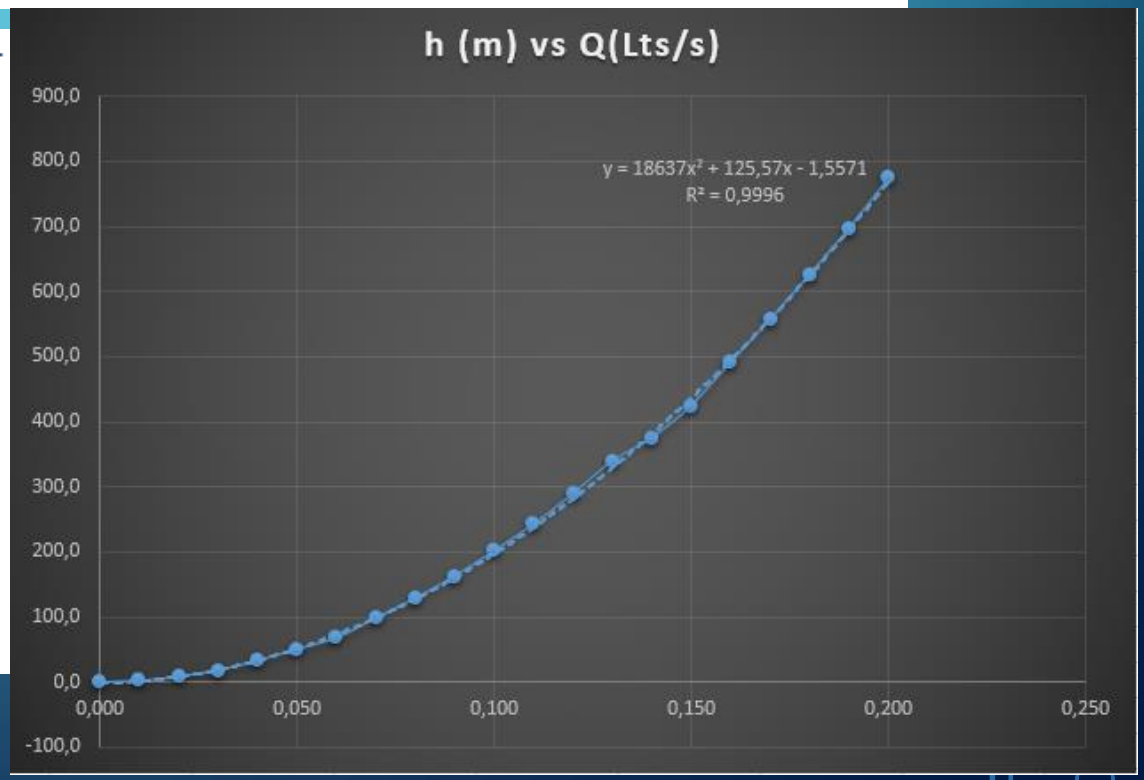
REGULATED POWER SUPPLY FOR THE XL-40 05 MODULE



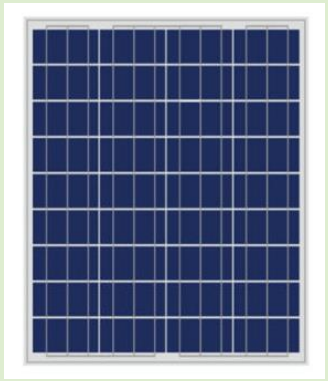
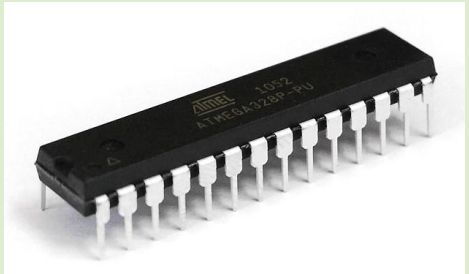
ULTRASONIC SENSOR SIGNAL INPUT (2.5 m CABLE)

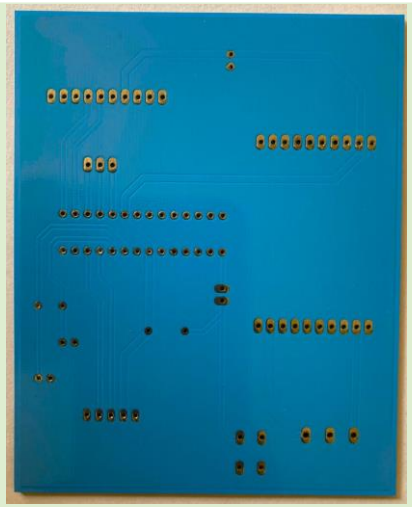
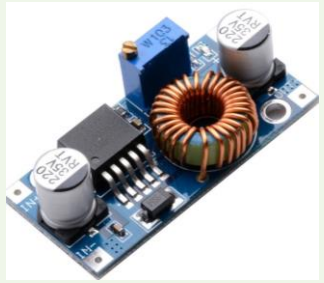
```
  //estos parametros se toman una vez instalado el sensor y completamente fijo.
  float sp=59.0;//distancia medida por el sensor hasta la lamina de agua por vez primera,se modifica el dia de la calibracion
  float rp=9.0;//distancia de la lamina de agua medida por la regla por vez primera,se modifica el dia de la calibracion

  float T=sp+rp;
  float r=T-dist;
  float rc=r*0.01;//medida regla en metros para calculos
```

```
//a continuación se introducen las ecuaciones obtenidas en el aforo topográfico.

if ((r>=0 && r <=20)) {
  Q= 15841*rc*rc + 107*rc ;

}
if (r<0) {
  Q=0;
  dist=0;
  r=0;
}
  if (r>20) {
  Q=655;
  dist=0;
  r=20;
}
```



75%

MATERIAL	DESCRIPTION & PRICE	MATERIAL	DESCRIPTION & PRICE
	JSN-SR04T ULTRASONIC SENSOR WITH IP67 PROTECTION $ 7,5 USD		SOLAR PANEL 20W $ 24 USD
	CHIP SIM800L MODULE GSM/GPRS 25 x 23 mm $6,5 USD		SEALED BATTERY MTEK 12V-7.8 Ah 151mm x 65 mm x 94 mm $16 USD
	ATMEGA 328P $3 USD		SOLAR CHARGE CONTROLLER 10 A $6 USD

MATERIAL	DESCRIPTION & PRICE	MATERIAL	DESCRIPTION & PRICE
	PCB $4 USD		METALWORKING $43 USD
	REDUCER DC-DC XL4005 $2 USD		PERIPHERALS ATMEGA Y PCB $1 USD
	CABLING 2 X 16 AWG 1M $1 USD		WATERPROOF BOXPROTECTION IP65 $6 USD