User Manual of **Wooden Dome Shelter**, *ASLAN Company*

Team 2 – ASLAN

User Manual Indications

1) Introduction

This is the User Manual of Wooden Dome Shelter. It has a big range of possibilities to use, including a sensor for measure the temperature and humidity. Depending of these values, the windows it opens or closes. The door is automatically and it can be opened with a simple bottom, making of this dome a smart shelter. A geo-dome has a big volume for a small surface, so its decreased surface area requires less building materials getting a multifunctional and sustainable wooden dome.

Here there are pictures with examples of the dome. The prototype presents one possibility of open the door.

Figure 1 – 3D Model Dome

2) System Overview

The Aslan dome has to be constructed in a way that allows the structure to be permanent with a large interior space and each person can use it as he wants: green house, garden shed, shelter or pergola. The wood is the principal material of the dome, giving the necessary features for a good price.

The system of the dome can be separate into groups: mechanic part and electronic part. On the one hand, we have the mechanic part, it is compose the dome, with the beams, strong connectors and resistant panels for support the outside weather. On the other hand, we have the electronic part, it is compose with an Arduino that control the door, windows and sensor. This Arduino takes electric energy of power supply implemented in the dome.

3) Technical Parameters

Here there are a table with the most important technical parameters for the electrical system of the shelter:

Product	Description	Value	Accuracy
Arduino UNO	Microcontroller	12 V	-
Power Supply DELL	Model Nº: L220P-00	12 V / 1.5 A	-
AM2302 DHT 22	Temperature Sensor	-40 to 80º	±0.5ºC
	Humidity Sensor	0 – 100%	2 – 5%
SG90	Micro Servo Motor	4.8 V ; 180º rotate	-

These are the electric and electronic components that you need for build the Aslan Wooden Dome Shelter.

4) Electronic Connections

Here there are explanations about how connect the electronic components for get the proper operation of window and door.

First of all there is a Black Box and Flowchart for knows better which is the function of each electric part.

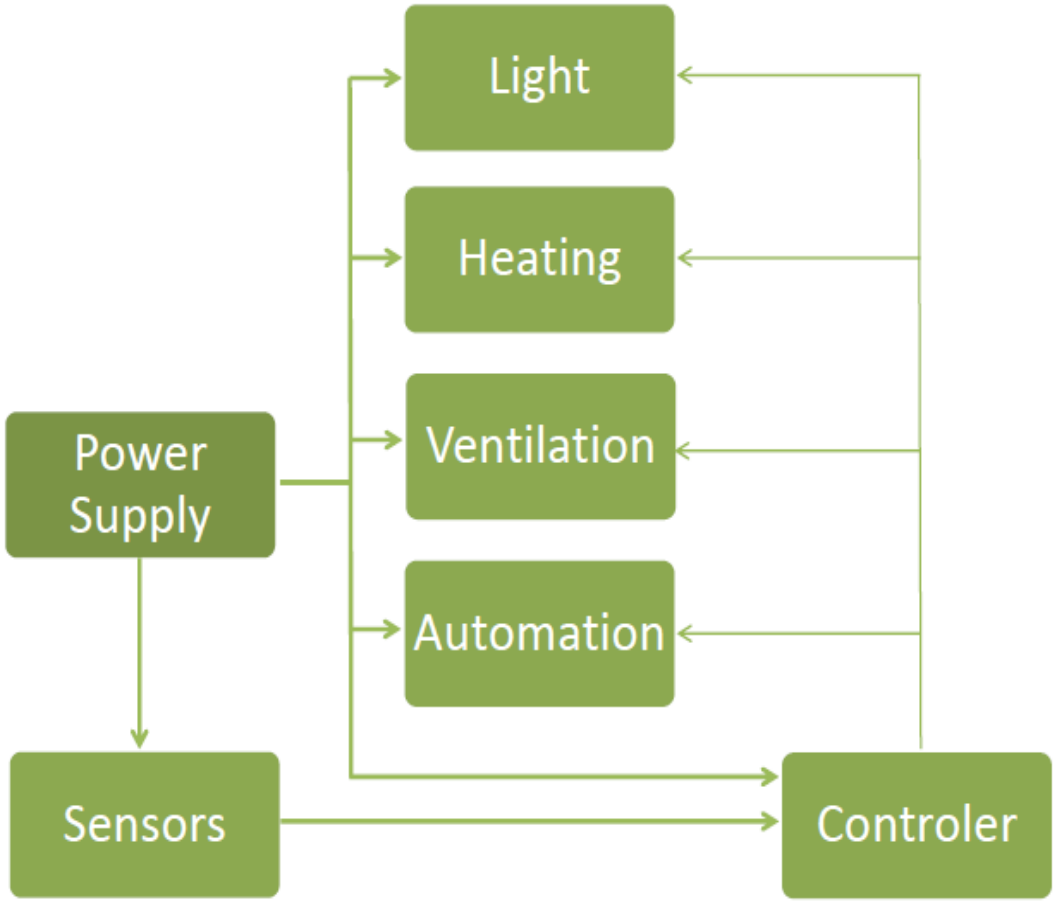


Figure 2 *– Black Box Dome Shelter*

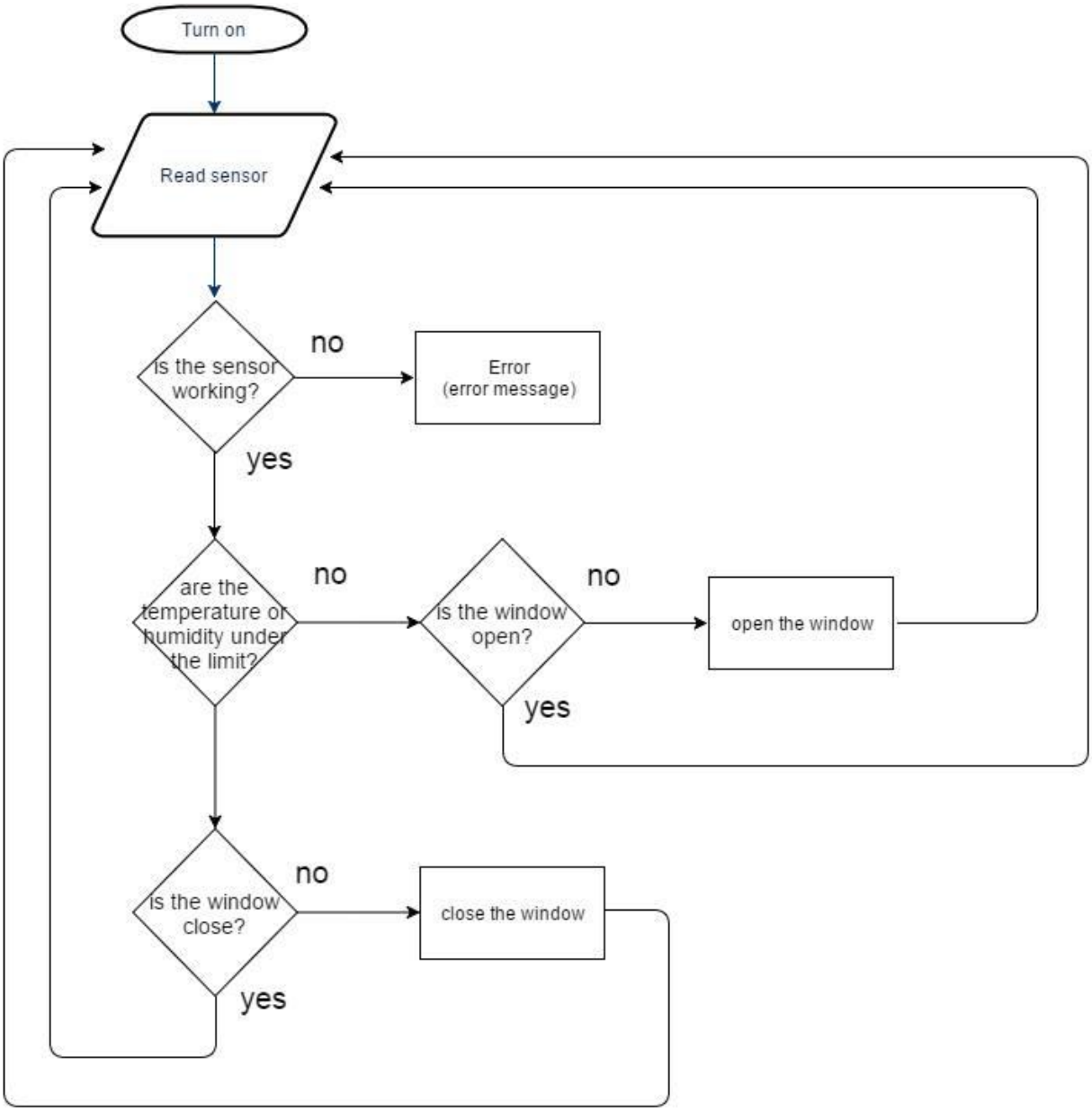


Figure 3 *– Flowchart Dome Shelter*

These are the aspects of each component:

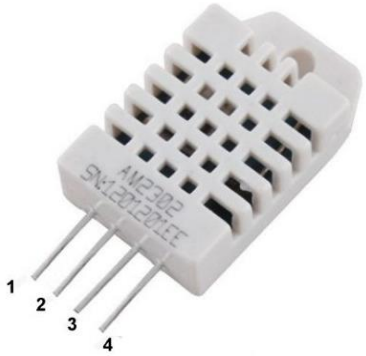
a) Arduino UNO

b) Power Supply DELL

c) Sensor AM2302 DHT 22

- 3.3 to 6V power and I/O
- 1.5mA max current use during conversion
- 0-100% humidity readings with 2-5% accuracy
- -40 to 80°C temperature readings ±0.5°C accuracy
- Up to 0.5 Hz sampling rate (once every 2 seconds)
- 4 pins, 0.1" spacing

1) VCC
2) DATA (digital I/O)
3) Not Connected (N.C)
4) GND



d) Micro Servo Motor SG90

Finally, there is the schematic connection between these components in Arduino program:

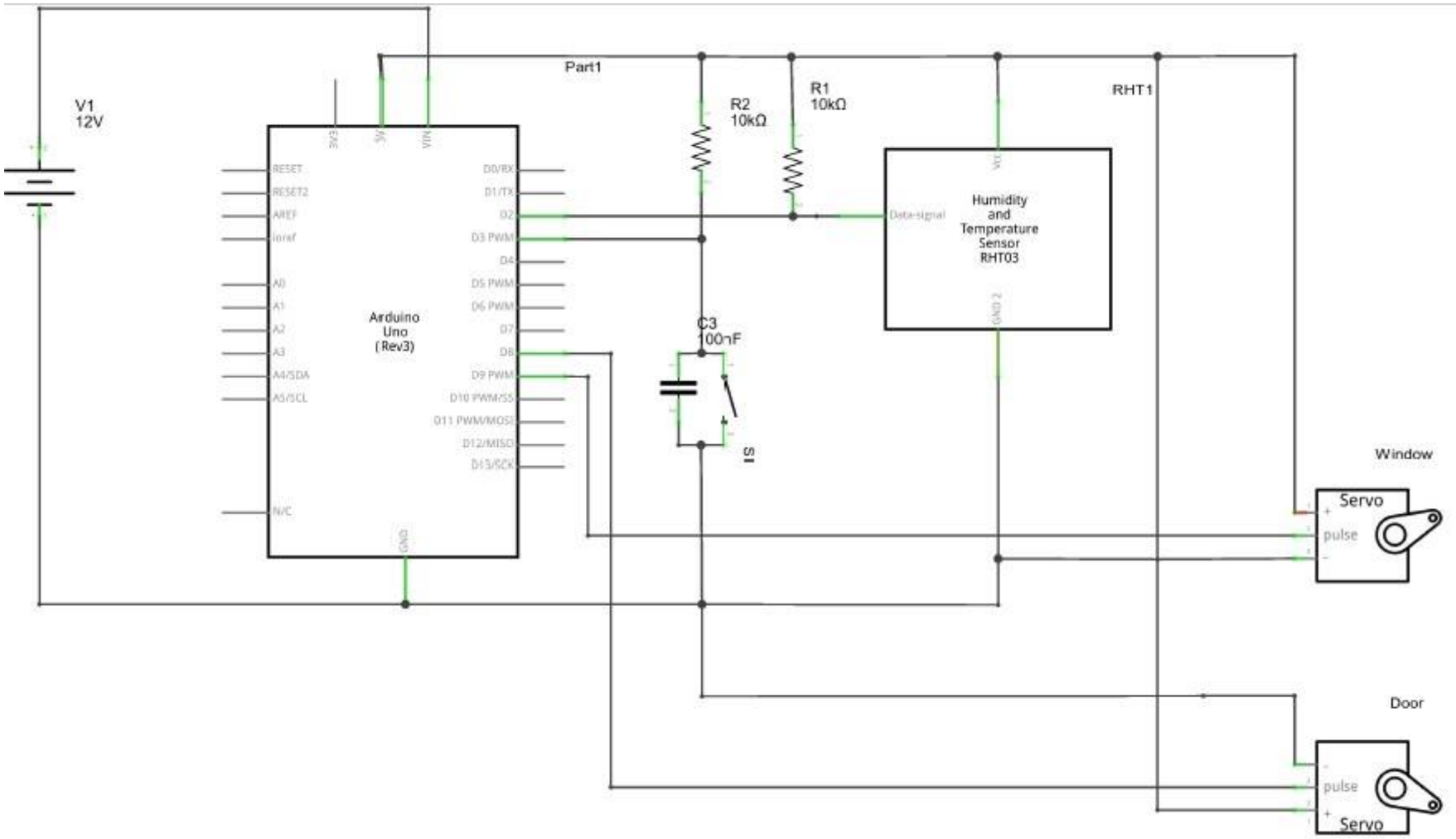


Figure 4 *– System Schematics*

5) Programming

Here you have the programming that is implement on the Arduino UNO for open and close the window and door. This is for people that have a notion about Arduino program. With the programing you can configure the value that DHT22 sensor measure for open the window.,

```
#include <DHT.h>


#include "DHT.h"

#include "Servo.h"


#define DHTPIN 2     // what pin we're connected to (2. pin)

#define DHTTYPE DHT22   // DHT 22  (AM2302)

Servo myservo;      //window's servo

Servo myservo1;     //door1s servo

int maxHum = 60;

int maxTemp = 28;

int pos=0;  //window position

int posd=0; //door position

int db=0;

DHT dht(DHTPIN, DHTTYPE);


void setup() {


 Serial.begin(9600);

 dht.begin();

  myservo.attach(9);     //window's servo connecting to the 9th pin

  myservo1.attach(8);   //door's servo connecting to the 8th pin
```

```
// the interrupt using the 3th pin and jump the blink program part every time when someone push the push-button
// the interrupt is activating when the signal is falling down from 1 (5 V) to 0 (0 V)
  attachInterrupt(1, blink, FALLING);


}

void loop() {

   // Wait a two seconds between measurements.
  delay(2000);

  // Reading temperature or humidity takes about 250 milliseconds!
  // Sensor readings may also be up to 2 seconds 'old' (its a very slow sensor)
  float h = dht.readHumidity();
  // Read temperature as Celsius
  float t = dht.readTemperature();

  // Check if any reads failed and exit early (to try again).
  if (isnan(h) || isnan(t)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }

  Serial.print("Humidity: ");
  Serial.print(h);
  Serial.print(" %\t");
  Serial.print("Temperature: ");
```

```
 Serial.print(t);
 Serial.println(" *C ");


//if the temperature higher than the maxTemp the servo is going to turn 100° and open the window
 if (t > maxTemp)
 {
  for(pos = 100; pos >0; pos=pos+1);
  {
   myservo.write(pos);
   delay(15);
  }}
//if the temperature is lower than the maxTemp the servo is going to turn back 100° and close the window
 else
 {
  for(pos = 0; pos<=100; pos=pos-1);
   {
    myservo.write(pos);
    delay(15);
   }
 }
}


//when you push the button first the servo is going to turn 100° and the second time is going to turn back 100°
void blink()
{
db++;
```

```
if(db%2==0)
{
 for(posd = 100; posd>0; posd=posd-1);
   {
    myservo1.write(posd);
    delay(15);
   }

}

else
{
 for(posd = 0; posd<100; posd=posd+1);
   {
    myservo1.write(posd);
    delay(15);
   }
}
}
```

6) Maintenance

The external conditions and the time can deteriorate some elements of the wooden dome.

1. Wood structure: to minimize damage to the wood by the weather, we recommend a coat of wood varnish out periodically. If you want to repeat the operation later, remember to sand the dome before applying any new product.
2. Foundations: for better protection of the elements in contact with the ground, we recommend to coat the bottom of a generous layer of product waterproofing.
3. Window panes: the windows can be cleaned with soap, but never with an abrasive product.
4. Door and windows: we advise you to periodically lubricate the hinges and check the tightening of the screws.
5. Roof: during major snowfalls, it is imperative to regularly remove snow from the roof of your dome to prevent overcharging.
6. Electronic system: we advise you to periodically dust the electronic system to ensure its good condition. If there is a dysfunction in the electronic system, contact our technical service.

Warning! The material used is natural. It varies according to climatic conditions and depending on its exposure. It is likely to swell slightly during the winter months and retract in dry periods. These dimensional changes are completely normal and expected and does not call into question the solidity, stability and functionality of the dome.

Thank you for buy Wooden Dome Shelter Aslan and we hope you will enjoy using it.

For any doubt, problem contact us via e-mail: aslan.wooden.dome@gmail.com