Sensor Automation Module (short: SAM)

ASSEMBLING INSTRUCTIONS

Goal: A functioning SAM that will be able to measure sensory values and display them.

General information:

The SAM is divided into three separate entities: a solar panel, a smart mirror and a base.

We will start off by first assembling the base and casing and then adding the electronics.

Please note: This instruction serves as a guideline only, you are welcome to build the SAM differently if that seems to be wise. What matters in the end is its functionality. If you experience any issues with setting SAM up feel free to let us know and we will try to help you fix them.

ASSEMBLING THE BASE

You will need:

A round ventilation grille (here: diameter 70mm; if you use a different sized one remember to adjust the sizes of the other components to your values)

A door hinge

About 50 bolts and screw-nuts (M2)

Cross-recessed countersunk screws (M3 or M4)

Glue

Roofing felt (or something similar)

A threaded rod (here: thickness/diameter of 8mm; if you use a larger one remember to drill a bigger hole at the roof where the rod is fixed)

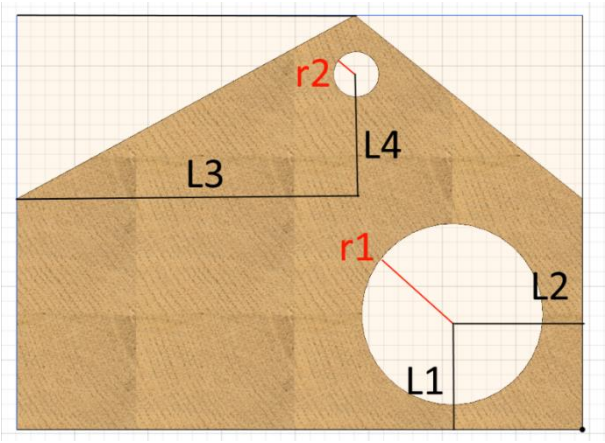
Step 1: Cutting out the pieces

component	use	length	width	height
A	Long wall	250 mm	184 mm	8 mm
B	Long wall	250 mm	184 mm	8 mm
C	Side wall	192 mm	102 mm	8 mm
D	Side wall	184 mm	102 mm	8 mm
E	Divider	184 mm	102 mm	8 mm
F	Ground panel	285 mm	200 mm	8 mm
G	Roof	270 mm	240 mm	8 mm
H	Roof	270 mm	240 mm	8 mm

Step 2: Cutting out more pieces

Please note: In the following we will talk of wood pieces as that is the material we used.

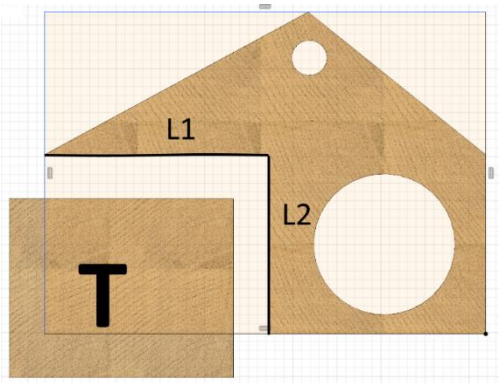
The pieces of wood A and B are cut as follows:



Name	**Length**
L1	51,00 mm
L2	57,50 mm
L3	55,00 mm
L4	150,00 mm
R1	40,00 mm
R2	10,00 mm

Important: Piece B must be cut further into the following lengths:

name	length
L1	127 mm
L2	102 mm

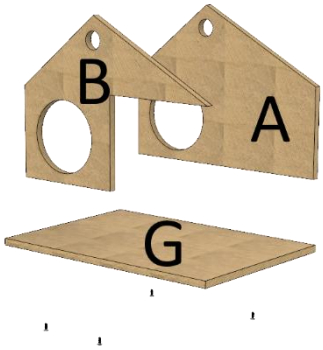


The door T is then to be cut out of piece B.

The wood remnants that were created when A and B were cut can now be reused in a sustainable fashion. In our case, it was used as a connector for the 2 roof components.

Step 3: Assembling of the first parts

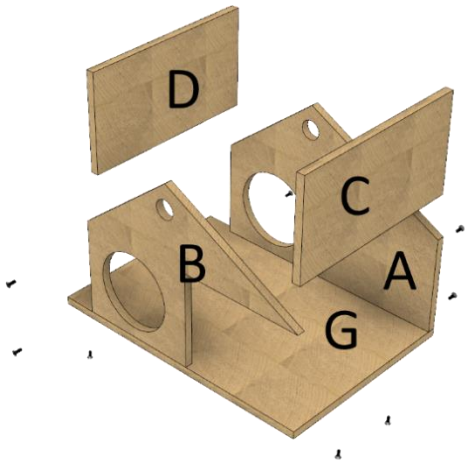
Before starting we recommend to glue contact points to the different wood panels as it improves the overall stability.



Glue the components A and B to the ground panel G.

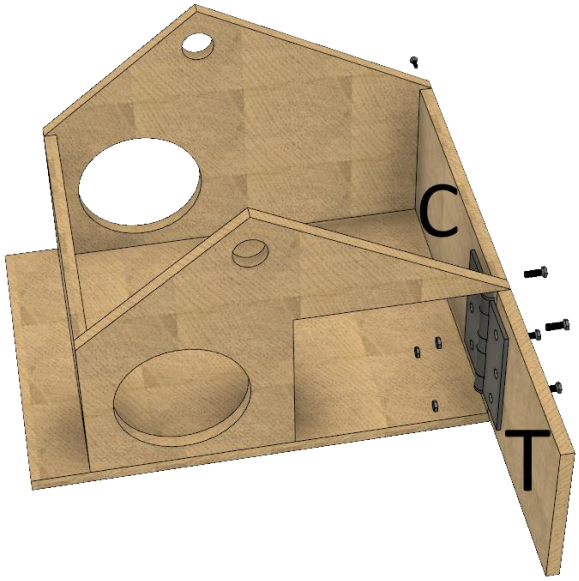
Then fix it with as many screws as required to achieve sturdy results.

Step 4: Adding more walls



Glue and bolt walls D and C to the ground panel G with screws (alternatively you can use screws instead of bolts to fix it besides walls A and B)

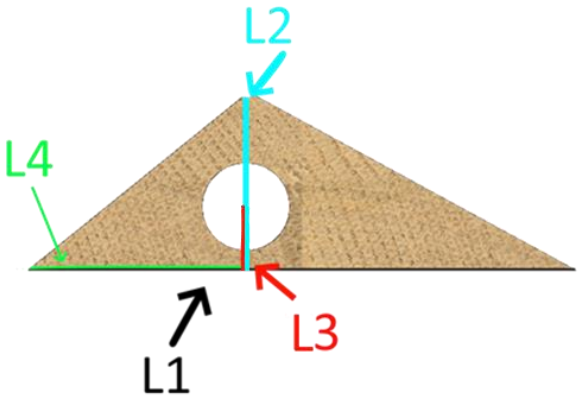
Step 5: Installing the door



Now use screws to assemble the door T on a door hinge which is fastened on the wall C (alternatively it is possible to fix it on wall B)

Step 6: Cutting out the mount of the roof

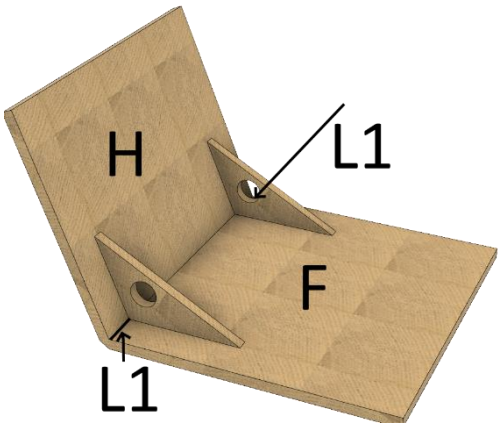
name	Size
L1	125 mm
L2	40,6 mm
L3	14,4 mm
L4	50,3 mm



Step 7: Building the roof

Name	Length

L1	28 mm



(Recommended: Step 8)

Use roofing felt or something similar to keep the case weatherproof.

We further impregnated our case to keep it more weatherproof.

ASSEMBLING THE ELECTRONICS

Adding the sensors

Please note that these are guidelines only.

We built in the following sensors although of course you are welcome to pick different ones which might suit your needs better.

Please consider that adding/leaving out sensors might slightly change parts of the wiring process and might lead to needing some more code

You will need:

Sensors:

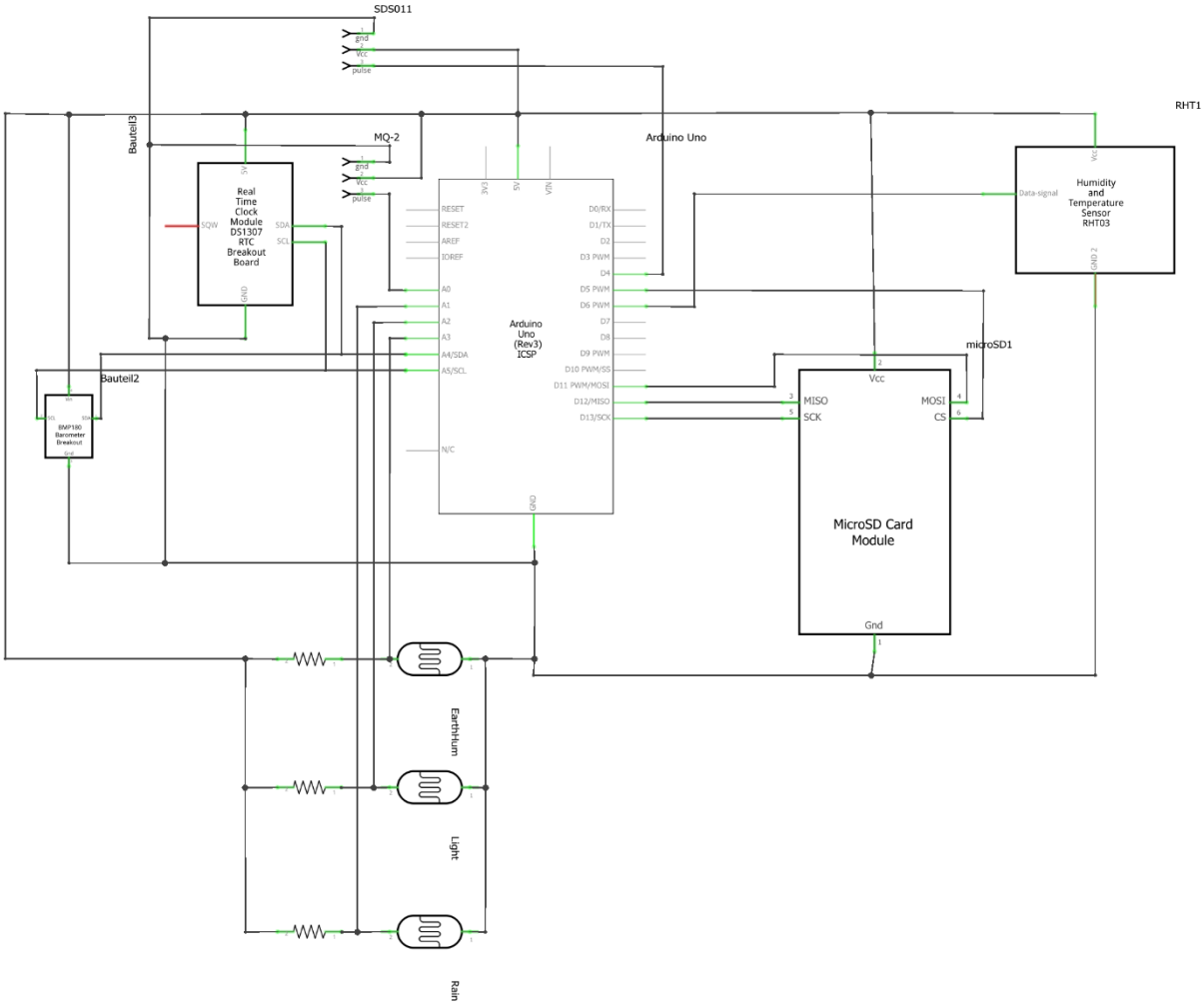
- MH-RD raindrop module
- PFW 2051 light intensity (photoresistor)
- MQ-2 Smoke/LPG/CO Gas Sensor (pulse in the graphic below is A0)
- earth humidity FC-28
- air humidity DHT-22
- temperature DHT-22
- bmp 180 or bmp 280 air pressure sensor
- SDS 011 air quality sensor (pulse in the graphic below is P25)

Further material:

- fitting cables for wiring (width 0,3 -0,5 mm)
- a soldering iron and solder
- a micro controller (here: an Arduino Uno)
- a (micro) SD module
- a real-time clock (RTC DS3231)
- A lead gel battery

Doing the wiring

The graphic shows how the wiring should be done:

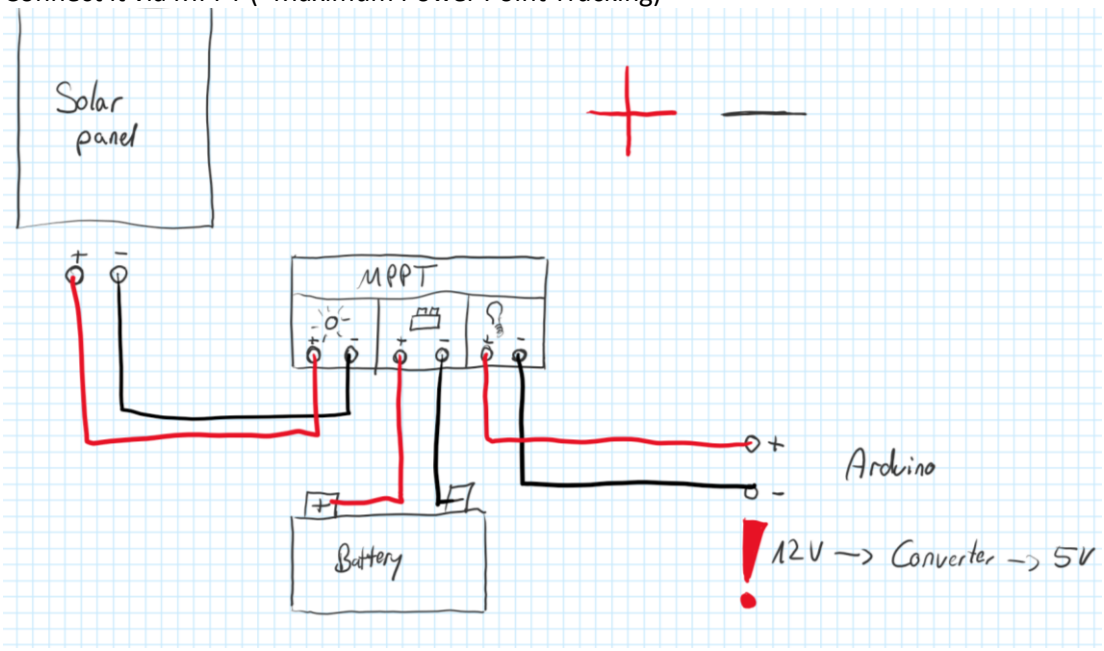


Setting up the Solar Panel

<u>You will need:</u>

A solar panel (Here: 40W)

Connect it via MPPT (=Maximum Power Point Tracking)



SETTING UP THE SOFTWARE

You will need:

A computer with the Arduino IDE installed and a fitting Arduino board (a USB cable to connect them)

Step 1: Downloading the code

Go to https://github.com/Aynril/NEW_SAM and download the repository to your desktop (if you are familiar with Git just clone it). Now unzip the file and open the file named Base using the Arduino IDE.

Step 2: Configuring the Arduino IDE for upload

For all libraries see the read.me file in the repository above. Afterwards go to Tools and select your port and your connected Arduino. If you are using an Arduino NANO please note that the latest bootloader does not work on every board.

Now just press upload (→). The IDE should now compile and upload to the board, otherwise try to fix the problem yourself (by using the issue console on the bottom) or by leaving us a message.