Notes to Reef-PI HAT

Contents

1. Main HAT board:

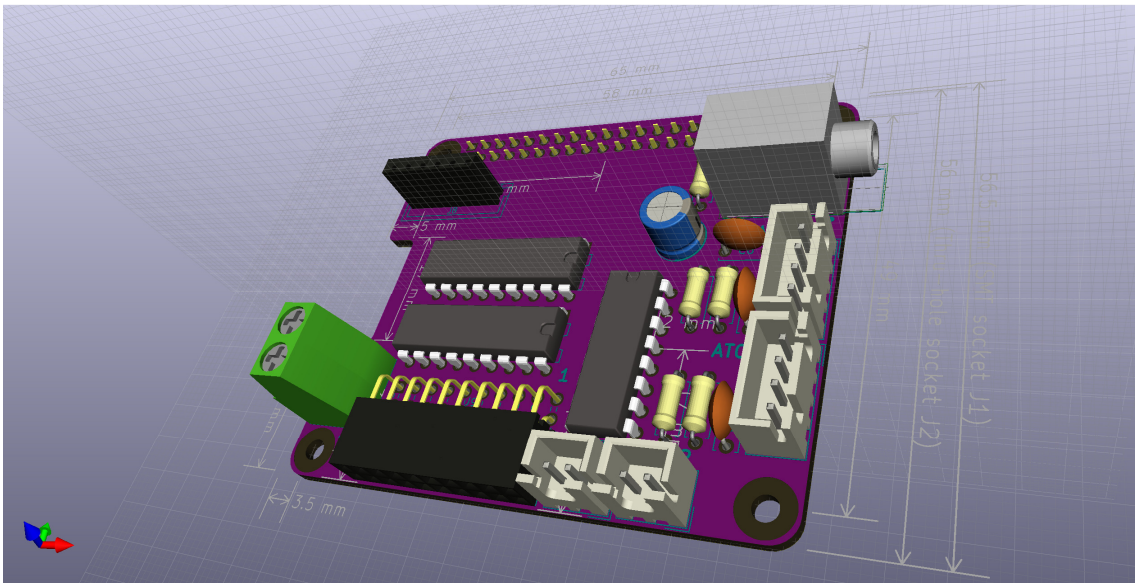

Figure 1: Top HAT board

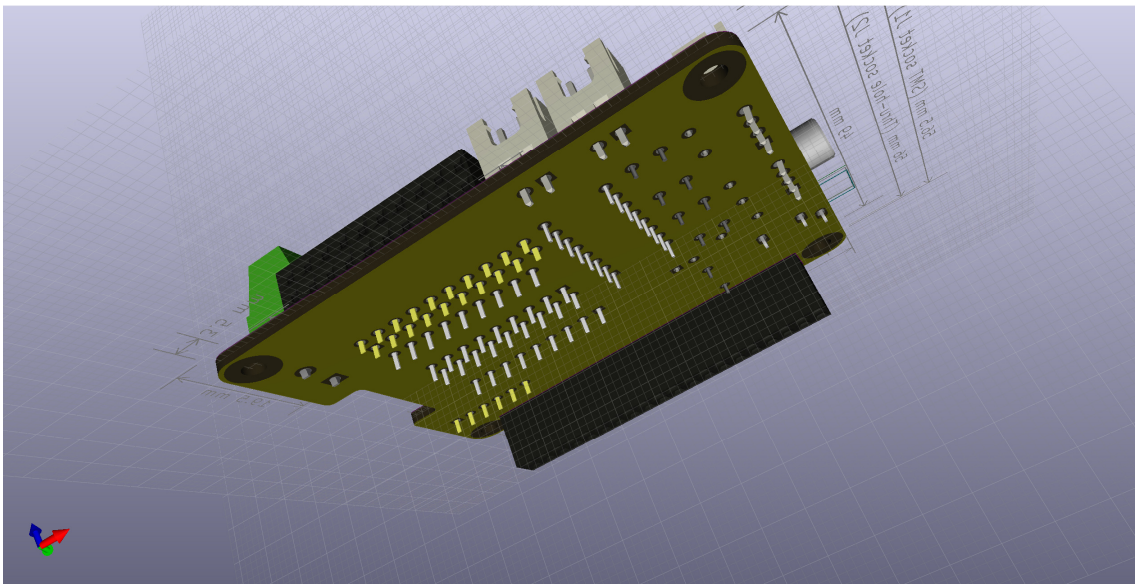

Figure 2: Bottom HAT board

2. Schematic:

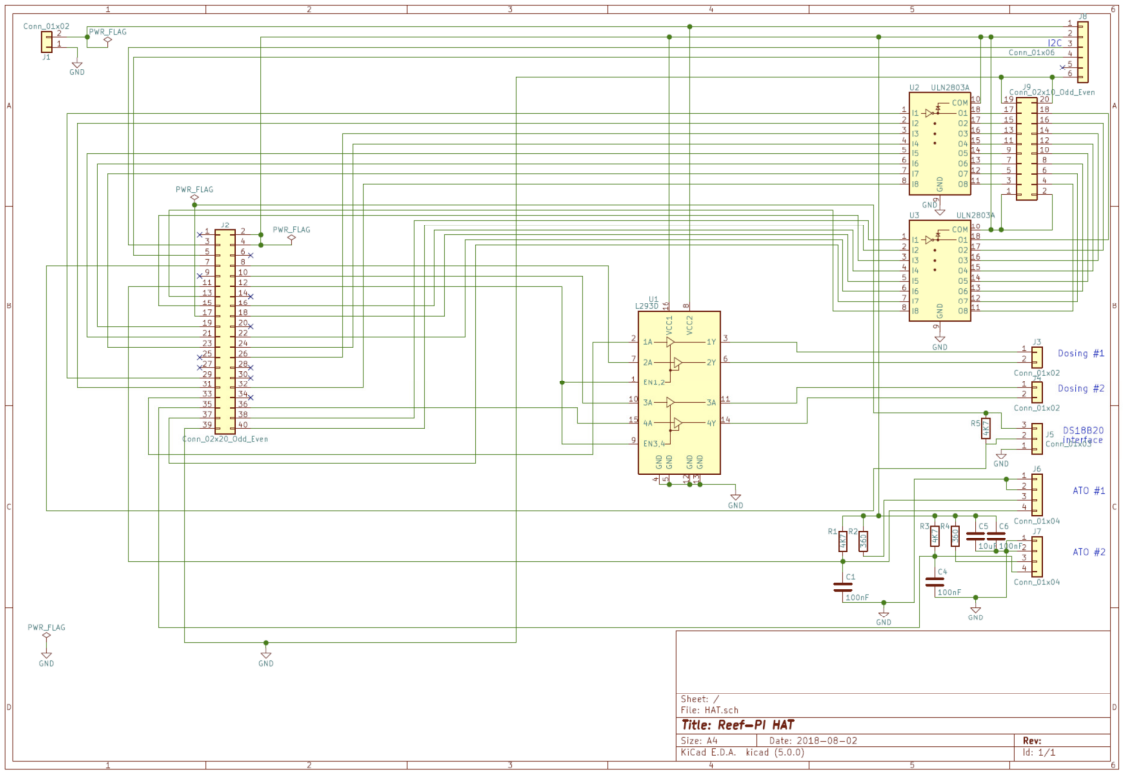

Figure 3: HAT schematics

3. Functional overview:

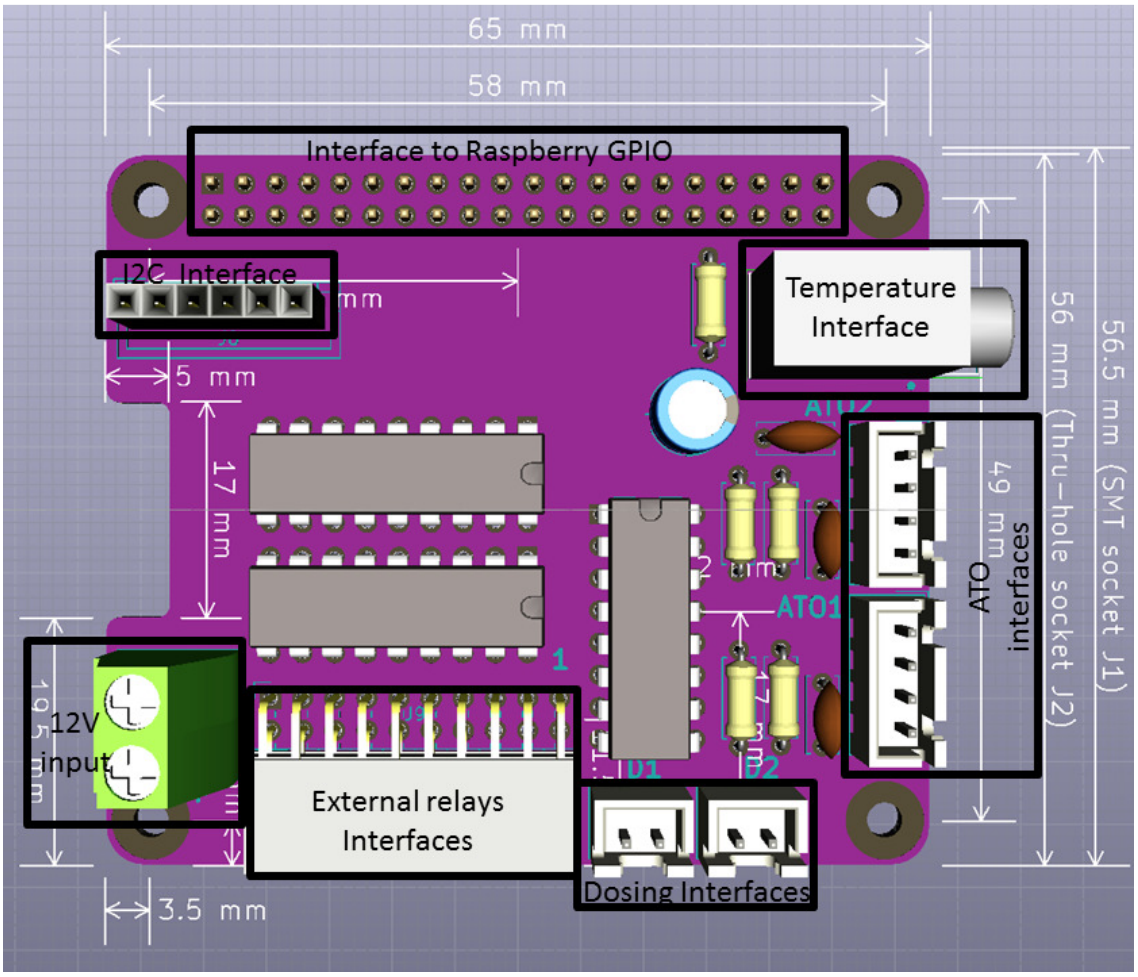

Figure 4: Overview HAT functions

4. BOM:

5. Connectors:

5.1.12V input:

Required 12V power supply to drive the dosing motors. Plus and minus are indicated on the board.

5.2.External relays interfaces:

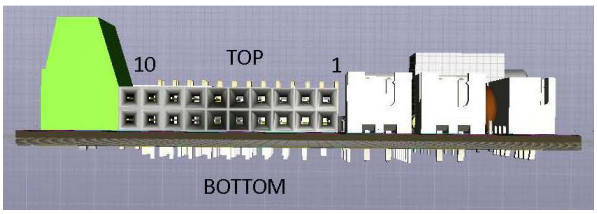

Figure 5: Relays interface

Top 10 pin connect relays:

Connector HAT	Relays	GPIO/Power
1	-	GND
2	1	5
3	2	6
4	3	7
5	4	8
6	5	9
7	6	10
8	7	11
9	8	12
10	-	5V

Table 1: Top 10 connections

Bottom 10 pin connector relays:

Connector HAT	Relays	GPIO/Power
11	-	GND
12	1	20
13	2	21
14	3	22
15	4	23
16	5	24
17	6	25
18	7	26
19	8	27
20	-	5v

Table 2: Bottom 10 connections

Connector HAT: The pin positions as shown in picture Figure 5: Relays interface
Relays: Usual external relays numbers when connected with 1-1 cable
GPIO: Shows under which GPIO ports the relays can be switched On/Off

Intended external relay module:

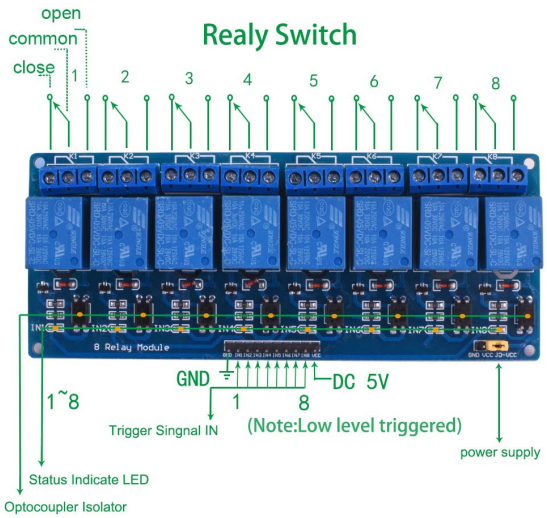

Figure 6: Intended external relays board

Also a smaller (4 channel) relay module can be used, but then a 10 to 6 pin adapter cable will be required. No external power supply is required. A total of 2 8 channel relays can be supported to have a total of 16 I/O interfaces.

5.3.Dosing interfaces:

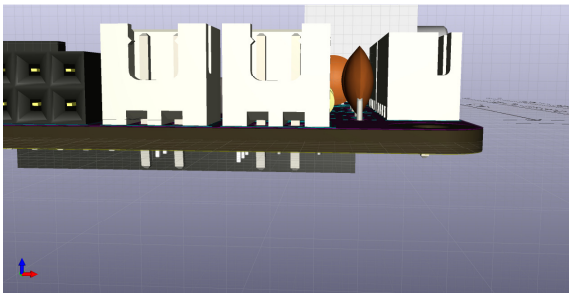

Figure 7: Dosing interfaces

Dosing motors are indicated on the HAT as D1 (left) and D2 (right)

In order for the dosing motors to function, the l293D must be enabled via GPIO port 18. Connectors are JST-XH (other will work as well, but since the optical ATO sensor has a 4pin JST-XH connector, the same 2 pin type has been selected).

GPIO port	Function
13	0/12V interface to motor #1
14	0/12V interface to motor #1
15	0/12V interface to motor #2
16	0/12V interface to motor #2
18	Enable both dosing interfaces

Table 3: Overview GPIO ports to control dosing interfaces

GPIO 18	GPIO 13	GPIO 14	GPIO 15	GPIO 16	Motor #1	Motor #2
OFF	-	-	-	-	OFF	OFF
ON	OFF	OFF	OFF	OFF	OFF	OFF
ON	ON	OFF	-	-	Direction 1	-
ON	ON	ON	-	-	OFF	-
ON	OFF	ON	-	-	Direction 2	-
ON	-	-	ON	OFF	-	Direction 1
ON	-	-	ON	ON	-	OFF
ON	-	-	OFF	ON	-	Direction 2

Table 4: Overview motor directions

5.4.ATO interface:

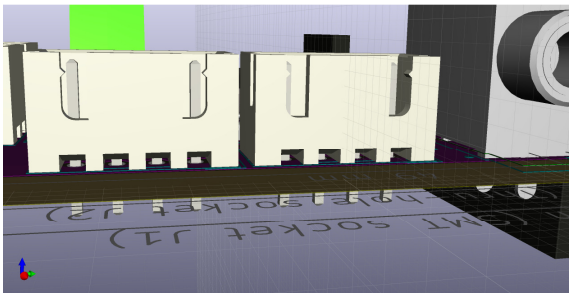

Figure 8: 4 pin dosing interfaces

The ATO1 (Left) and ATO2 (right are marked on the PCB. The interfaces connect to this type of probe

Figure 9: Intended optical water sensor

The values can be read out via GPIO ports 17 and 19

GPIO Port	Description
17	Read out ATO1
19	Read out ATO2

Table 5: ATO read out ports

5.5.Temperature sensor interface:

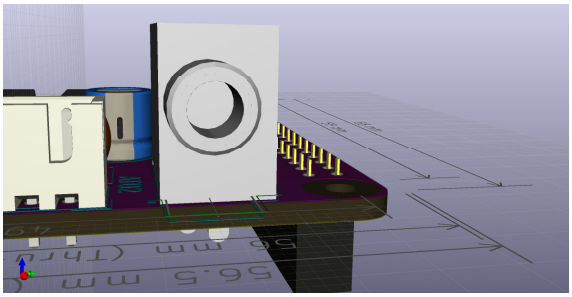

Figure 10: 3 pin DS18B20 interface

Multiple DS18B20 can be connected to the same interface alike this

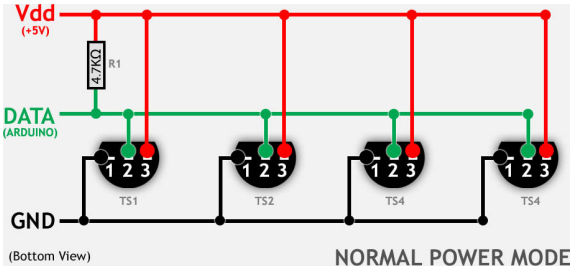

Figure 11: Mounting multiple DS18B20 sensors

It should be noted that the power supply is 3V3 and not 5V! The connection is done via a stereo audio plug alike this

Figure 12: Intended 3.5mm stereo jack connector

Connections used are:

Pin	Connection
Tip (left)	3V3 power supply (VDD)
Middle	Connects to GPIO 4 (DATA)
Right	GND

Table 6: Connector pin out

5.6.Raspberry PI interface:

Female 2x20 pin strip to connect directly to the Raspberry PI 2 or 3

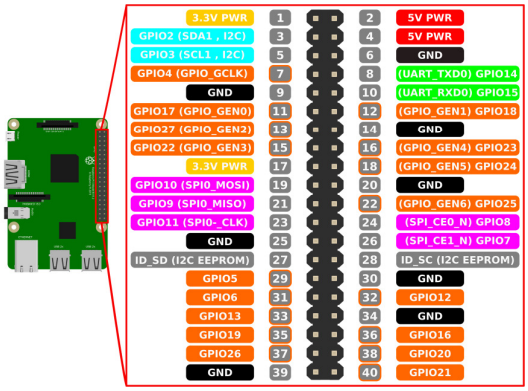

Figure 13: Raspberry GPIO pin overview

Only pins 27 and 28 (I2C EEPROM) are not used.

5.7.I2C interface:

Interface to external I2C boards (under development or existing). The interface provides signals

Pin	Signal
1	12V
2	5V
3	SDA
4	SCL
5	Not connected
6	GND

Table 7: I2C interface pin out