

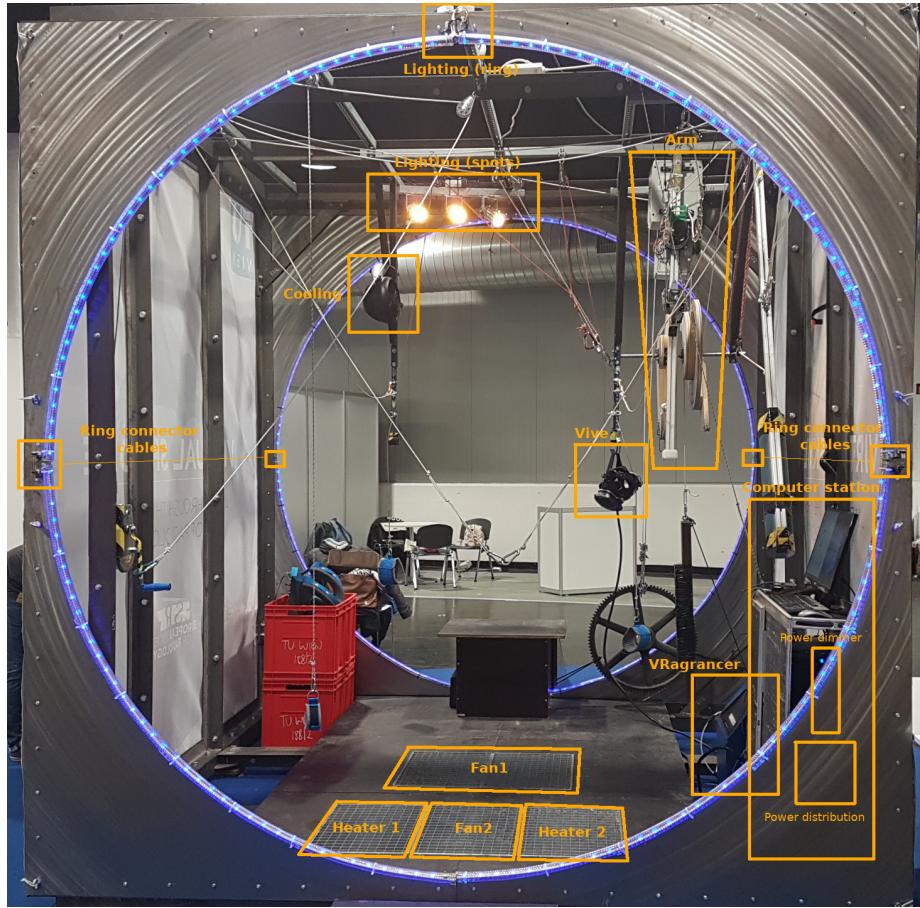
JumpCube Electrical Documentation

The JumpCube consists of several electrical components, each of which consists of different parts. This documentation lists all electrical components and explains in detail each component in its section, including hardware and software.

Components

The following is a list of components that can be found in the following two photos.

- Computing station
- Vive
- Arm
- Flight controller
- VRagrancer
- Power distribution
- Power dimmer
- Lighting
 - Spots
 - Ring
 - Ring connector cables
- Cooling
- Fans
 - Fan 1
 - Fan 2
- Heating
 - Heater 1
 - Heater 2





Computing Station

TODO: @Florin: Insert a picture of the ComputingStation

The computing station consists of:

- Power distribution
- Power dimmer
- Computer
- Monitor
- Mouse and Keyboard
- Microphone
- Vive Connect Box
- Router
- Power supplies
 - Monitor
 - RaspberryPI
 - Router
 - Vive

Control server

The control server is the software that runs on a RPi located inside the computing station and provides a web interface to the user to access the following

components: servo controller, VRagrancer and the power dimmer.

Software sources

TODO @Juri: README

Software sources can be found at <https://github.com/j-be/vj-control-server>

Connections

Name	Description
Mains Power plug	Goes to main power source
LAN	LAN switch
HDMI/USB	Connects Vive Connect Box with the Vive

Power Distribution



Figure 1: Power distribution

The power distribution features a residual-current device, multiple circuit breakers and power sockets. Power is fed from a thick cable with a Schuko AC plug,

ranging out of the box from the lower right corner. This device is current limited to 16A single phase through the residual current device.

Label	Description
FI	Residual current device 16A, Main, other circuit breaker are connected to this FI
DIMMER	Circuit breaker 16A, feeds power to the power dimmer
PC+	Circuit breaker 16A, feeds power to the internal plug strip
CONTROL	
1, 2, 3	Circuit breaker 10A, feeds power to sockets 1, 2, 3
4	Circuit breaker 16A, feeds power to socket 4

Connections

The connections listed below are just a proposal and can be changed individually. But the VRagrancer needs the 16A circuit breaker, because it contains a compressor. A 10A circuit breaker would open when the compressor starts up.

Socket label	Description
1	Servo motor
2	Lighting
3	Vive Lighthouses
4	VRagrancer

Power Dimmer

The power dimmer provides 5 channel PWM controlled 230V~ power sockets, through Solid State Relays controlled via a Arduino. The RPi running vj-control-server talks to the Arduino via USB with a serial protocol. Each channel features multiple phase angle control modes that can be set individually. Each channel is fused separately with an 10A fuse.

The following is a description of the individual modes. The letters refer to the mode in the preceding image, showing the different modes of operation.

Mode	Description
NO_FIRE	Channel disabled
PHASE_TRAILING_EDGE	A
PHASE.LEADING_EDGE	B
HALF_WAVE_BURST	C
FULL_WAVE_BURST	D

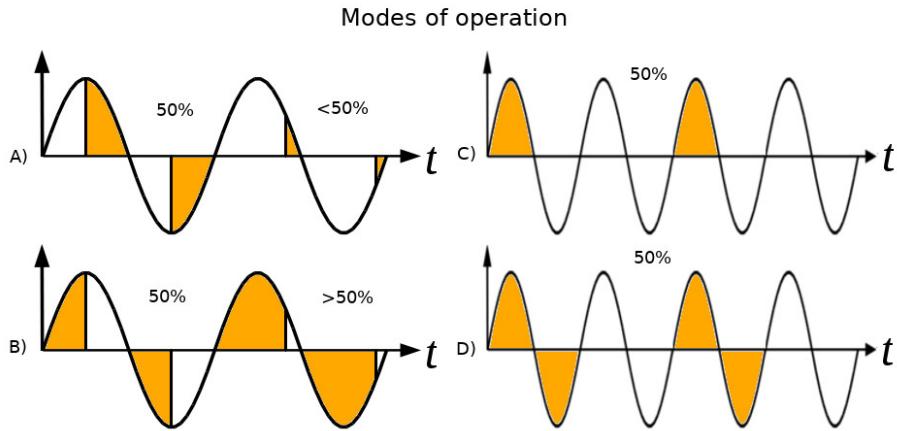


Figure 2: Dimmer operating modes

Connections

Label	Description
F	Fans
H	Heating
W	Water

Since there are two fans, both are connected together using a power strip and plugged in to the socket with label ‘F’.

There are also two heaters, both are connected together using a power strip and plugged in to the socket with label ‘H’.

Schematic

Eagle schematic can be found at <https://github.com/flozone/ssr-dimmer-board/tree/master/hw>

Layout

Eagle board layout can be found at <https://github.com/flozone/ssr-dimmer-board/tree/master/hw>

ssr-dimmer-board

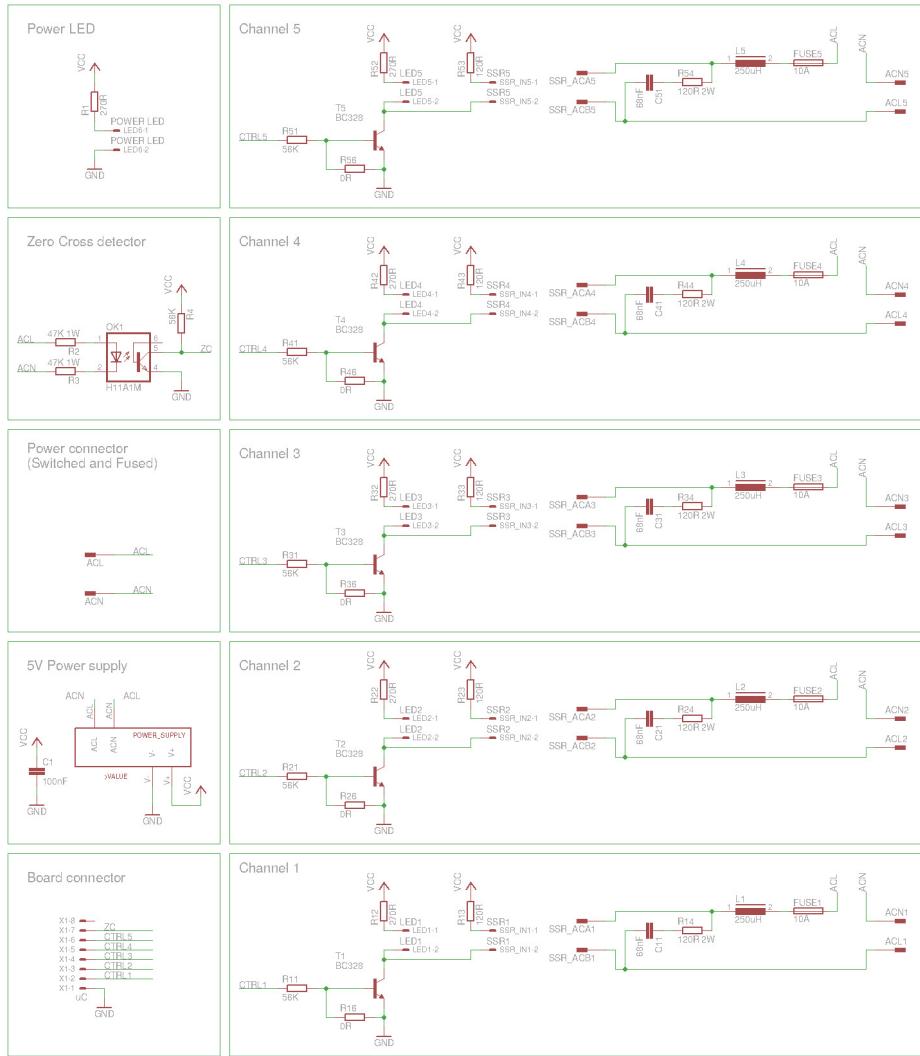


Figure 3: ssr-dimmer-board schematic

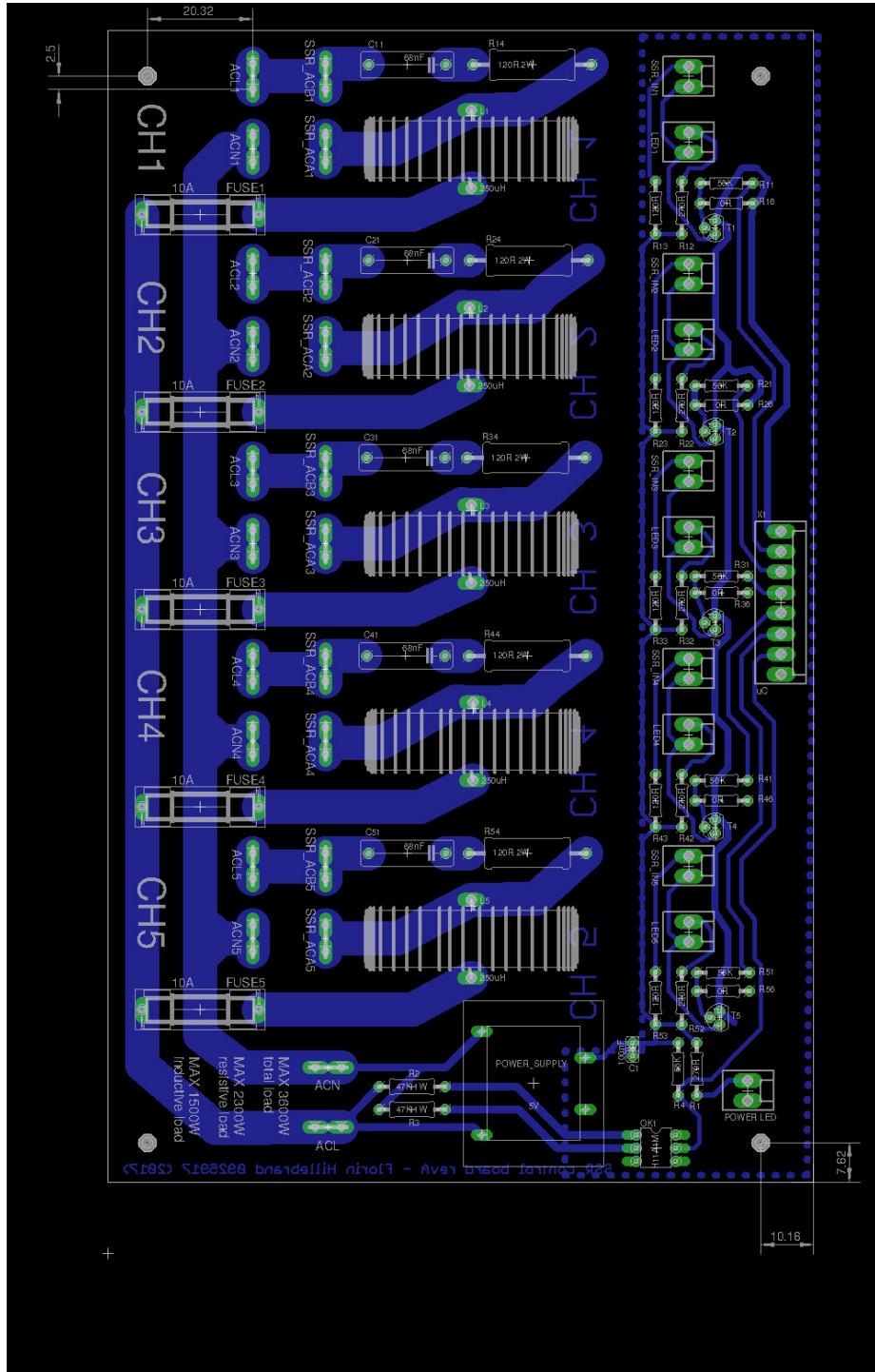


Figure 4: ssr-dimmer-board layout

Software sources

Arduino compatible firmware and documentation can be found at the github repository <https://github.com/flozzone/ssr-dimmer-board/tree/master/src>

Flight controller

The Gyrosensor delivers the actual roll position of the person directly to the computer via a USB cable using a serial protocol. It consists of a Arduino Nano running the vj-flight-controller firmware and the gyrocope module.

Connections

Name	Description
USB	Computer in the computer station

Schematic

TODO @Juri: What sensor is this? How is it connected to the Arduino?

Software sources

TODO @Juri: README

Sources for the vj-flight-controller firmware and a library to communicate to the vj-flight-controller from Unity can be found at the github repository <https://github.com/j-be/vj-flight-controller>

Arm

The arm contains the servo motor, controller, RPi, Arduino Nano, Rotary encoder, a magnetic clutch and limit switches for the clutch.

- Servo motor: Maxxon EC 60 flat 408057
- Servo controller: Maxxon EPOS 24/5

The Arduino runs the vj-servo-controller Arduino firmware and sends rotary positions read from the rotary encoder and sends them to the RPi.

Connections

Name	Description
Power plug	Power distribution socket 1
LAN	LAN switch

Schematic

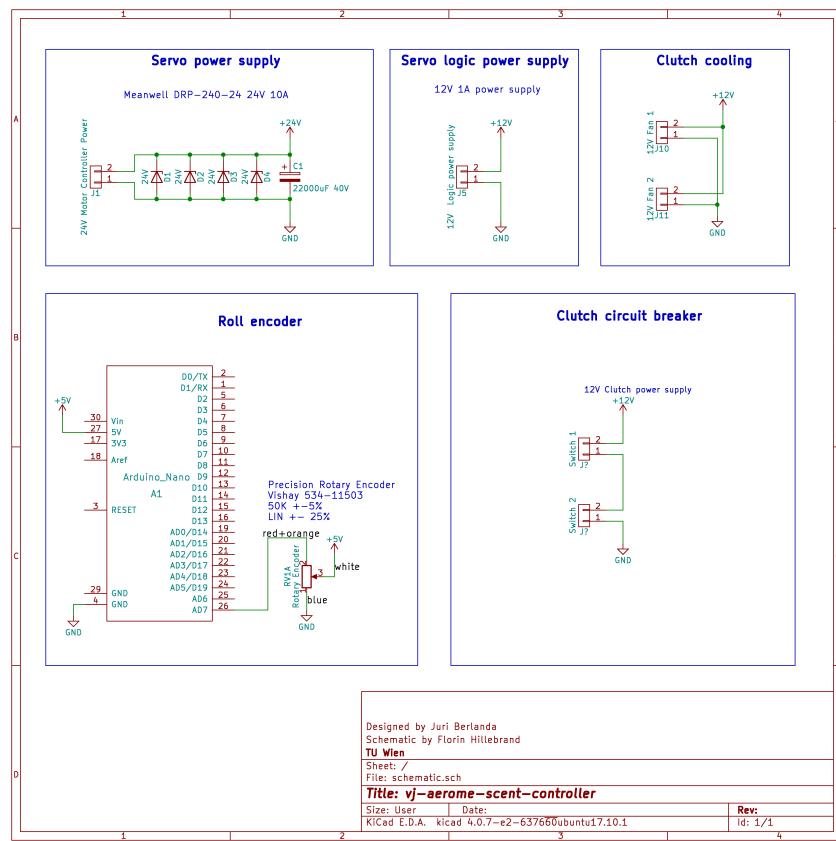


Figure 5: servo-controller schematic

KiCad schematic is located at <https://github.com/j-be/vj-servo-controller/tree/master/hw>

Software sources

TODO @Juri: README

Sources for the Arduino firmware can be found at <https://github.com/j-be/vj-servo-controller/tree/master/Arduino> While sources for the RPi can be found in the root of the repository <https://github.com/j-be/vj-servo-controller>

VRagrancer

The VRagrancer is able to produce smells using a compressor, scent capsules, power supply and valves. It is controlled by a RPi running the vj-aerome-scent-controller software.

Connections

As depicted in the figure above, the VRagrancer is connected with

Name	Description
Power plug	Power distribution socket 4
LAN	LAN switch
Tube	Connected to the tube in the cable bundle that goes to the Vive

Schematic

KiCad schematic can be found at <https://github.com/j-be/vj-aerome-scent-controller/tree/master/hw>

Layout

There is no board layout for this component, because parts are soldered on a breadboard.

Software Sources

TODO @Juri: README

Software sources and documentation can be found at the github repository <https://github.com/j-be/vj-aerome-scent-controller>

Lighting

- Light Spots
- Led ring



Figure 6: Dimmer operating modes

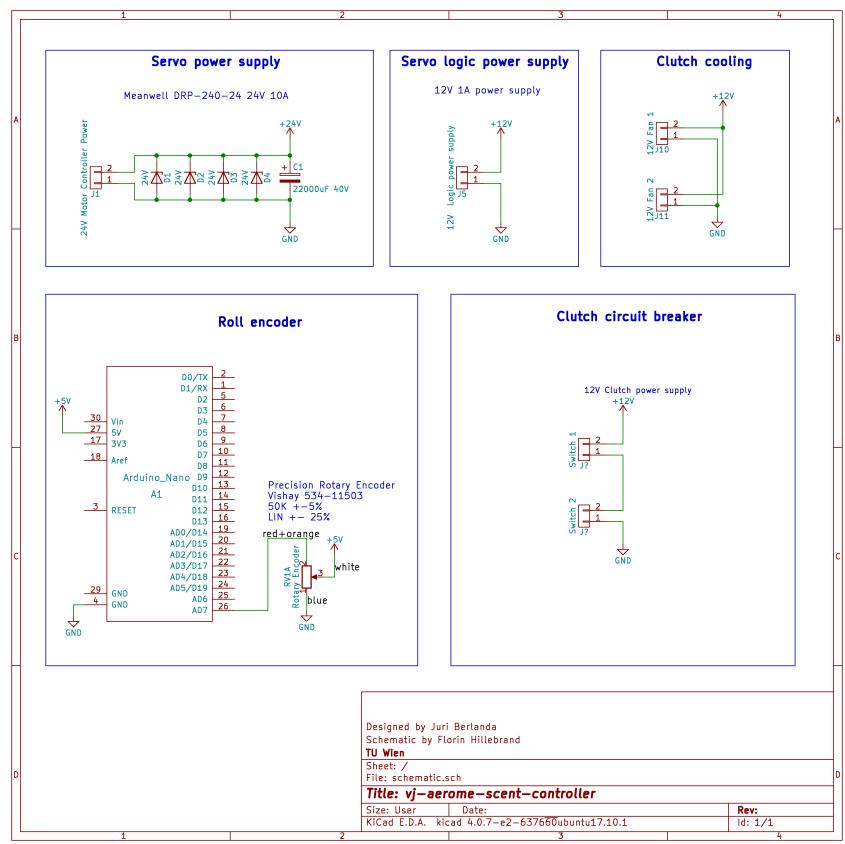


Figure 7: vj-aerome-scent-controller schematic

Connections

Led ring

The led ring consists of 4 parts on each side, while each part is a 1/4 led ring (means 8 * 1/4 led ring). Two 1/4 parts are connected together using the led ring connector (see the “ring connector cable” in the first photo) and are controlled by one led controller (means 4 * controller for 1/2 led ring each).

Name	Description
Power	Power distribution socket 2
LED Ring connector	connecting 2* 1/4 LED ring together to form a 1/2 ring
LED Ring controller	Connect 1/2 LED ring with one controller

Cooling

This is the fan as depicted in the first figure, that cools the attendant while the preparation phase.

Connections

Connected with the lighting equipment

Name	Description
Power	Power distribution socket 2

Repository summary

Components not listed here don't contain source code.

Component name	Link
Arm	https://github.com/j-be/vj-servo-controller
Flight controller	https://github.com/j-be/vj-flight-controller
VRagrancer	https://github.com/j-be/vj-aerome-scent-controller
Power dimmer	https://github.com/flozone/ssr-dimmer-board
Control server	https://github.com/j-be/vj-control-server