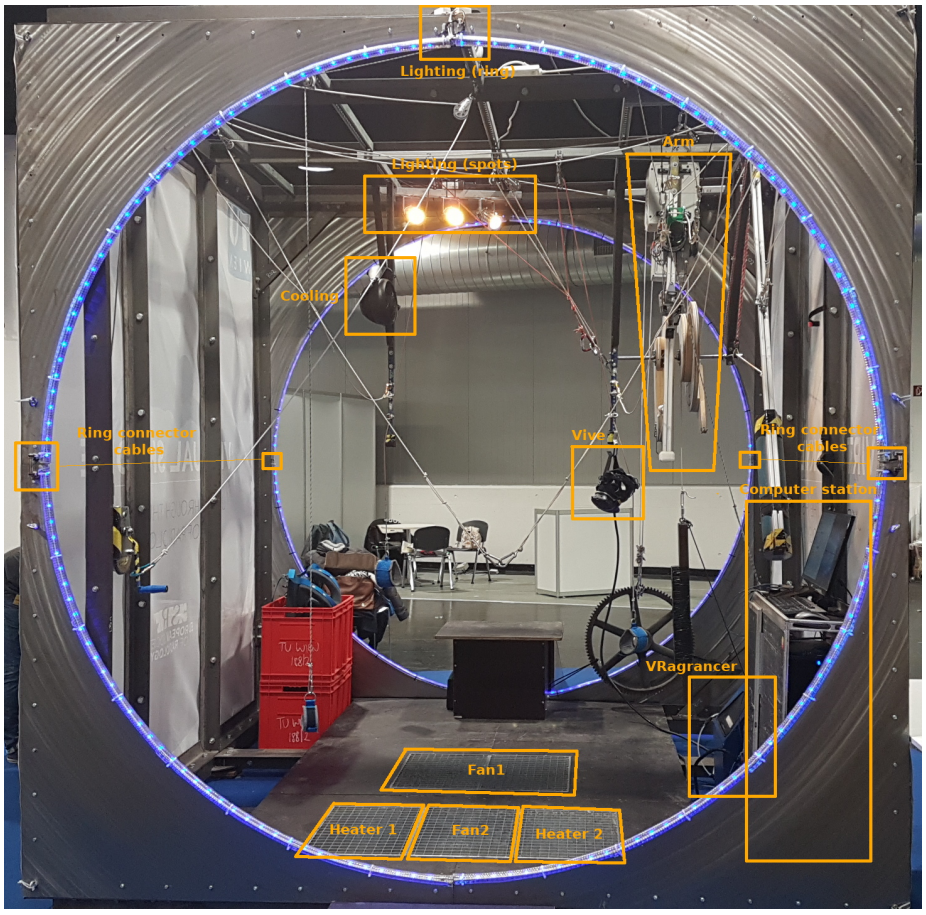
JumpCube Electrical Documentation

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 on the following two pictures.

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


Lighting (ring)
Arm
Lighting (spots)
Cooling
Ring connector cables
Vive
Ring connector cables
Computer station
VRagrancer
Fan1
Heater 1
Fan2
Heater 2

Computing Station

TODO: 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

Connections

Name	Description

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

Label	Description
PC+ CONTROL	Circuit breaker 16A, feeds power to the internal plug strip
1, 2, 3	Circuit breaker 10A, feeds power to sockets 1, 2, 3
4	Circuit breaker 16A, feeds power to socket 4

Connections

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.

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

Connections

TODO: list connections

Sources

Schematic, board layout and Arduino compatible firmware can be found at the github repository https://github.com/flozzone/ssr-dimmer-board

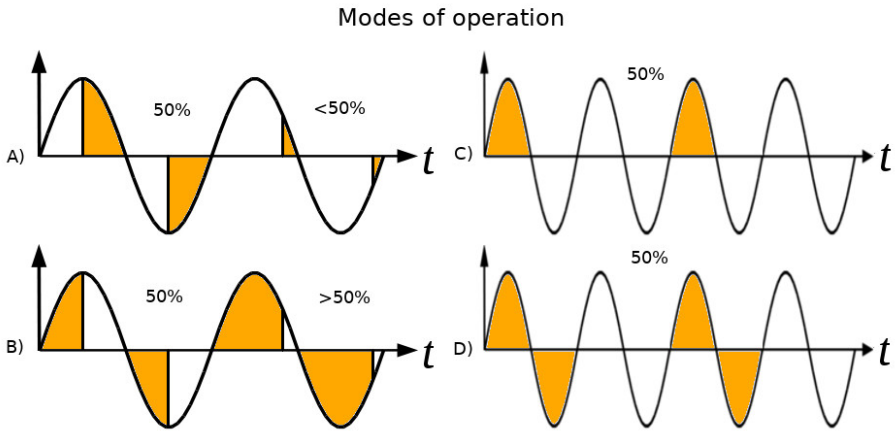


Figure 2: Dimmer operating modes

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

Sources

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 circuit breakers 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.

Sources

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 Schematics are located at https://github.com/j-be/vj-servo-controller/tree/master/hw

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

Sources

Schematic and software sources can be found at the github repository https://github.com/j-be/vj-aerome-scent-controller

Lighting

- Light Spots
- Led ring

Connections

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

Connections

Connected with the lighting equipment

Figure 3: Dimmer operating modes

Name	Description
Power	Power distribution socket 2