Workshop project

RGB-LED-Matrix-Console
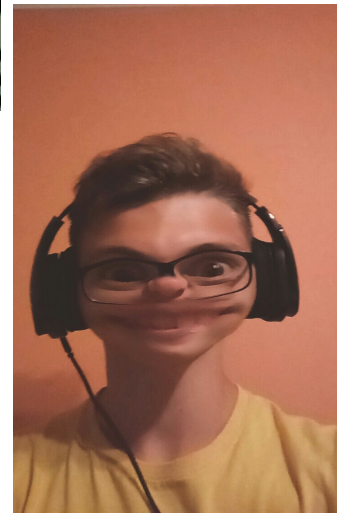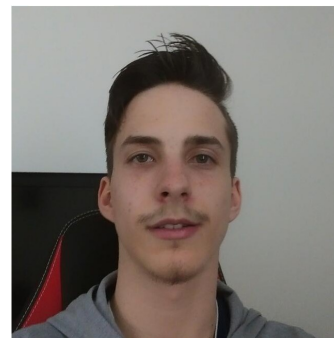
CONTENTS

1) project team

Mujic Haris, builder of boards,

Karayanov Vitaliy, programmer and support,

Pucher Jonas, drawer of diagrams and layouts,

2) project description, idea

2.1) basic concept
We want to construct a game-console using a 32x32 RGB-LED-Matrix for graphics and four controllers with four controlbuttons and two actionbuttons each. We also want to add a 7-segments-display for scores, health etc.

2.2) final product
It's like the basic concept said, but the 7-segments-display doesn't work while controling the matrix. There is no package.

2.3) feedback
// TODO

3) daily construction records

03.03.2017, creating the concept, searching for parts
03.10.2017, splitting the 6-man-group into two 3-man-groups, starting to create the circuit diagram
03.31.2017, completed partslist and controller-layout
**04.21.2017**, completed boards and soldering of contacts between top and bottom
05.05.2017, programming and mounting of the parts

4) instruction manual

1. You just have to connect the power supply with a 230V 50Hz supply.

2. You will land in the game-selection-menu

    1. There you can navigate through the different games with the left and right control-buttons (gray).

    2. To choose a game you simply push the lower blue button.

3. Now you are in a game

    1. Tanks

        1. It's a four player game. You control a tank with the gray buttons and you can shoot with the lower blue button.

        2. To win a game you have to hit the other tanks until you are the last one.
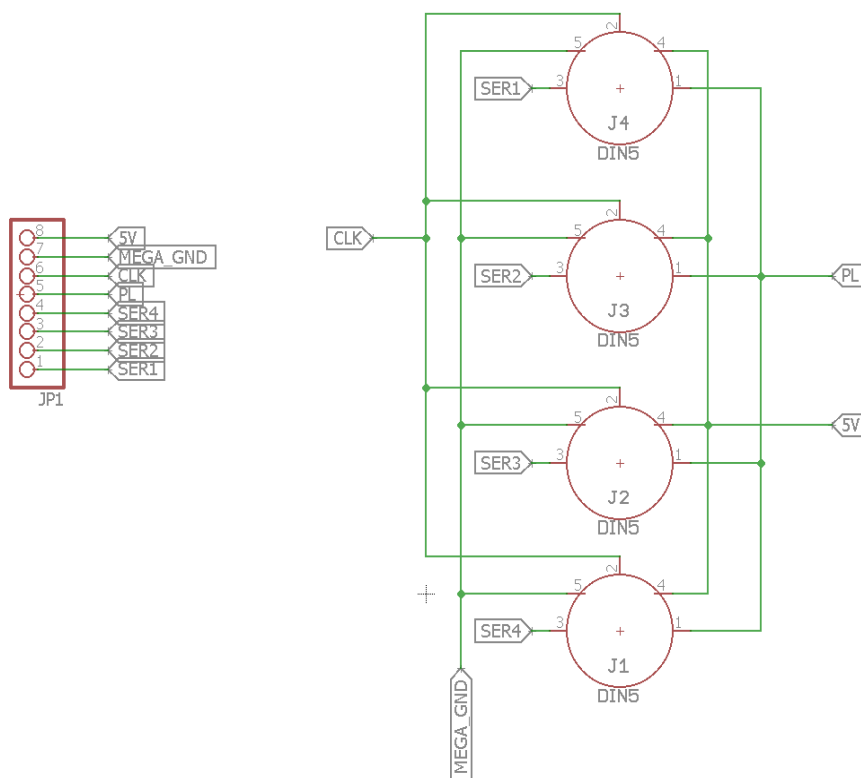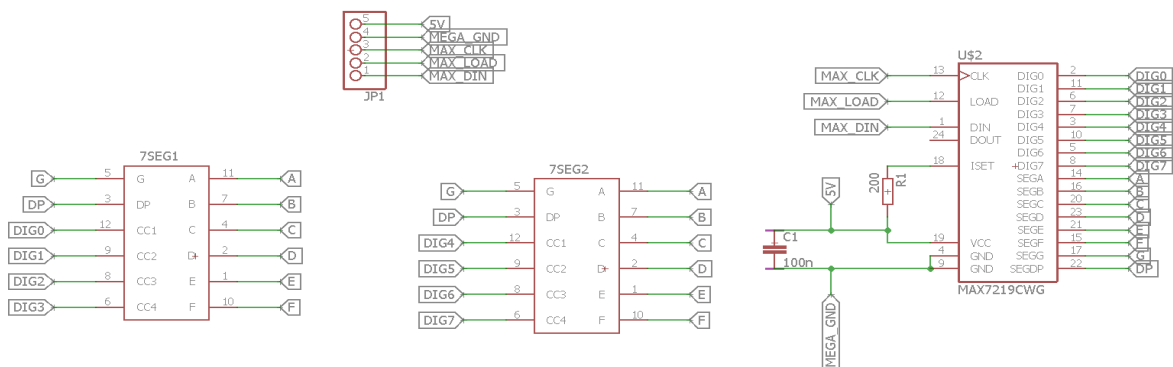
5) circuit, layout

5.1) circuit
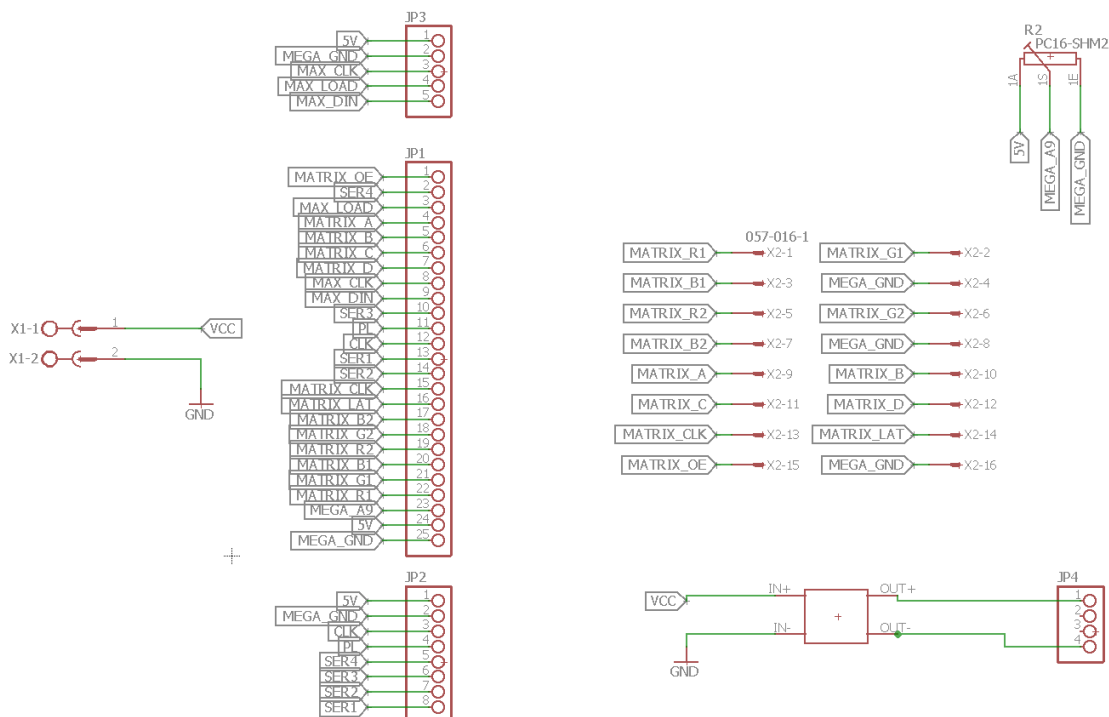
console.sch
This is the main board which consists of a power supply, a voltage stabilizer and a few pin header to connect everything.

JP1

Pin	Signal
8	5V
7	MEGA_GND
6	CLK
5	PL
4	SER4
3	SER3
2	SER2
1	SER1

CLK

SER1 — J4 DIN5

SER2 — J3 DIN5 — PL

SER3 — J2 DIN5 — 5V

SER4 — J1 DIN5

MEGA_GND

console1.sch
This board consists of the controller-jacks and a pin header to connect it with the main board.

JP1

Pin	Signal
5	5V
4	MEGA_GND
3	MAX_CLK
2	MAX_LOAD
1	MAX_DIN

7SEG1

G	5	G	A	11	A
DP	3	DP	B	7	B
DIG0	12	CC1	C	4	C
DIG1	9	CC2	D	2	D
DIG2	8	CC3	E	1	E
DIG3	6	CC4	F	10	F

7SEG2

G	5	G	A	11	A
DP	3	DP	B	7	B
DIG4	12	CC1	C	4	C
DIG5	9	CC2	D	2	D
DIG6	8	CC3	E	1	E
DIG7	6	CC4	F	10	F

U$2 — MAX7219CWG

MAX_CLK — 13 CLK   DIG0 2 — DIG0
DIG1 11 — DIG1
MAX_LOAD — 12 LOAD   DIG2 6 — DIG2
DIG3 7 — DIG3
MAX_DIN — 1 DIN   DIG4 3 — DIG4
24 DOUT   DIG5 10 — DIG5
DIG6 5 — DIG6
18 ISET   DIG7 8 — DIG7
SEGA 14 — A
SEGB 16 — B
SEGC 20 — C
SEGD 23 — D
SEGE 21 — E
19 VCC   SEGF 15 — F
4 GND   SEGG 17 — G
9 GND   SEGDP 22 — DP

5V   200   R1

C1 100n

MEGA_GND

console2.sch
This board consists of two 4-digit-7-segments-displays, a MAX71219-IC to control these and a pin header to connect it with the main board.
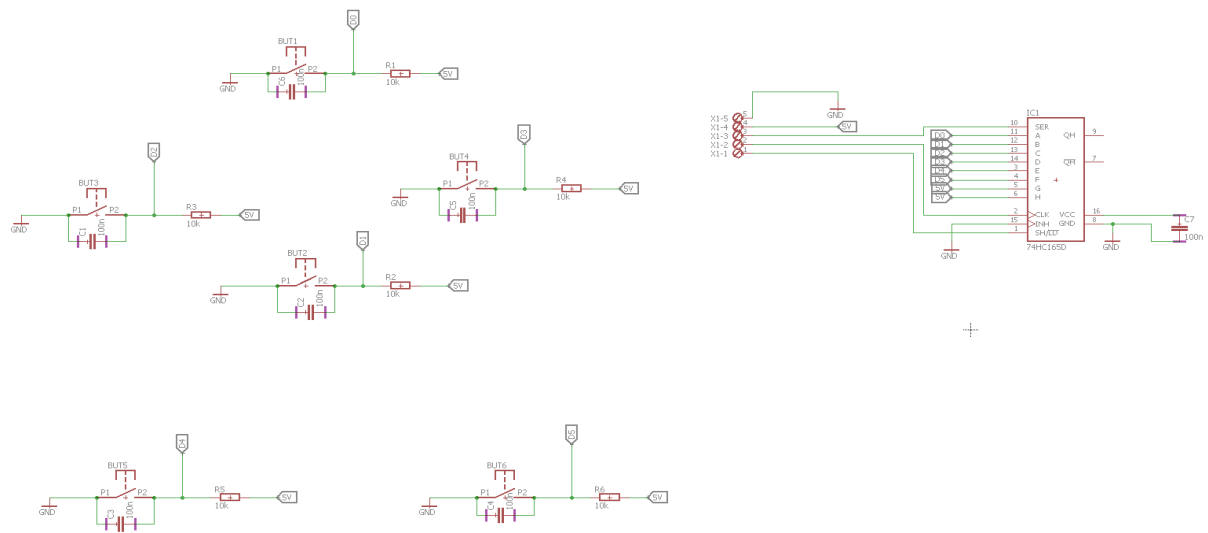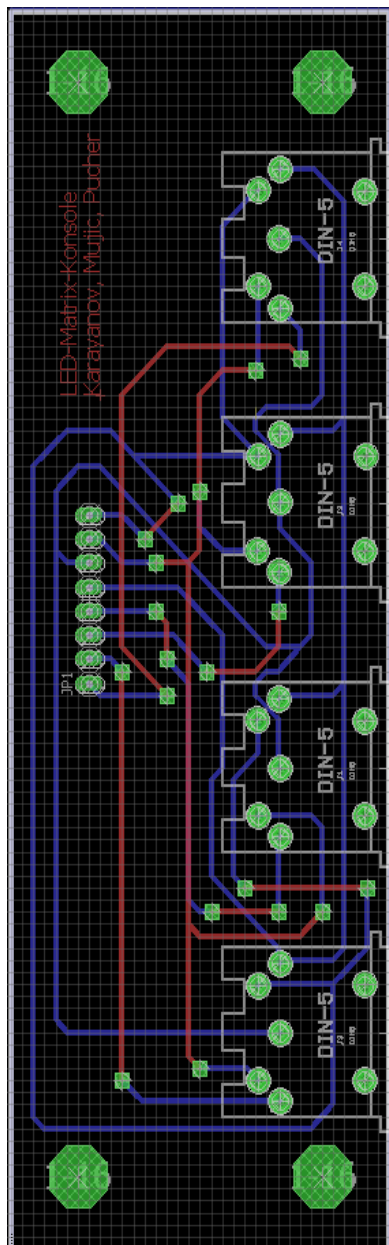
controller.sch

This is the board of the controller which consists of 6 buttons with the pull-up-resistors and debouncing capacitors. There is also a 74HC165-shift register to transmit the button states to the arduino.
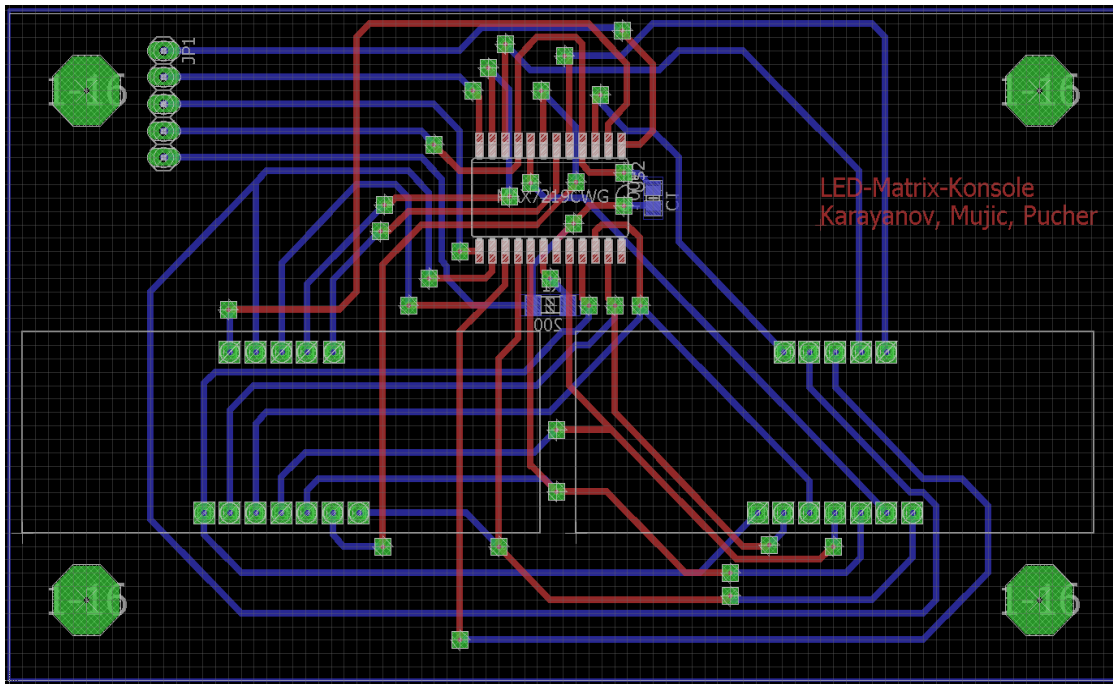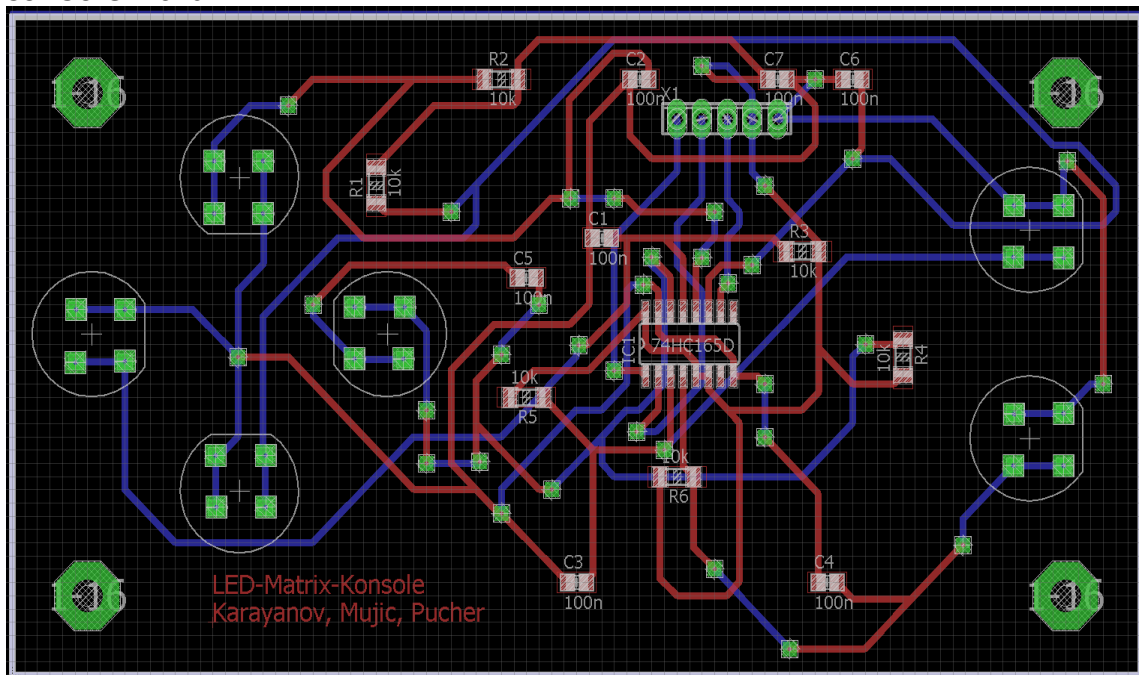
5.2) layout
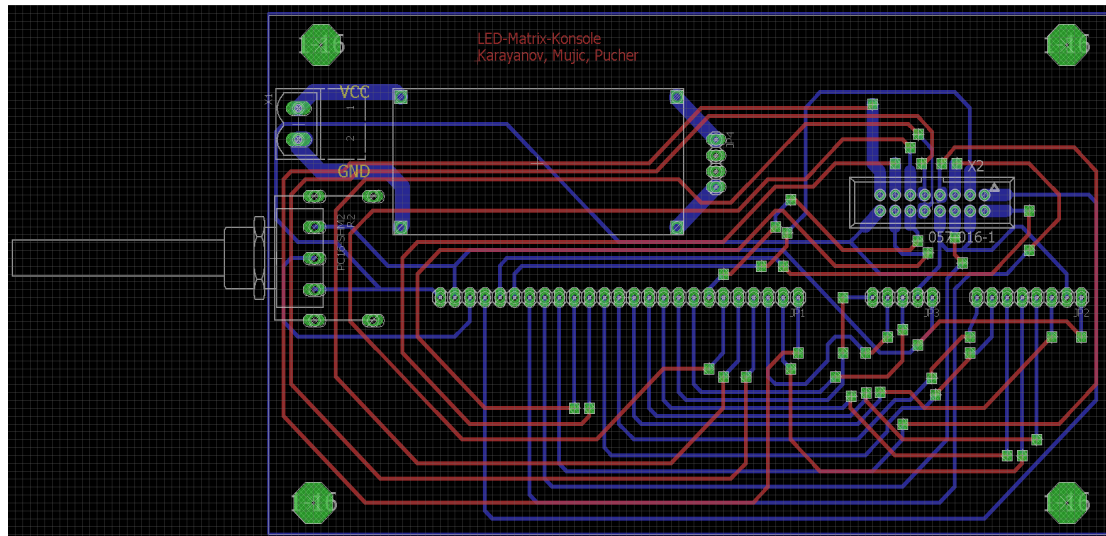
console.brd

console1.brd

console2.brd
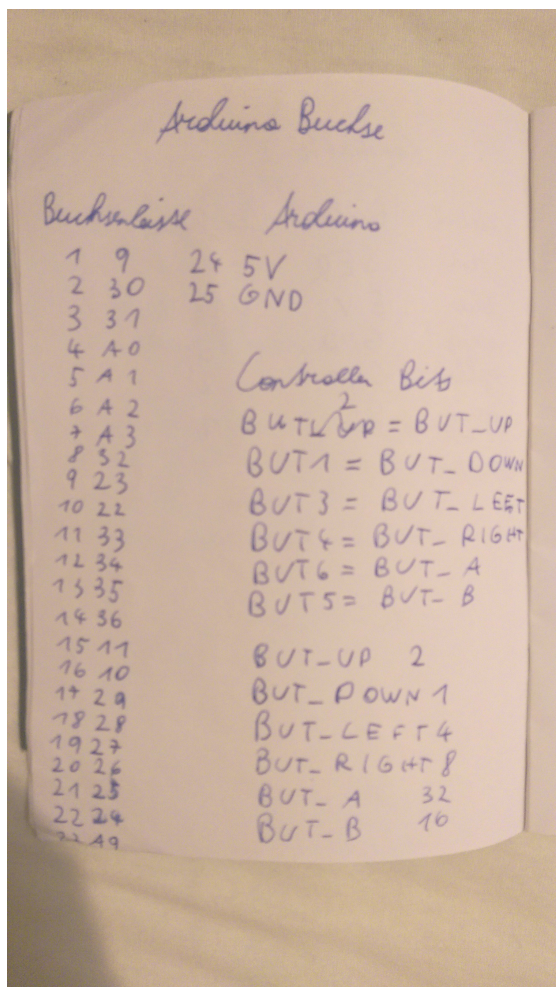

controller.brd

6) plans, calculations, parts list

6.1) parts list

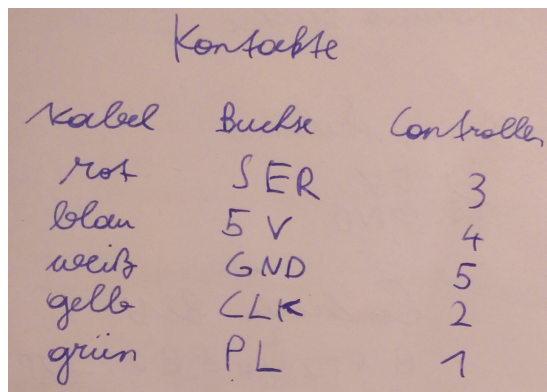| name	amount	prize	website
32x32 Matrix	1	€ 63,02	www.adafruit.com
Arduino Mega	1	€ 35,28	www.arduino.cc
7-segments-display	2	€ 5,94	at.rs-online.com
controlbuttons	16	€ 23,84	at.rs-online.com
actionbuttons	8	€ 11,44	at.rs-online.com
potentiometer	1	€ 1,92	reichelt.at
74HC165	4	€ 1,28	at.rs-online.com
MAX7219	1	€ 7,44	at.rs-online.com
DIN-jack	4	€ 2,40	reichelt.at
DIN-cable	4	€ 5,64	reichelt.at
25x1 pinheader	1	€ 3,71	at.rs-online.at
8x1 pinheader	2	€ 3,08	at.rs-online.at
5x1 pinheader	2 (5)	€ 0,90 (2,26)	at.rs-online.at
8x2 pinstrip	1	€ 0,49	at.rs-online.at
voltage stabalizer	1	€ 2,95	neuhold-elektronik.at
100n capacitor	29	€ 1,16	reichelt.at
10k resistor	24	€ 0,48	reichelt.at
200 resistor	1	€ 0,02	reichelt.at
power supply	1	€ 13,85	amazon.de
	Sum	€ 186,20	

6.2) plans

1. Think out how we can do it
2. Search for fitting parts
3. Draw the circuit diagram
4. Draw the circuit layout
5. Print the boards
6. Solder the connection from top to bottom
7. Mount the parts
8. Test the main board
9. Design the package
10. Print out the controller package with the 3D printer
11. Build the main package in the KUV
12. Connect everything and test it
13. Finished!

6.3) calculations

A photo of some notes. There are the pins of the 25x1 pinheader with their corresponding arduino pin and the bits for the different buttons in the program.

A picture of some notes about the contacts of the controller. There are the pins of the controller and their corresponding cable-color and function in the program.

7) check list

Appointments: 03.03.2017   start
03.24.2017   ZT1, circuit finished, order components
04.28.2017   ZT2, control work progress
05.12.2017   test - presentation
06.09.2017   presentation

before presentation on 06.09.2017:
documentation (1x on paper, 1 x data medium) to teacher

every unit: upload work report to moodle