

# Extended Abstract

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## THE LED CUBE FOR LIGHT SHOWS

### Objective and Requirements

Our main goal with this project is to construct a led cube of 125 individual leds that is controlled by inputs from the ChipKit Uc32. The cube is going to be built with a 4 cm distance between every led and be 5 leds wide, 5 leds high and 5 leds in depth. To control the leds we are going to use three I/O expanders MCP23017 that supports the I2C protocol. The cube will have multiple patterns that plays in different speeds depending on what the user want to integrate it in, for example with music.

### Solution

To make everything work we first divided up the projekt into three main parts. The cube, communication and code. For the cube we chose a 5 x 5 x 5 led matrix design with distances of 4 cm. We solder together the cathodes of the leds in rows and then solder together them in planes so that no anode touches the plain. Then we did five planes and solder together them by solder together the anodes in columns. This design allows us to light up individual leds by place high on a column and GND on a plane. For the communication part we connected three

MCP23017 on to a breadboard and connected the columns to their outputs. For the planes we used nMOS and pMOS mosfets to have an inverter that drained the planes when we outputted high from the I/O expander. For the code we first initialised the I2C module and coded convenient functions that were could use so the protocol was easily used in the code. After that we coded patterns functions that is executed by the press of buttons.

## **Verification**

Before we started the project we tried the cube in a virtual environment where we also tried the idea of I/O expanders. We also did some research and did find proof of that the design is working.

## **Contributions**

Kocin started with trying to figure out the I2C protocol while Tom started solder the cube together. Tom finished the cube with some help from Kocin and Kocin did figure out the I2C with some help from Tom. For the rest of the project we collaborated together. We helped each other out with the breadboard to make it work with the cube and with the code. We are very happy how the project turned out and how we collaborated during the whole project.

## **Reflections**

After we finished the project we wanted to implement MIDI input but we were missing some hardware to make it work. If we had researched some more we could have bought the missing microcontroller that could have made it work. Else then that we could have done a lot more to the design but then we would need to have more time, which we didn't have.