

PINT personal assignment report

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CHAPTER 1

INTRODUCTION

I had to make a PCB that was centered around the ESP32-WROOM-32E (referred to as ESP32 from now on) chip. I was tasked with connecting it to power, making it programmable and integrating two sensors (one digital and one analog) while keeping the design as modular as possible.

CHAPTER 2

BASIC CIRCUITRY

To program the ESP32 chip we need a programmer, which serializes the data coming from the USB. For this I will be using the CP2102N chip. We also need a power supply, which can convert 5V to 3,3V and some GPIO header pins.

2.1 Programmer

As you can see in [2.1](#), the power is supplied by the USB and the data lines we use are the ones which are compatible with older USB standards. The rest of the components ensure the proper operation of the programmer.

2.2 Power supply

The power supply ([2.2](#)) provides 3,3V from a 5V battery or an external power supply. As you can see in [2.4](#) you can use the power header to connect the external 5V.

2.3 ESP32

In [2.3](#) you can see how the ESP32 chip is wired. Some of the connections (marked with NC) should not be used. For more on

2.4 Headers

The header connections are shown in [2.4](#). There are headers for the GPIO pins, the battery/power supply and external programmer.

2.4.1 GPIO headers

The GPIO pins are not ordered so users should reference the pinout every time. The pins which connect to the NC pins on the ESP should not be used (see [2.3](#))

2.4.2 Power headers

You can see the net labels for the 5V pins in [2.5](#). The 3,3V is looks the same, but it does not go through a voltage regulator (see [2.6](#)). Do not connect a 5V and a 3,3V at the same time. Use this paragraph and the accompanying pictures for wiring.

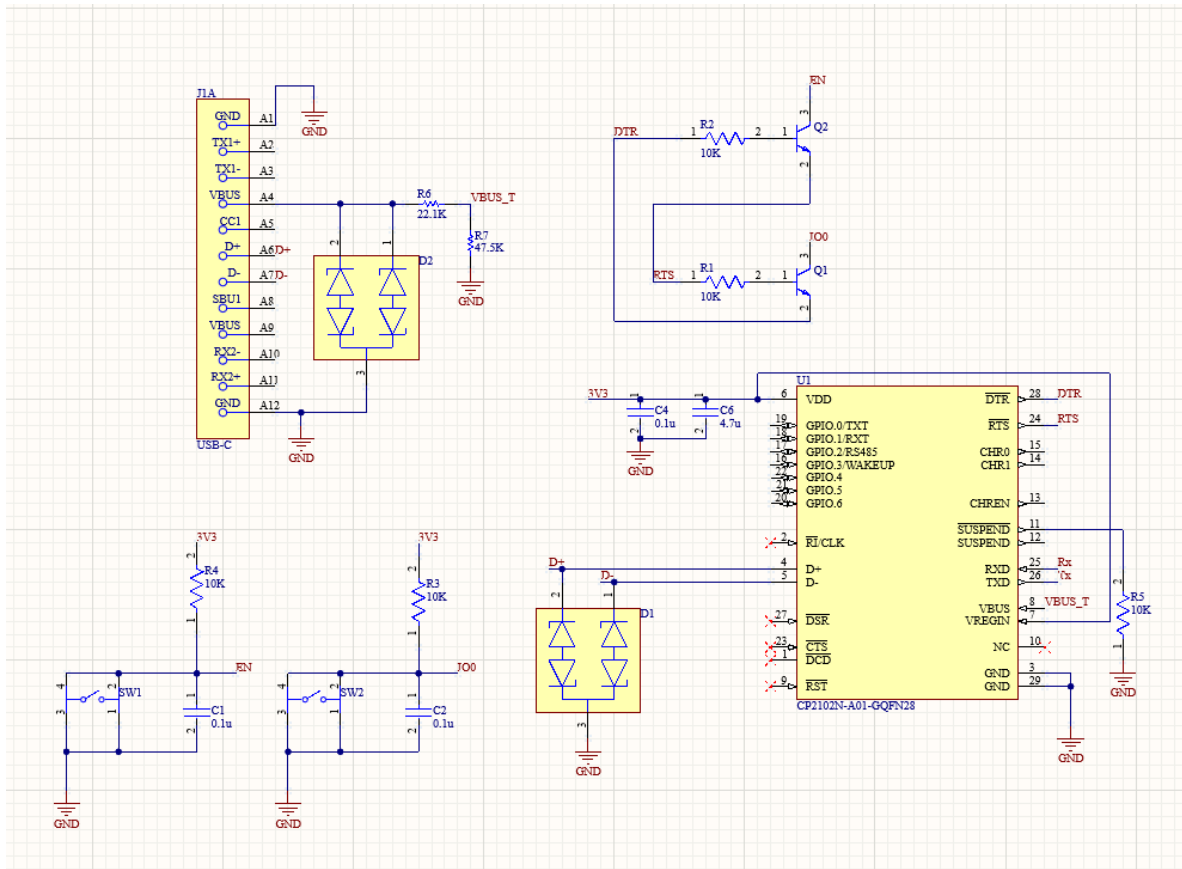


Figure 2.1: Programmer circuit

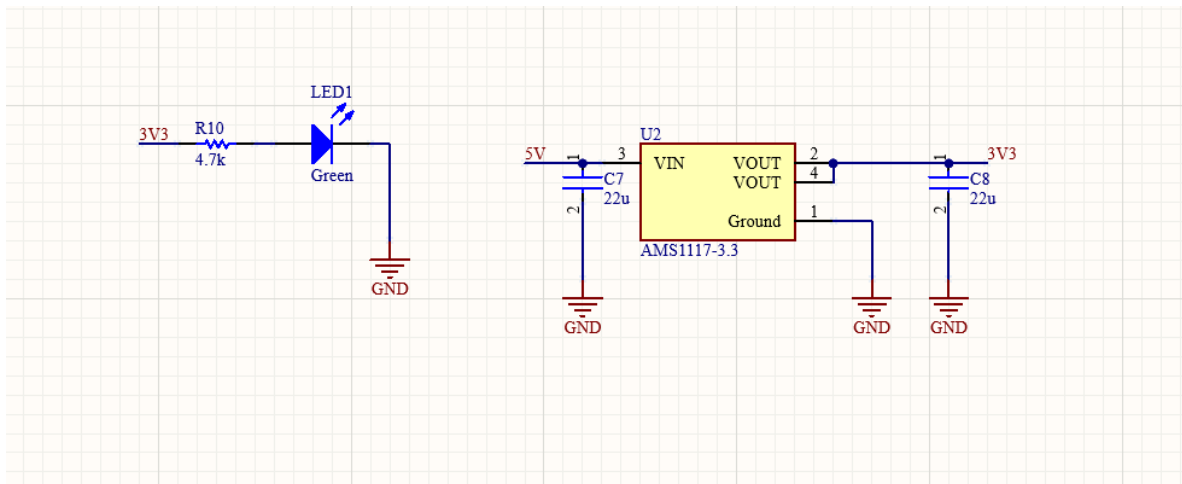


Figure 2.2: Power supply circuit

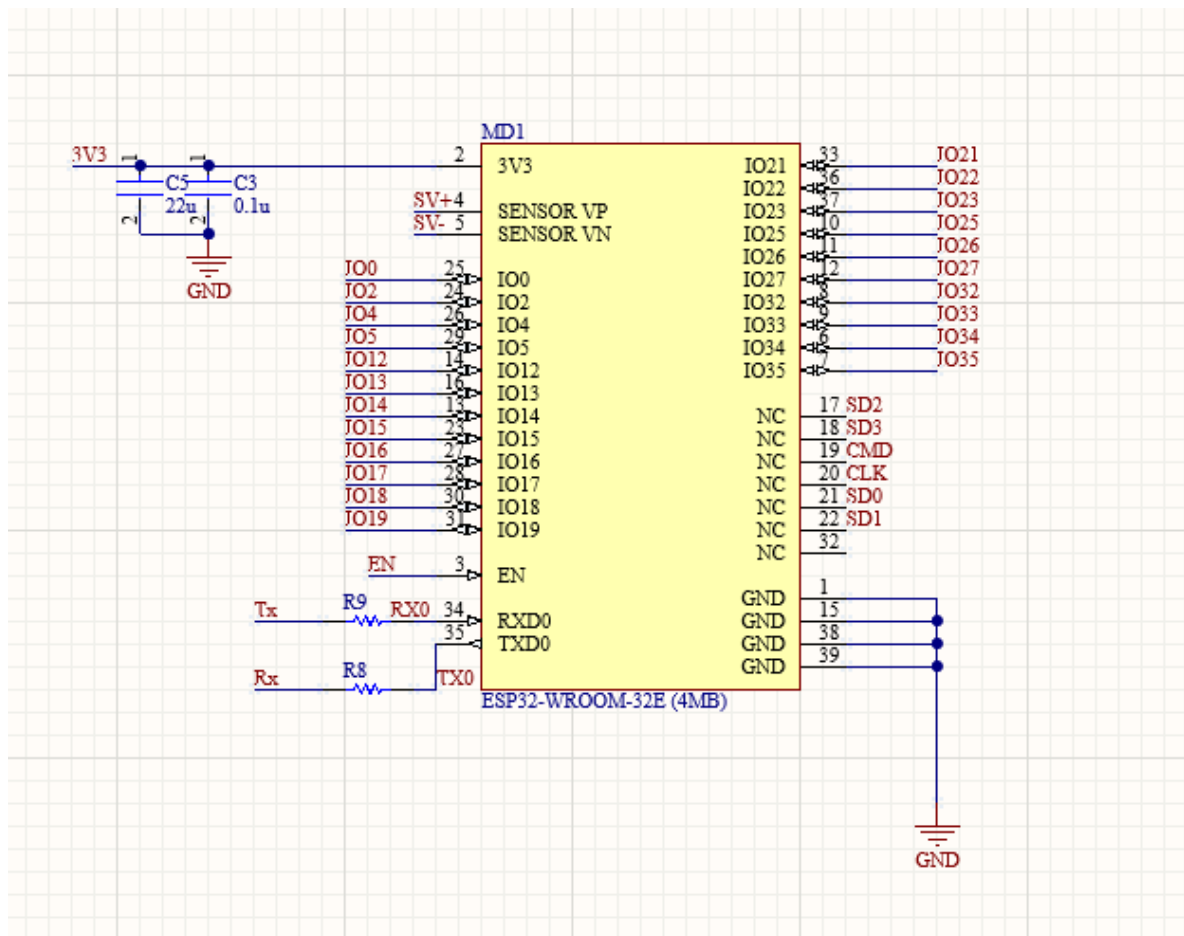


Figure 2.3: ESP32 wiring

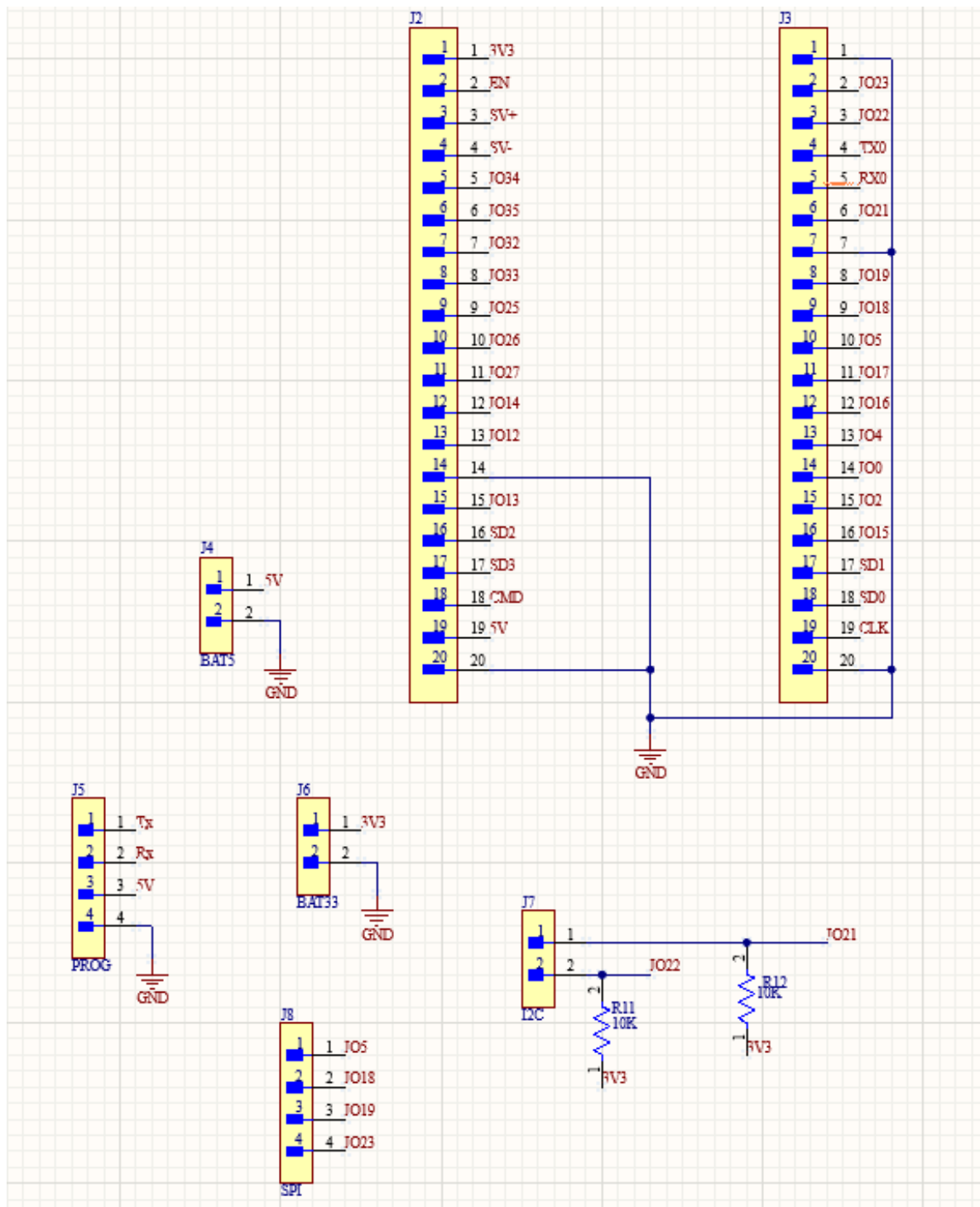


Figure 2.4: Headers

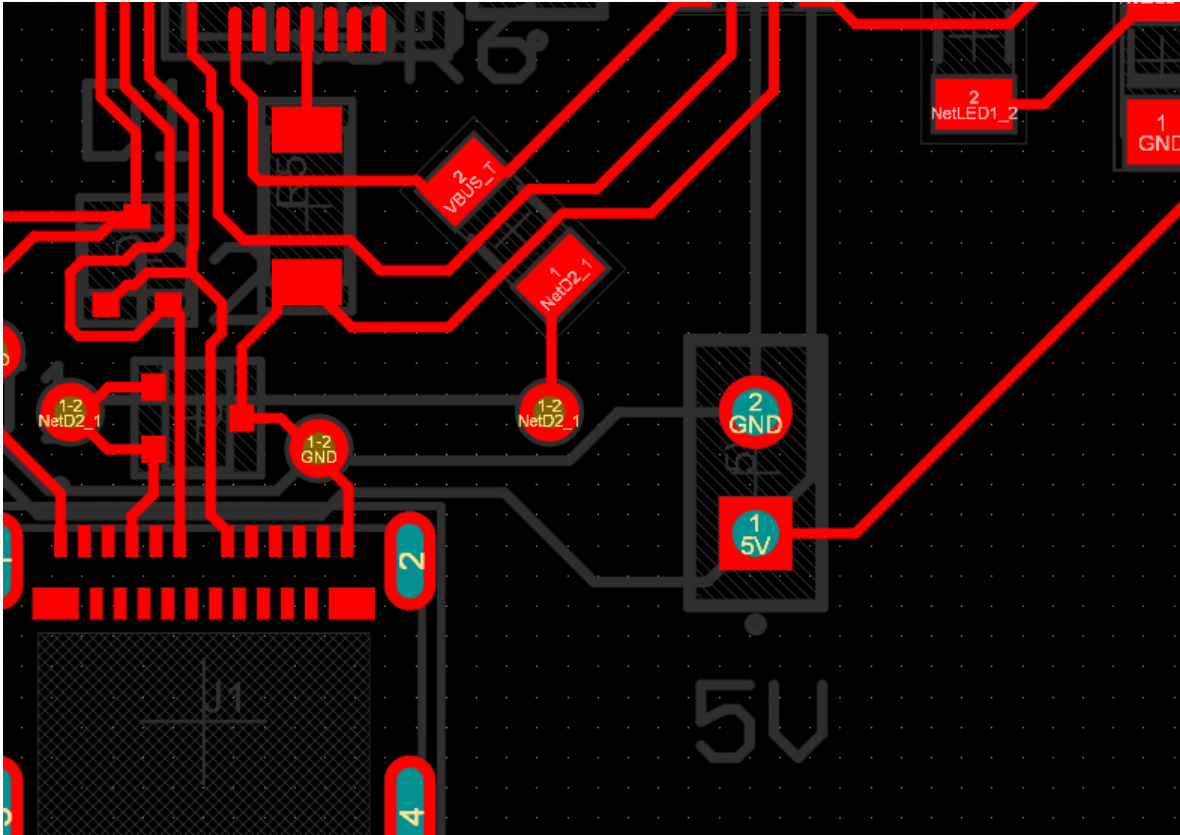


Figure 2.5: External 5V pins

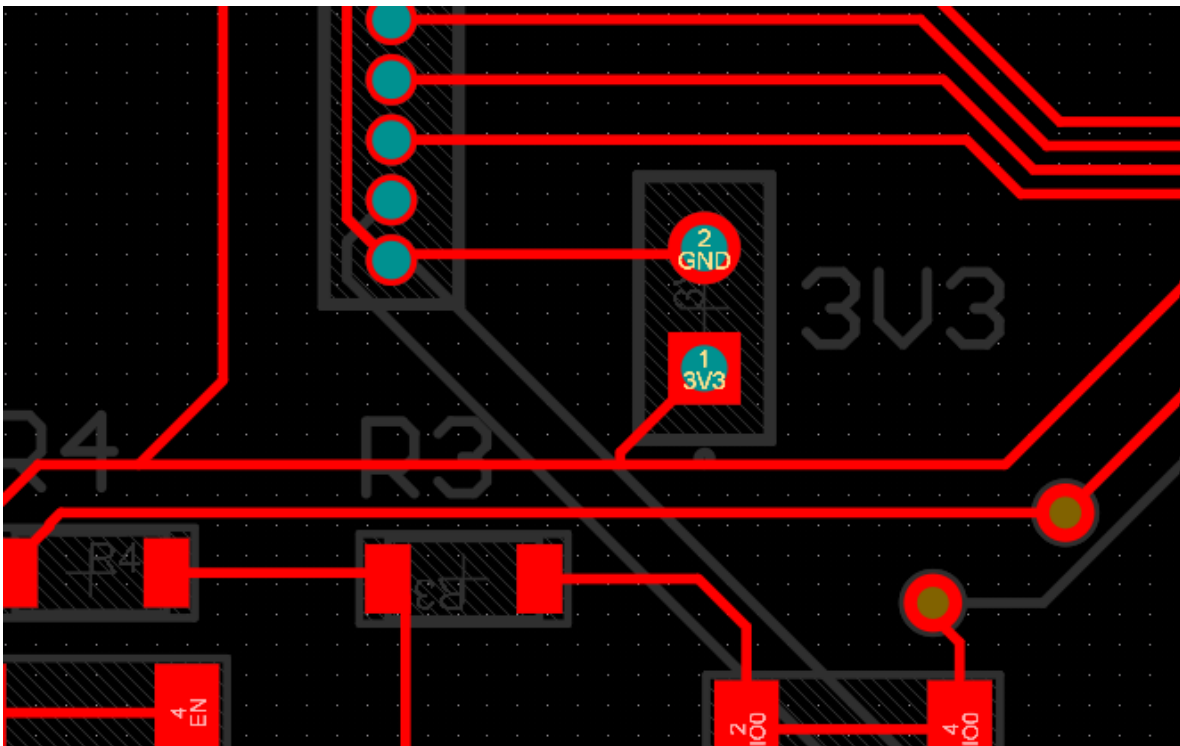


Figure 2.6: External 3,3V pins

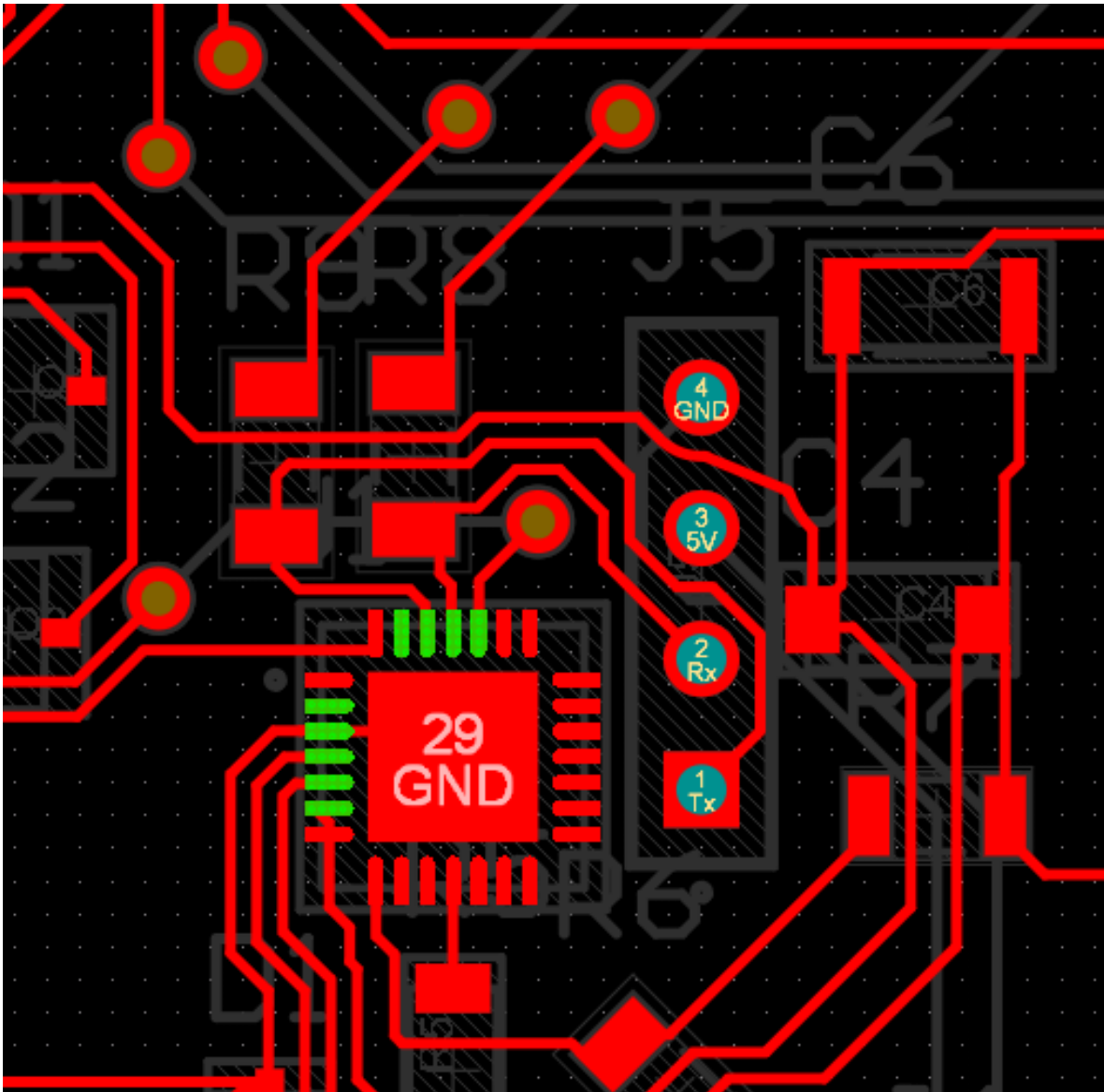


Figure 2.7: External programmer pins

2.4.3 External programmer header

You can see the net labels in [2.7](#). Use this for wiring.

2.4.4 Other headers

The rest of the headers are meant for serial communication using SPI and I2C. Those require more attention when plugging in so their pins have been labelled. See [2.8](#). The I2C has pull-up resistors which is the only addition to any header.

2.5 PCB

In the end, the PCB looks like this

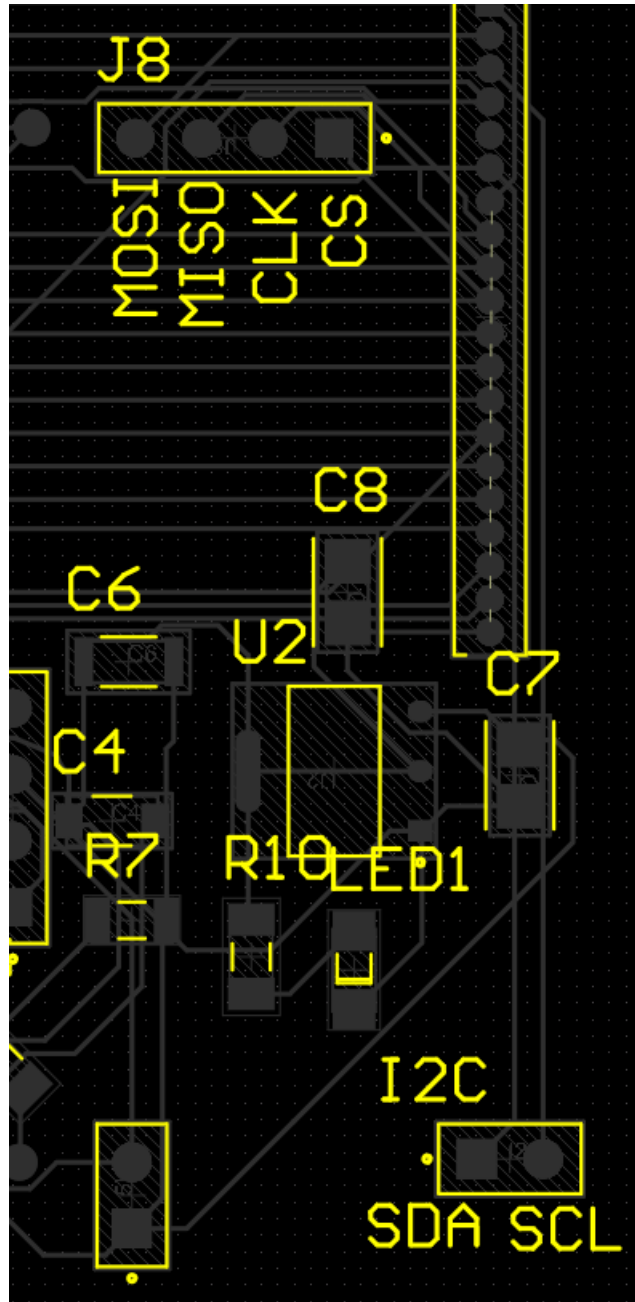


Figure 2.8: SPI and I2C headers

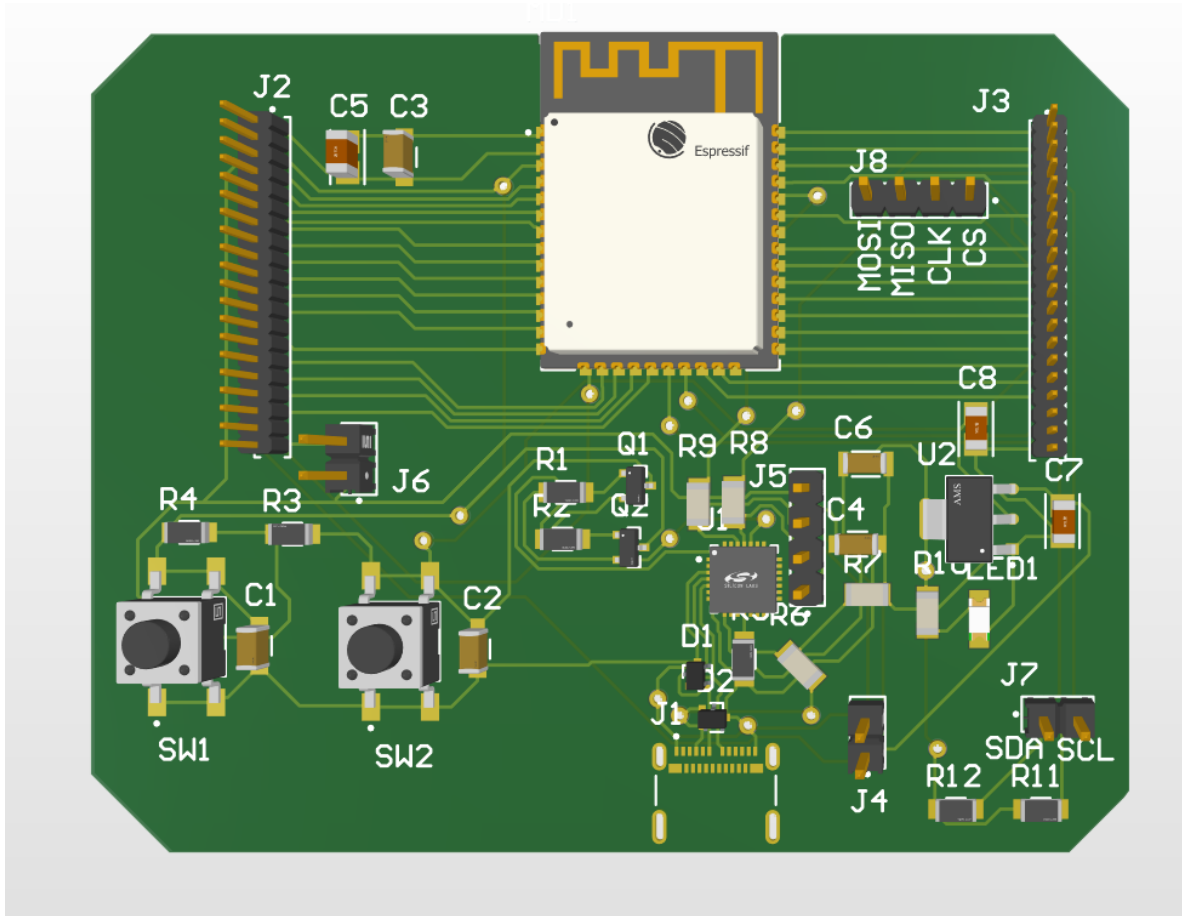


Figure 2.9: 3D model of the PCB