



UNIVERSITY OF CAMBRIDGE

IDP - ELECTRICAL DOCUMENTATION

IT DOESN'T WORK UNTIL IT DOES
GROUP L205

March 15, 2025

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- During this project, we had to design and construct the interface board which represents the connection between the PicoBot and the electrical components.
 - The work was divided into 3 different steps, as presented below: the circuit design, the circuit layout, and the actual assemble of the board.

1 Circuit Design

An important first step was the circuit design. We decided together which sensors and components we were going to use and to which pins they were all assigned.

In the end, we used: 4 line sensors, 2 motors, 1 servo, 1 colour sensor, 1 time of flight sensor, 1 LED, and 1 push button.

Going into more detail, we concluded that the motors and the servo have different connections that are not required to be part of the interface board. Moreover, for the colour and the time of flight sensors, we had to incorporate some I2C pins and pull-up resistors.

For the LED circuit, we used a CD4093 chip in order to send a signal similar to a square wave. The microprocessor follows a boolean expression that transmits to the LED when to blink and when to stop.

Taking all this into consideration, we constructed the diagram from Figure 1.

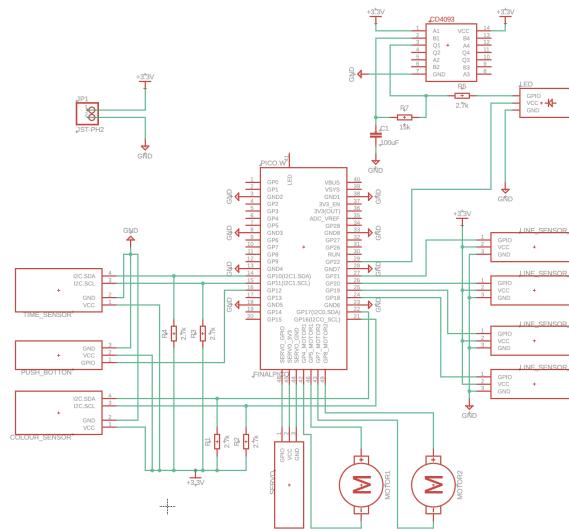


Figure 1: Circuit Design

2 Circuit Layout

We then proceeded to do the circuit layout, taking into account all the necessary lines of solder and pieces of wires. The results are seen in Figures 2 and 3.

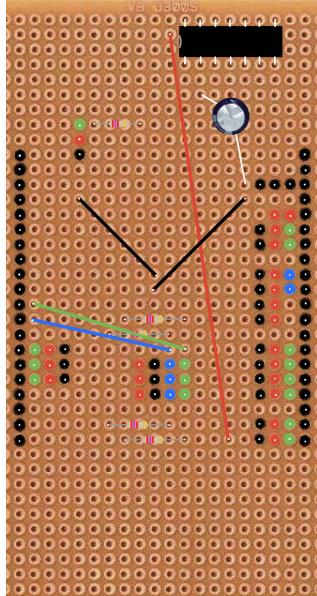


Figure 2: Circuit layout - top face

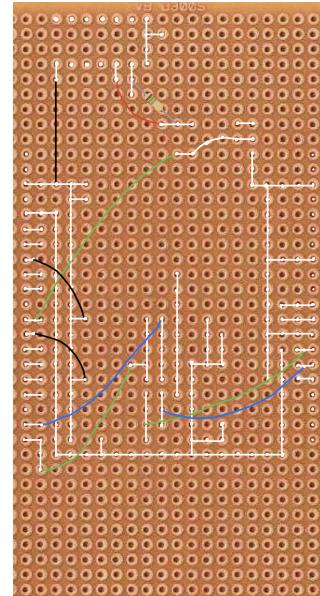


Figure 3: Circuit layout - bottom face

3 Final Product

Finally, we had to actually create the board. Following the circuit layout, we managed to construct the interface without any major problems. We can take a good look at our results by checking Figures 4 and 5.

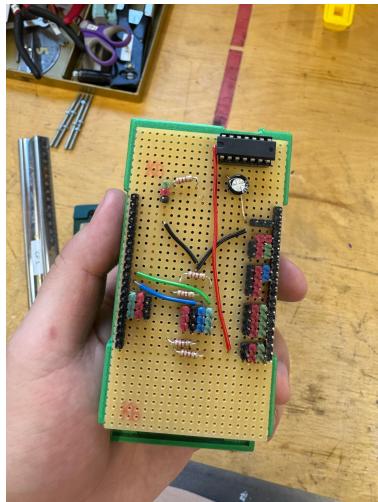


Figure 4: Interface Board - top face

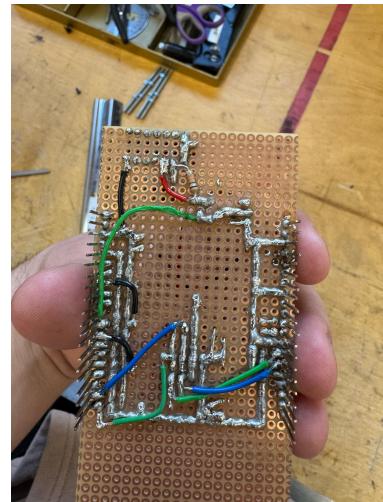


Figure 5: Interface Board - bottom face