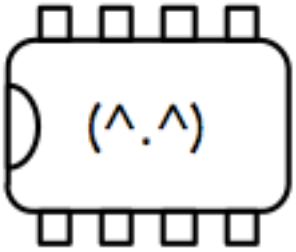
ZenAI Community of Robots ch2



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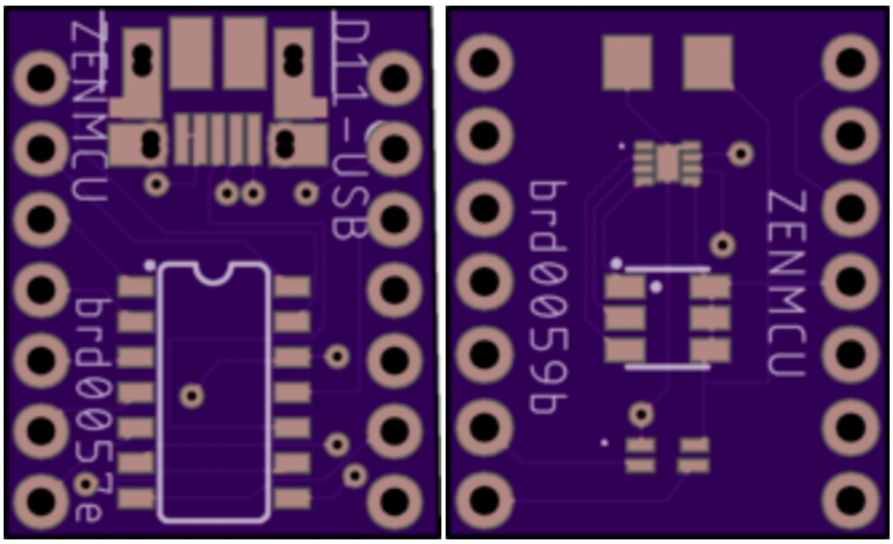
zenai-0.0a

I have performed a number of experiments to determine a simple, inexpensive, reasonably reliable mechanism for robots to locate and identify each other. I believe, based on these experiments, that I can accomplish this by equipping each robot with at lease one RGB LED and at least one color sensor. Obviously two color sensors will make it easier for the robots to locate each other as they can compare the brightness of the left and right sensors and know which direction to turn.

The color sensors I used were those I had on hand, which are now end of life and unavailable. So I purchased an alternative active device, designed a circuit board, and ordered some. I am awaiting delivery, and then I attempt to solder them. The parts are very small and I expect soldering to be somewhat tricky.

brd0059b has an I2C color sensor, an I2C RGB LED driver, and an RGB LED. They are designed to mount onto the 57 series boards, such as brd0057e.



brd0057e **bed0059b**

This should allow me to experiment with things like:

- Prove that I can use them to sense RGB LEDs as well as the obsolete sensors.

- Attempt to perform obstacle detection by comparing a reading with the LED on to a reading with the LED off. I.e, if an object is in the line of sight then it should generally reflect light back to the sensor, and thus read 'brighter than ambient'. If this works then I -may- be able to eliminate whiskers for collision detection.

- Attempt to implement a low bandwidth reasonably reliable communications link using these boards.

Because the sensors have fixed addresses, attaching two such boards to a robot means that the robots must use an MCU with two I2C busses (Or two MCUs with a control link). So I have designed a new MCU board (brd0060b) with a 20 pin SAMD variant, and connection points for two (new, better form factor) RGB sensor boards (one left, one right) and a connection for an I2C OLED (between the sensors).

I have not yet ordered PCBs because I am waiting to see how the experiments with bed0059b turn out. There are several considerations:

- The battery connection is not designed to allow the battery box to solder directly to the board because in the current design the battery faces up and the PCB does not cover the battery.

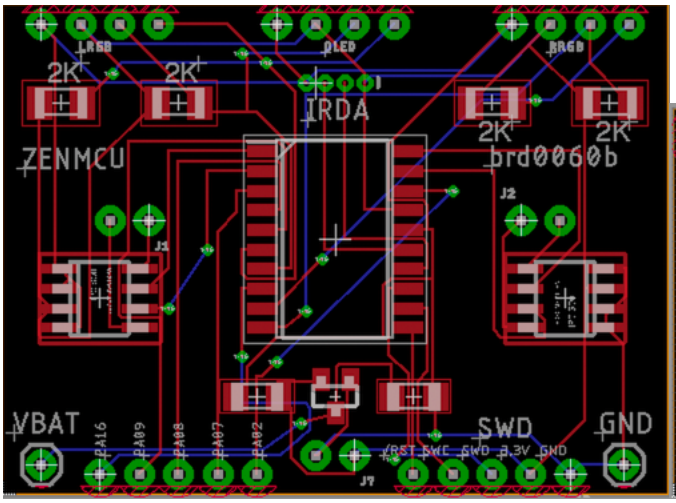
- The I/R transceiver need to be mounted on a small riser card to give it clearance over the solder joints of the OLED socket. I don't even know yet if I am going to use the infrared UART for communications yet.

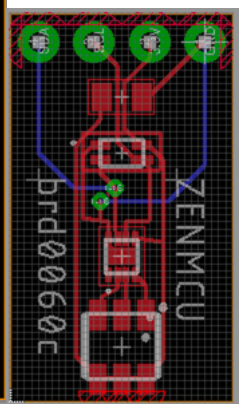
- I don't yet know if I need whiskers for collision detection.

- I switched from the SAMD1xC 14 pin MCU to the SAMD1xD 20 pin MCU which has two I2C modules.

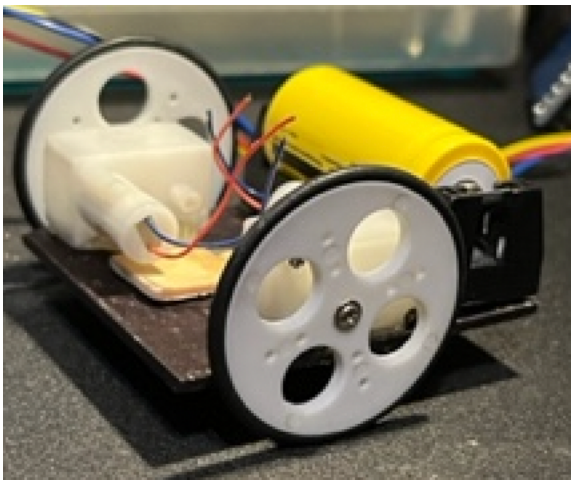
- I forgot to put a power switch on the PCB ... probably need one ... for now just remove battery ...

- I brought out the unused pins, and power, to some holes on the edge in case I decide to add something while experimenting.





brd0060b **brd0060c**



New chassis.

Ok, I realize it isn't great, but I built it to try to verify my measurements/estimates to make sure I got the PCBs sized right. Its just hot-glued so once I get everything prototyped and working it will be easy to reclaim the parts and build a set of several identical robots.

PCB goes on top, from front edge, up to edge of battery cover. At least, that is the intent. I wanted to have the battery inverted with the battery box soldered directly to the PCB but a) the battery hanging down resulted in very little ground clearance, and b) it made it harder to attach a competent tail skid.

I mean, I don't really need much ground clearance. And I'm sure I can work out a decent skid. Because it would be convenient for the primary structure to be the main PCB with everything supported from that. But that involves detailed measurements and component placements to ensure the motor mounting brackets can screw to the PCB without interfering with traces etc. So if this prototype actually works well enough to proceed with more robots I will revisit the physical design.

Anyhow, at this stage, there isn't much more I can do on this experiment other than wait for the experimental PCBs to arrive so that I can ... conduct experiments. Probably I will design more PCBs and work on firmware in preparation.

End