

ZBot V0.1a Interim Update

The IR design has been implemented in the form of a Stripboard prototype and mounted to the front of the ZBot. Included in the design are two micro switches to detect any collision that may occur with the ZBot. If it does indeed collide with an object, it should be able to reverse, alter direction and carry on.

Software Updates

The only real difference is the addition of an extra IR Receiver (which did not work well enough and was therefore disabled in software), and therefore rearranging the port allocations to accommodate for the extra wires. Also, the speed of the turning was increased to provide more torque when turning corners (It was sometimes getting stuck).

IR Problems

The purchased IR LED's have little directivity, and without a backing, they trigger the IR Receivers at a very low power; low enough to only detect objects a few centimeters away. Therefore, for the time being, insulating tape (electrical tape) has been stuck to the back of the IR LED's to attempt to block some of the unwanted, stray modulated light.

Furthermore, a center IR pair was added to aid in head-on collision detection but unintentionally triggers the two side IR Receivers, again due to stray IR light.

Finally, the IR LED's have to be angled upwards so as not to reflect off carpet or other rough surfaces that would otherwise be traversable.

IR Resolutions

The three above problems originate from the fact that the IR LED's (Rapid 72-8966) do not have enough directivity. When another order is made, IR LED's of a radial type will be purchased and covered with heat-shrink to improve, and hopefully fix, the problem.

This does not resolve the underlying predicament that different surfaces have different reflection coefficients. Unfortunately there is no way around this other than to paint every surface in the house white. This would be similarly true for ultrasonic based proximity detection, although to a lesser extent, but the increased complexity in circuitry does not warrant an investigation at this time. This does not mean however, that it shall never be attempted. At some point a Phased Array Sonar solution will be designed; the parts are in stock, but unfortunately, the time is not.

Bill of Materials

78-2738	LONG LEVER R/A V4 MICROSWITCH RC	£0.59	£1.18
77-3136	ULTRASONIC RECEIVER NON ROHS	£0.55	£4.40
77-3135	ULTRASONIC TRANSMITTER NON ROHS	£0.55	£4.40
55-0905	TSOP4838 IR RECEIVER MODULE 38KHZ (RC)	£0.49	£1.47
85-0592	100GR REEL 22SWG 60/40 SOLDER (RE)	£1.49	£1.49
72-8966	INFRA-RED EMITTING DIODE (RC)	£0.11	£0.55
		Total ex. Vat	£13.49
		Inc. Vat	£15.85

Images

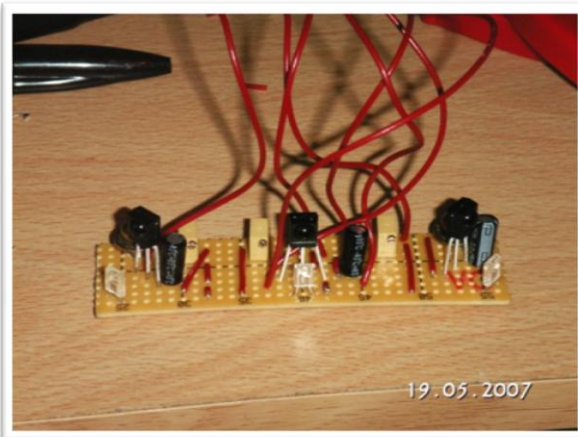


Figure 1: IR Circuit Construction

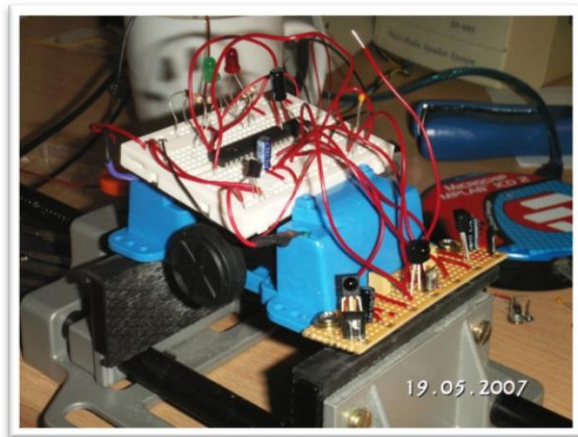


Figure 2: IR Circuit Placing

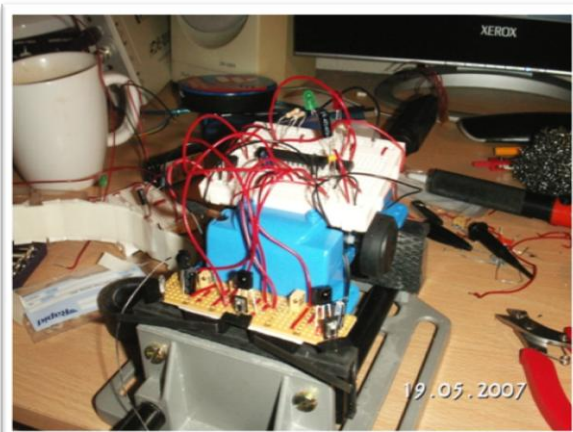


Figure 3: ZBot with Bumper Switches (Whiskers)

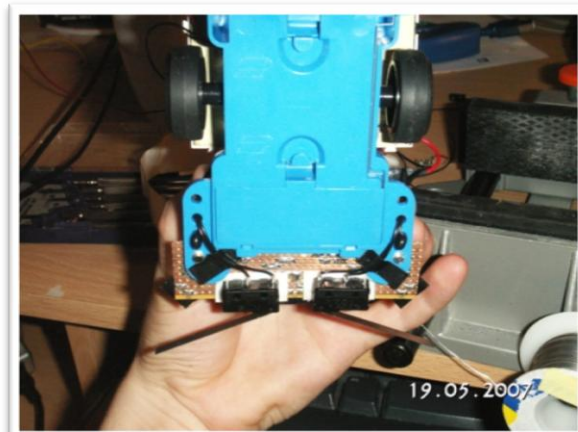


Figure 4: Bumper Switch Placing