TTT Infra-Red Proximity Detector Kit

Revision D2

Introduction

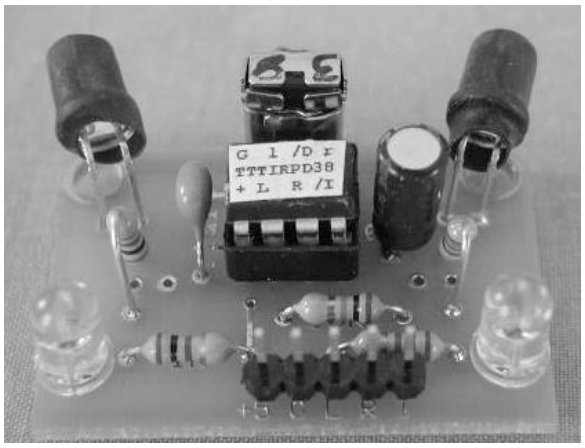
The TTT IRPD board utilizes a PIC12C508A to modulate two IR LED's at 38 or 56.7KHz and look for reflections on an IR detector module. Using the TTT IRPD with another controller is simplicity itself, you can even use it on a BEAM robot because no computational power is required at all from the host computer. The IRPD requires +5V and less than 5ma total current on average, so its not very power hungry either. This version is small and simpler to build than previous versions.

There are five pins to connect the IRPD to your host controller, +5V, Ground, Left detect output, Right detect output and Enable are the connections used. The Enable pin does not need connecting unless you wish to disable the IRPD to avoid detection by passive IR sensors. The "I" pin is the Enable, its also known as the Inhibit pin, and if you pull this pin low the IRPD stops broadcasting IR and stops looking for reflections. If this pin is left high then whenever a signal is detected when the Left IR LED is flashing the L pin will go high. The same occurs when the Right IR LED is being flashed. An object straight ahead will turn both outputs on.

Construction

These are the components that you get with your TTT IRPD kit:

1- TTT IRPD PC board
2- TTT IRPD programmed PIC
3- Panasonic 4602, 4612 or 4614 IR demodulator
4- 2 LiteOn 40 degree IR LEDs (will be clear, with black dot if visible LED is also clear.)
5- 2 visible light LEDs (May be clear, red or green)
6- Assorted resistors and capacitors.



Some notes for building your TTT IRPD board:

1- Two resistors are for the IR LED's, with the 4612 and 4614 IR demodulators 1K resistors work well. These setups will give ranges of about 12 to 18 inches. If using the Panasonic 4602, use 470 ohm resistors. The 4602 has no metal case. DO NOT REMOVE THE METAL CASE ON THE 4612 OR 4614. The holes for the resistors are designed to use trimmer pots so you will have to stand your resistors up to fit them to the board, they will not lie down. Feel free to experiment with ranges by using trimmer pots. Standup trimmer pots fit better on the board. There is a pattern of 4 holes for resistors or pots for each side.
2- 1 .1uf ceramic capacitor, usually yellow
3- 1 10uf electrolytic capacitor, looks like a pop can ('-' lead goes in round hole)
4- 1 5-pin header type connector is needed, many connectors will work here, or you can wire it directly to your project.
5- 1 4.7K resistor, yellow, purple, red, gold bands, goes in spot marked 10K or 4.7K.
6- Place the black shrink tube over the IR LEDs such that only the tip of the dome sticks out of the black tubing.
7- OPTIONAL 2 standard LEDs, short lead goes in square hole.
8- OPTIONAL 2 1K ohm resistors (brown, black, red, gold) for these LED's, goes in spot marked 1K
9- OPTIONAL 8 pin DIP socket for the PIC12C508A

There are pads on the board to install trim pots for the IR resistors, be careful you don't trim them down to 0 ohms when testing! If you are using the included 1K or 470 ohm resistors they must "stand up" on the board as there is no space for them to lie down. You really don't need the OPTIONAL parts and if you don't load them your current needs drop by over half. They are useful as "bug eyes" because they will light when something is detected on that side. This is also useful for troubleshooting your controller if it isn't detecting anything. Besides, they look cool.

Install the resistors and capacitors in the board first. You can keep them in when you turn the board over for soldering by bending their leads away from each other. Next install the socket for the PIC. It is an 8-pin socket and if you are new to soldering I recommend you use this instead of soldering the chip in directly. This way you won't risk frying your chip! Now install the normal LED's and the Panasonic demodulator. Make sure that the module is centered approximately on the board, this assures that you

soldered the leads on properly. Now, solder in the IR LED's. Install these so that they are elevated off of the board and bent over so that they look directly ahead at about the same height as the IR module's face. The normal LED's and IR LED's install so that the short lead that is on the flat side of the LED goes into the square hole. Finally, solder in the 5 pin connector, or whatever you are using there. Your board is complete. Make VERY SURE that you have no solder shorts on your board.

Troubleshooting and LED arrangement and Use

Apply power to the proper pins of the 5 pin connector. To make sure your board has been built properly get out your trusty DVM, put the negative test lead on pin 8 of the PIC socket and look for these voltages on these pins:

1- 5V on pin 1 of the PIC socket
2- 5V on pin 4 of the PIC socket
3- 5V on pin 6 of the PIC socket
4- around .6V or so +/- .4V on pins 5 and 7 of the PIC socket

If your board detects when nothing is there you are getting IR from the LED to the demodulator, adjust your LEDs and/or your black shrink tubing until it works correctly. In *very* rare instances the board will appear to detect at all times, no matter what you do. If this happens then solder a small wire to the metal case of the demodulator to ground – I use wire wrap wire. This will solve the issue.

If these all check out then remove power and install the PIC. Make sure that the pin labeled "+" is in the square hole on the PC board. When you apply power this time, the LED's will light up on the side that the board detects an object. You can adjust the angle that the board "sees" objects by changing the angle of the IR LED's to face somewhat away from the IR module. The wider the angle, the further to the side it will see; but, wider angles will enlarge the "dead zone" directly in front of the IRPD where nothing can be seen. You can experiment with resistor values or the trim pots to the IR LED's to change the range at which an object is detected. The TTT IRPD board is now ready to install into your project!