

Hardware Features

PIC Microcontroller 16F627: 1024 words program 224 bytes RAM 128 bytes EEPROM
In-Circuit Programming socket provided.

Half-duplex IR asynchronous communications link: 1200 baud.

Two motors with common control signals: Programmable speed, forward/reverse/stop.

16-channel IR scanner: Programmable threshold, switchable IR illumination.

Firmware

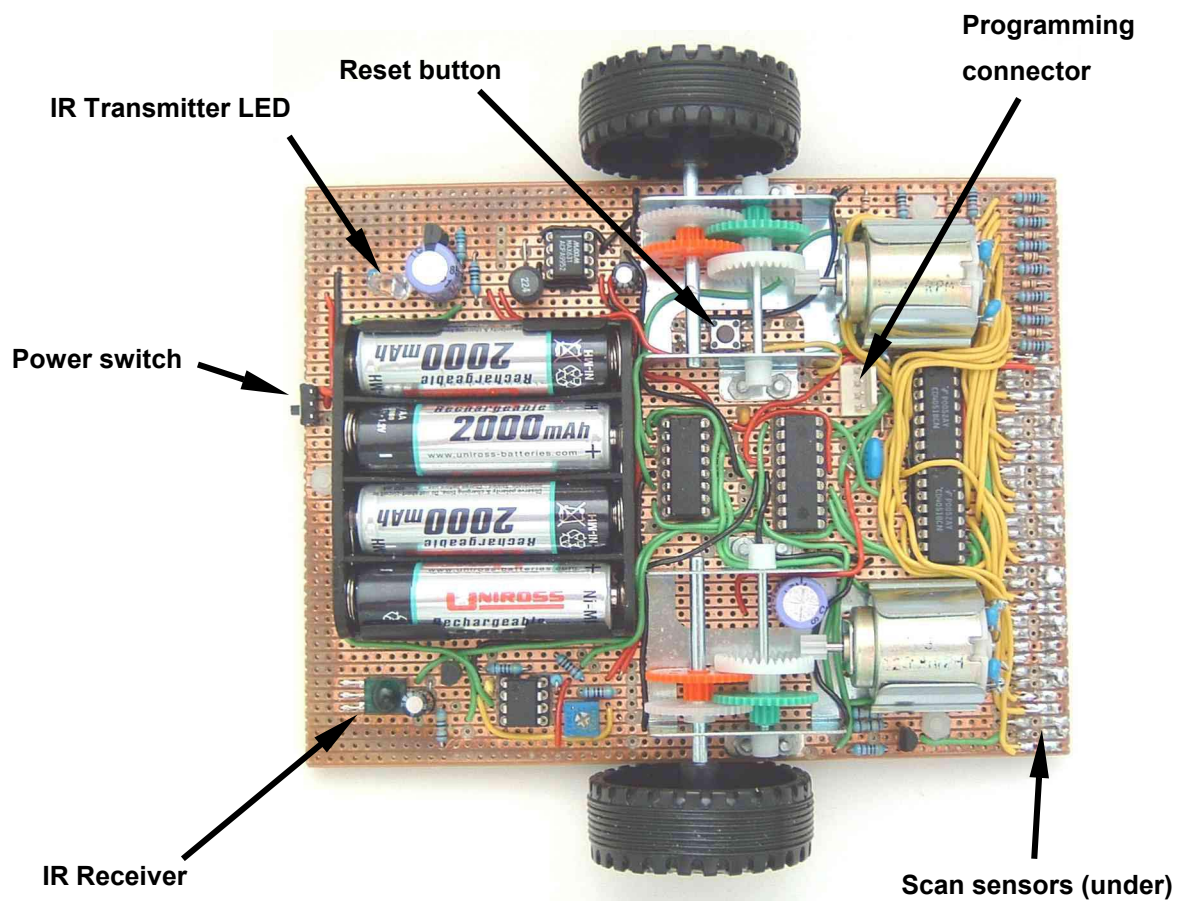
Command interpreter built in, working through IR communications link to PC. Suggested user interface is Windows HyperTerminal set to 1200 baud, 8 bits, no parity, 1 stop bit.

Command Summary

- H Turns on motors and begins scan. A single sensor 'sweep' consists of 16 bits where a '0' represents white and a '1' represents dark. After a sweep is captured, the data is formatted into four ASCII-hex digits and output on the IR serial port. The 'Capture Text' option of HyperTerminal can be used to save this data to a text file. There follows a programmable delay before the next sweep is taken.
- I Turns on motors and begins scan. Differs from H command only in the format of the output data. The sensor outputs are sent as a line of 16 ASCII-hex characters followed by CR and LF. Each character is either a '0' or a '1' depending on the corresponding sensor state. This format provides a graphical representation of the image data on the PC screen.
- Q Quits scan mode, turning off the motors.
- M Used to set motor speed. Inputs a 2-digit hex number between about 2F (slow) to FF (fast). Reset default is 3F. Example: 4FM.
- T Used to set sensor threshold. Inputs a 2-digit hex number in two ranges. 0x is the high range and 1x the low. Suggest the high range is used. Reset default is 06. Example: 08T sets the comparator threshold at about mid-rail.

- P Used to set the scan period (time interval between scans) in units of about 66ms. There will be a minimum time between scans of about 210ms when in I-scan mode and about 70ms in H-scan because of the data transmission time. Reset default is 04. Example: 05P

- R Re-initialize program and reset to default parameters.



PIC Pin Assignments

Pin	Port	Function	In/Out
1	RA2	Scan LEDs drive	O
2	RA3	Not used	O
3	RA4	Not used	O
4	RA5 / V _{PP}	MCLR	I
5	V _{SS}	Ov	
6	RB0	Motor select A	O
7	RB1 / Rx	IR Rx	I
8	RB2 / Tx	IR Tx	I
9	RB3 / CCP1	Motor PWM	O
10	RB4	Motor select B	O
11	RB5	Scan select A	O
12	RB6 / PGC	Scan select B	O
13	RB7 / PGD	Scan select C	O
14	V _{DD}	+5v	
15	RA6	4.0 MHz Resonator	I
16	RA7	4.0 MHz Resonator	I
17	RA0 / AN0	Scan inputs 8 - 15	I
18	RA1 / AN1	Scan inputs 0 - 7	I

Parts

X1	Microchip PIC 16F627
X2	7555 CMOS Timer
X3	IS1U60 IR receiver
X4, X5	CD4051B Analogue multiplexer
X6	L293D Motor driver
X7	MAX631 Voltage regulator
TR1	BC549 or equivalent
TR2, TR3	BC639 or equivalent
PT1 – PT16	SFH309 IR phototransistor or equivalent
D1	IR LED
D2	1N4148 or equivalent
D3 – D10	SFH409 IR LED or equivalent
R1	5R6
R2	100R
R3	3k3
R4	8k2
R5, R24	4k7
R6	10k
R7	1k
R8 – R23	10k
R25	12R 0.5 watt
R26	47R
VR1	20k preset
C1, C7	470 μ F Electrolytic
C2 - C4	0.1 μ F dipped ceramic
C5	680pF ceramic
C6	47 μ F Electrolytic
L1	220 μ H
XT1	4MHz Resonator (3-terminal)
M1, M2	3V dc motor and gearbox
B1	4 x AA battery pack
S1	SPST slide switch

