FUTURE KIT

HIGH QUALITY ELECTRONIC KITS

AVR2 OBSTACLE-AVOIDING ROBOT

CODE 1110 LEVEL 3

This robot will start moving whenever the sensor detects any obstacles and can avoid them. With it's built-in AVR microcontroller. The user can re-write any program for getting new applications.

Technical Specifications:

- Power supply : 2 AA batteries (not included).
- Consumption : 60mA.
- PCB dimensions : 2.54 x 1.18 in. (sensor board)
  2.54 x 2.70 in. (control board)

(1) ROBOT CONTROL CIRCUIT

How To Work:

The circuit is composed of 2 major parts, sensor board and control board, as shown in Fig. 1.

Sensor board have 2 sets, in set as transmitter and receiver of infrared light. Transmitter part is consist TR2 and LED INF. VR3 is used for adjust the level of infrared light. Receiver part, when photo-transistor received infrared light from LED INF, causing voltage being passed through. The more reflected light will lessen the internal resistance and give bigger passing through voltage. Less reflected light will enlarge the internal resistance and give less passing through voltage. TR1 and TR3 will work when the photo-transistor received infrared light.

Control board, at the heart of the circuit is the AVR microcontroller IC1. When photo-transistor is not receiving infrared light, TR1 and TR3 are not working. IC1 will send the voltage to pin 12 and pin 15, causing both motor is running forward. If some photo-transistor received infrared light, motor is running backward. IDE port is used for connect AVR programmer.

Circuit Assembling:

The PCB will be divided into two boards, AVR2-1 for circuit controlling and Body set for body, motor gear, wheel and battery holder assembling.

The AVR2-1 circuit assembling has been shown in Fig 2. It is recommended to assemble the circuit starting with a less height component i.e. diodes, resistor, electrolytic capacitors and transistors etc. Be careful while assembling and check for the matching of PCB poles and components before soldering as shown in Fig 3. For IDE port, press the pin of IDE port to be level with the black plastic before soldering as shown in Fig 4. Use a max. 40W solder and soldering tin with a tin and lead ratio of 60/40 together with a joint solution inside. Recheck the assembled circuit for your own confidence. Better use a lead sucker or a lead wire absorber in case of component misplacing to protect PCB from damage.

The Body set is to be assembled as shown in the next page.

Testing:

When the two circuit boards have been completely assembled, jump J2 and not jump J1. Insert two AA batteries into the battery holder. Then adjust VR1, VR2 and VR3 to the middle side and slide switch SW to "on" position. LED at sensor board is lighted on. Lay down the assembled robot on the box. When any sensor detects bar, The robot will avoid the bar and running the other way.

VR1 and VR2 will act as sensitivity of photo-transistor. Adjust VR1 and VR2 to the left hand side for decreasing sensitivity and to the right hand side for increasing sensitivity. VR3 will act as level of infrared light. SW1 is not used.

Troubleshooting:

As the circuit has only a few components, the main cause of troubles will come from component misplacing and defaulted soldering. When found out that the circuit does not work, check for the proper component placings and various soldering points.

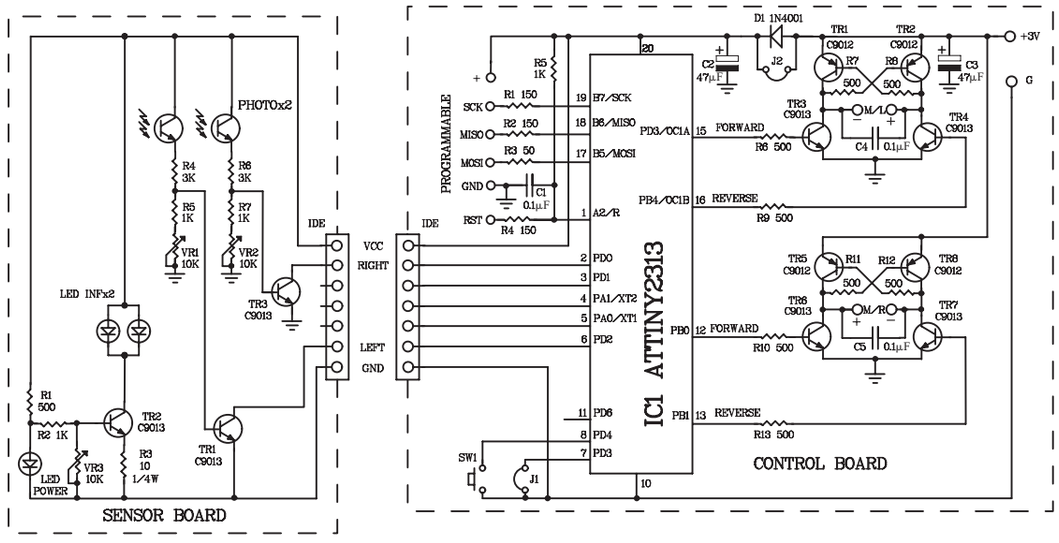
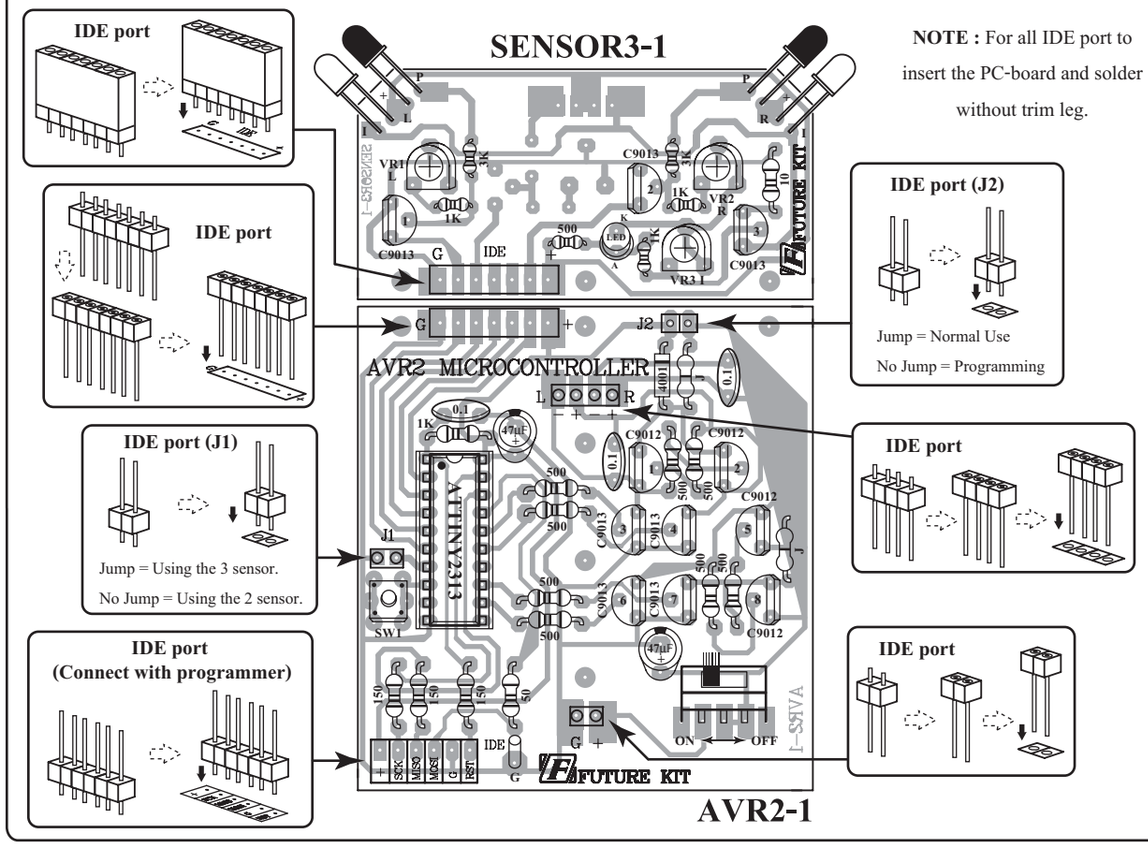


Figure 1. AVR2 Obstacle-Avoiding Robot Circuit

Figure 2. AVR2-1 and SENSOR3-1 Circuit Board Assembling

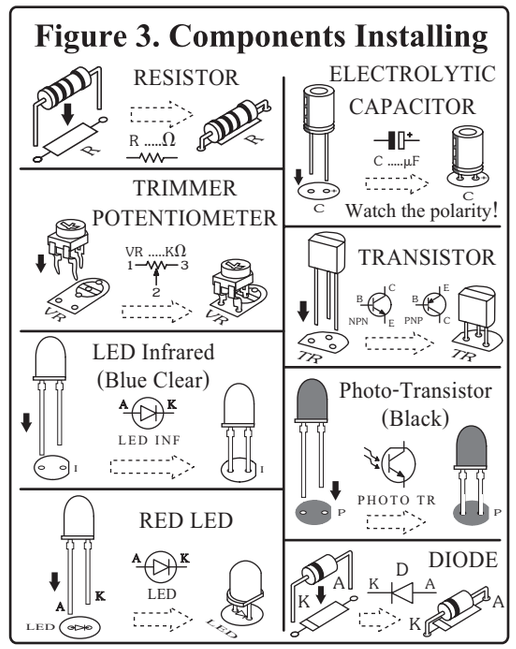


NOTE : For all IDE port to insert the PC-board and solder without trim leg.

NOTE: Jumper J1, If jumping this point is using 2 sensor (left and right side) but if no jumping this point is using 3 sensor (left, right and front side).

SENSOR BOARD			
RESISTORS 1/8W			
R1	500Ω		- green-black-brown-gold
R2,R5,R7	1kΩ		- brown-black-red-gold
R4,R6	3kΩ		- orange-black-red-gold
RESISTORS 1/4W			
R3	10Ω		- brown-black-black-gold
TRANSISTORS			
TR1-TR3	=	C9013	
CONTROL BOARD			
RESISTORS 1/4W			
R1,R2,R4	150Ω		- brown-green-brown-gold
R3	50Ω		- green-black-black-gold
R5	1kΩ		- brown-black-red-gold
R6-R13	500Ω		- green-black-brown-gold
TRANSISTORS			
TR1,TR2,R5,R8	=	C9012	
TR3,TR4,R6,R7	=	C9013	
DIODE	D1	=	1N4001
IC	IC1	=	ATTINY2313

Figure 3. Components Installing



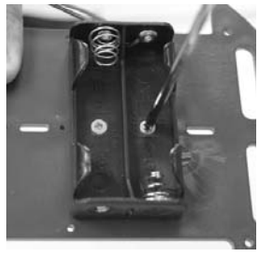
(2) ROBOT BODY

Assembling Steps of the Body set.

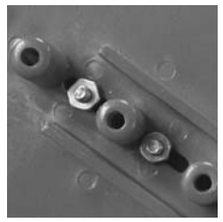
1

Mini Caster

Fix a mini caster wheel set to the Body set with using a 12 mm. bolt as a holder.

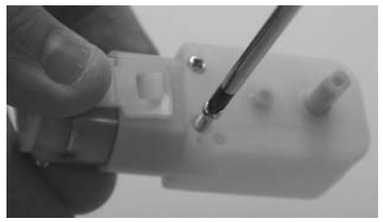


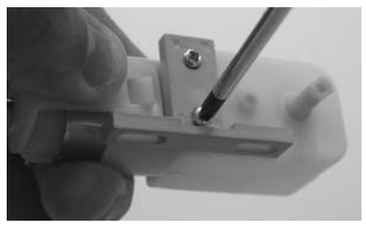
Flat head nut 2.5x10 and NUT M2.5



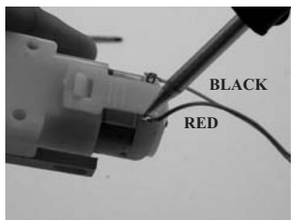
2 Install battery holder to body robot with flat head nut 2.5x10 and nut M2.5.

3 Insert the electric wire battery holder into body robot.

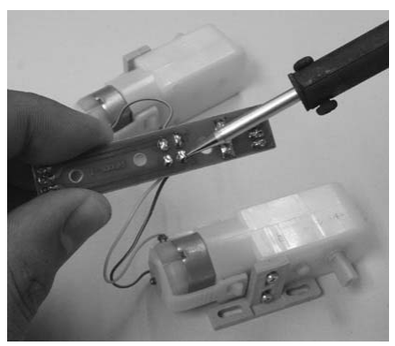




4 Take off the both screw of motor gear and then mount the motor lock. Secure with the both screw of motor gear.



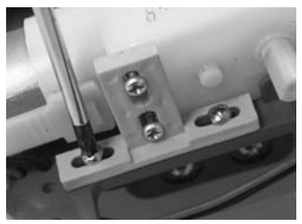
Solder electric wire at motor pole with red wire solders at left hand side and black wire solders at right hand side.



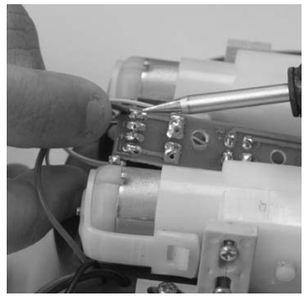
5

Solder motor wire to BR002-1 PC-board. Red wire is positive pole and black wire is negative pole. Character "L" is left motor gear and "R" is right motor gear.

Screw 4x1/4

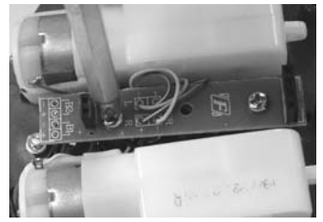


6 Mount motors, each with two #4 x 1/4" screws



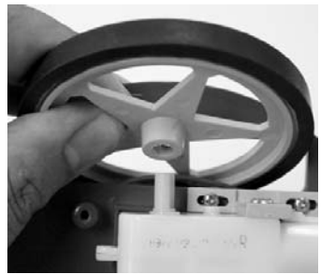
7

Solder battery holder wire to BR002-1 PC-board at B1 and B2. Red wire is positive pole and Black is negative pole.



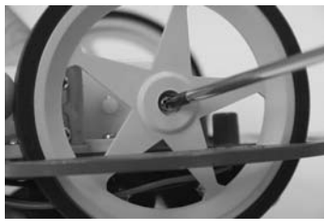
Screw 2x1/4

8 Mount BR002-1 PC-board into body robot and secure them with two #2 x 1/4" screws.

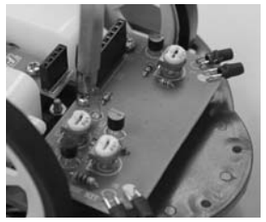


9

Install the wheels onto the shaft of the gear motors and secure them with the remaining two #4 x 1/4" pointy screws.



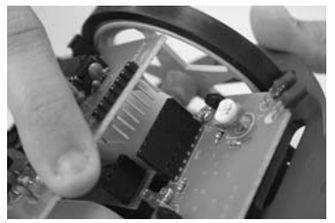
Screw 4x1/4



Screw 2x1/4

10 Mount sensor board into body robot and secure with two #2 x 1/4" screws.

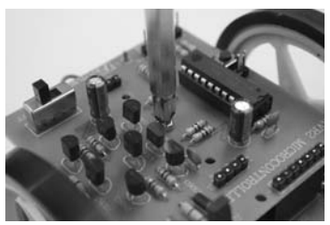
11



Install the control board into body robot.

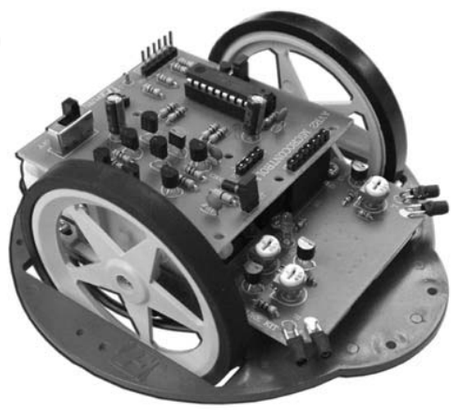
12

Screw 4x3/4



Secure control board with two #4 x 3/4" screws.

13



The robot is prompt working and playing.