

AVR3 TREASURE FINDER ROBOT

CODE 1112

LEVEL 3

This treasure finder robot can be used as general purpose metal detector. It will stop and start beeping whenever it has detected any metal. The user can rewrite any required new programme as this robot is run by the AVR microcontroller.

Technical Specifications:

- Power supply : 4 AA batteries (not included).
- Consumption : 220mA. max.
- Detecting distance : 0.5-1 cm. (depend upon the metal size).
- PCB dimensions : 2.54 x 1.28 in. (sensor board)
2.54 x 2.70 in. (control board)

(1) ROBOT CONTROL CIRCUIT

How To Work:

The circuit is composed of 2 main parts, the sensor board and the control board, as shown in Figure 1.

The sensor board comprises 3 components i.e. ,transmitter, receiver and metal detector. The transmitter includes working of TR5 and peripheral components for sending out the infrared light. The receiver has 3 photo transistors for detecting the reflected infrared light. And the metal detector consists of wire coils and the transistors TR3 TR6 and TR7.

The control board has microcontroller IC1 as an important role. It produces energy and intelligence for the robot in controlling direction and speed of moving.

Circuit Assembling

Figure 2 shows the installing method of each components into the circuit board. It is recommended to assemble the

circuit starting with a less height components. Be careful while assembling and check for the matching of PCB poles and components before soldering.

Figure 3 presents the completed AVR3 and Sensor circuit board assembling.

(2) ROBOT BODY

The body set is to be assembled as described in the next page.

How To Use The Kit:

Insert 4 AA batteries into the battery holder. Press switch to "ON" position, then robot go ahead. When the robot detects any obstruction, it will move backward and turn away. And when the robot sensor can detect the metal object, it will stop and beep twice and then move forward.

Adjusting:

- VR1 will act as a light detecting speed controller of the left photo-transistor.
- VR2 will act as a light detecting speed controller of the center photo-transistor.
- VR3 will act as a sensing speed controller of the metal detector.
- VR4 will act as a light detecting speed controller of the right photo-transistor.
- VR5 will act as a light concentration controller of the infrared light.

For VR1, VR2 and VR4, turn to the left hand side for decreasing sensitivity and to the right hand side for increasing one.

- SW1 is used for setting the speed of the robot. By pressing and hold SW1, them slide the switch to "on" position. LEDs at control board will be lighted on one by one. LED1 is slowest speed while LED4 is fastest speed and then release SW1. It is recommended to adjust the speed at level 1 or 2, in order that the metal detector can be able to detect the object properly.

- IDE port can be connected to the AVR programmer.

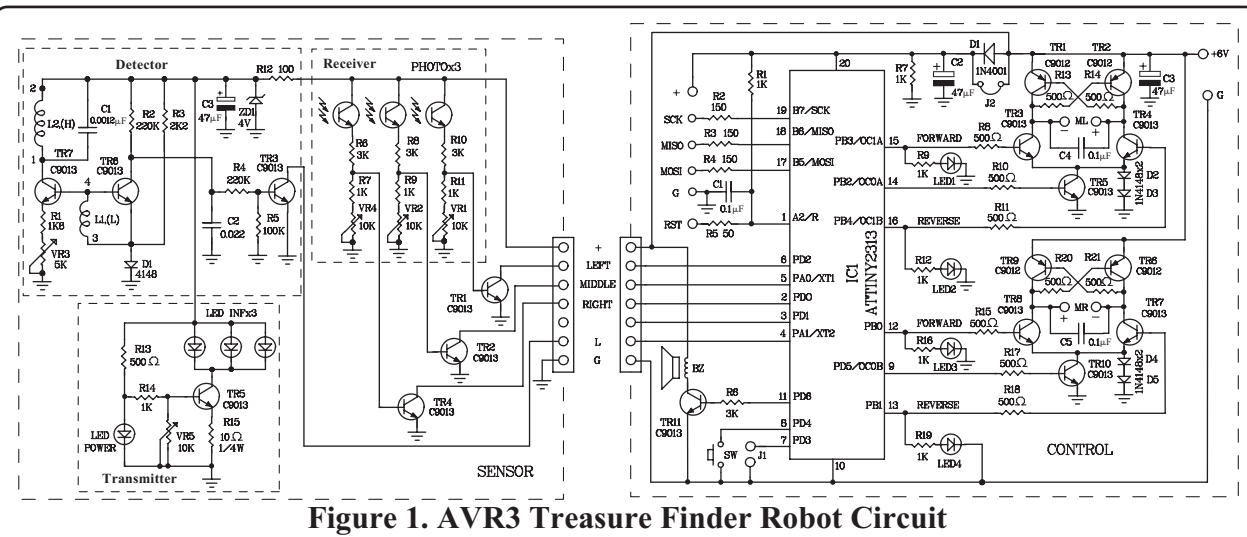
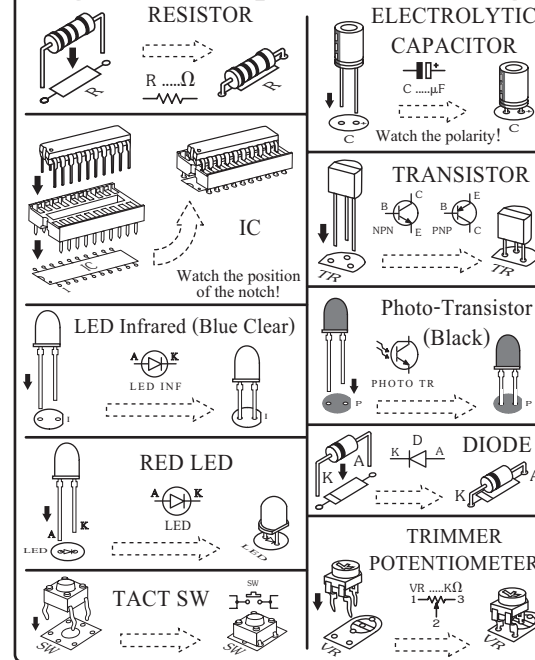


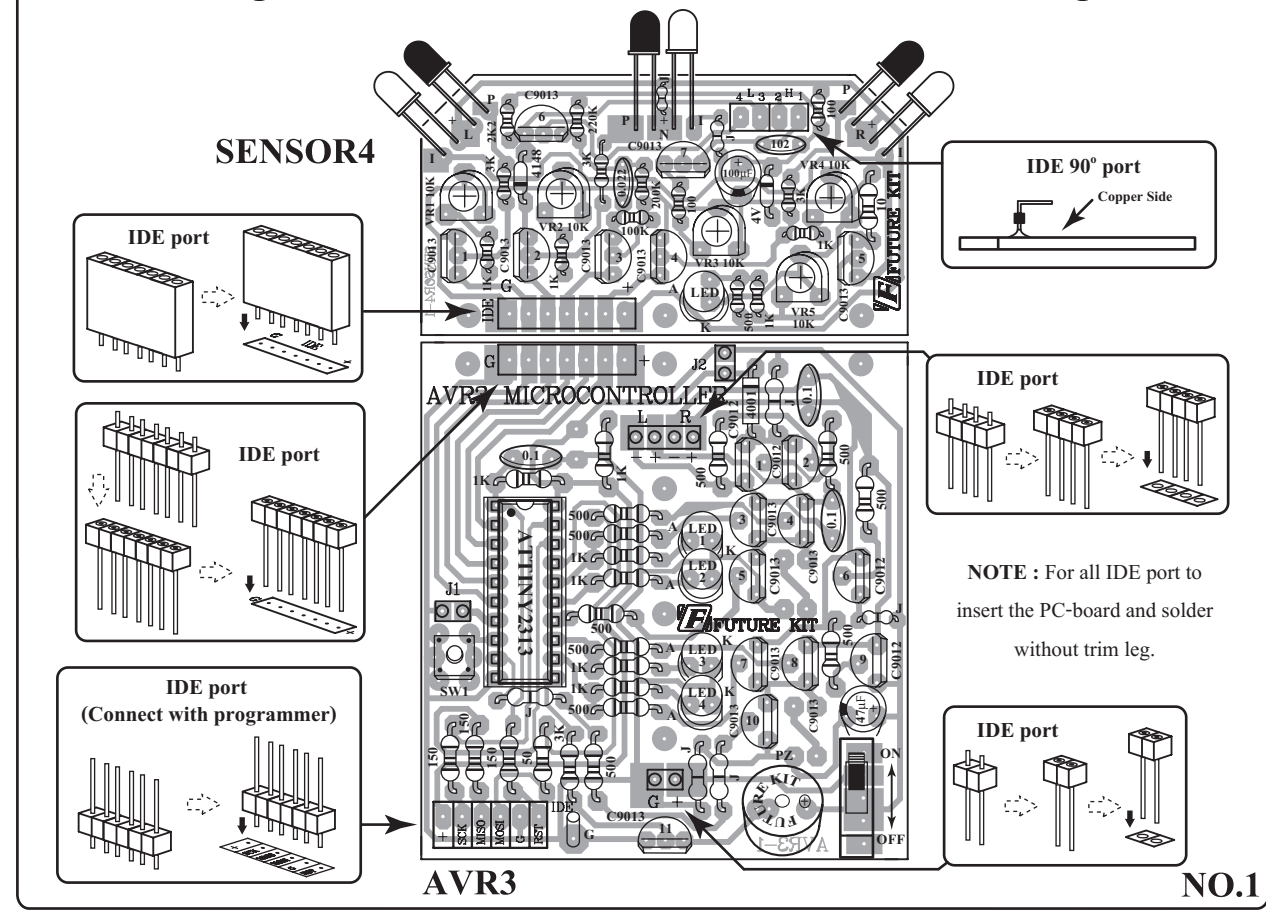
Figure 1. AVR3 Treasure Finder Robot Circuit

Figure 2. Components Installing

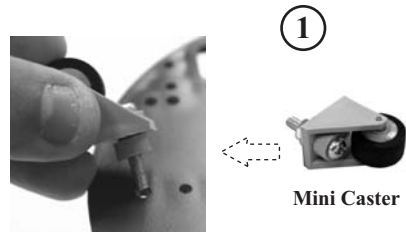


SENSOR BOARD	
RESISTOR 1/8W	
R1	1k Ω - brown-gray-red-gold
R2,R4	220k Ω - red-red-yellow-gold
R3	2k Ω - red-red-red-gold
R5	100k Ω - brown-black-yellow-gold
R6,R8,R10	3k Ω - orange-black-red-gold
R7,R9,R11,R14	1k Ω - brown-black-red-gold
R12	100 Ω - brown-black-brown-gold
R13	500 Ω - green-black-brown-gold
RESISTOR 1/4W	
R12	10 Ω - brown-black-black-gold
TRIMMER POTENTIOMETERS	
VR1,VR2,VR4,VR5	= 10k Ω or 103
VR3	= 5k Ω or 502
CONTROL BOARD	
RESISTOR 1/4W	
R1,R7,R9,R12,R16,R19	1k Ω - brown-black-red-gold
R2-R4	150 Ω - brown-green-brown-gold
R5	50 Ω - green-black-black-gold
R6	3k Ω - brown-black-red-gold
R8,R10,R11,R13-R15,R17,R18,R20,R21	500 Ω - green-black-brown-gold

Figure 3. AVR3 and SENSOR4 Circuit Board Assembling



Assembling Steps for the Body Set.



①

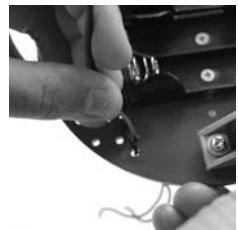
Mini Caster

Fix a mini caster wheel set to the body set by using a 12 mm. bolt as a holder.

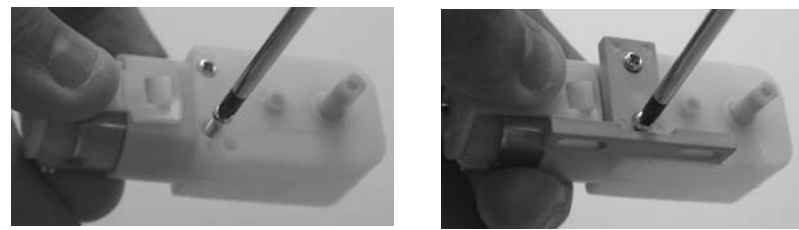


②

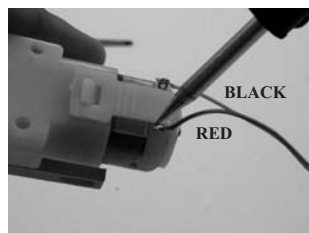
Install battery holder to robot body with flat head nut 2.5x10 mm.



③ Insert the electric wire of battery holder into the robot body.

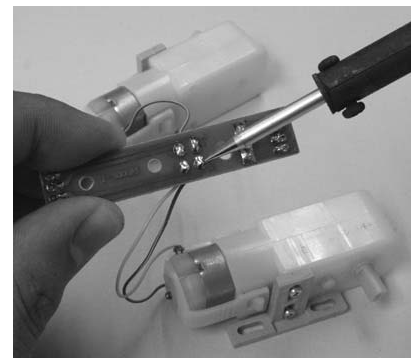


④ Mount the motor lock.



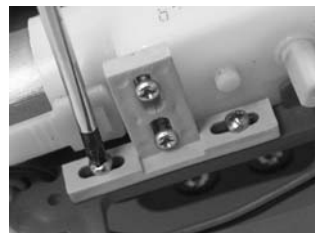
⑤

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



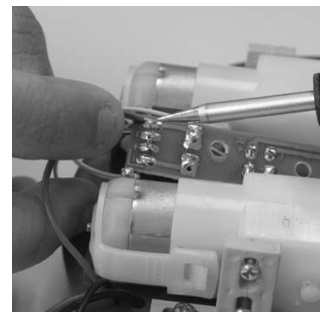
⑥

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.



⑦

Mount motors, each with two 2 x 1/4" screws



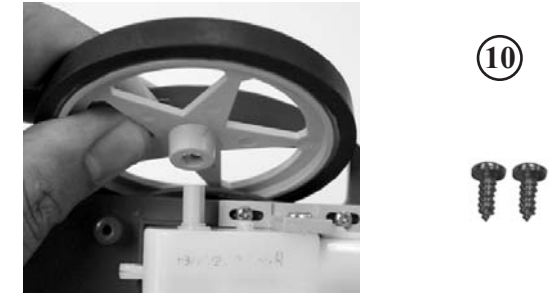
⑧

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



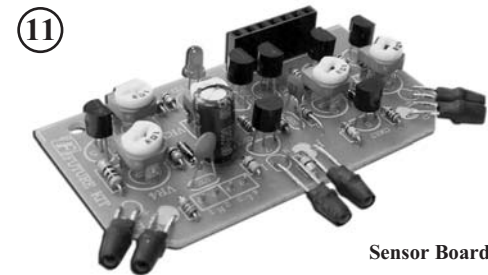
⑨

Mount BR002-1 PC-board into robot body with two 4 x 1/4" screws.



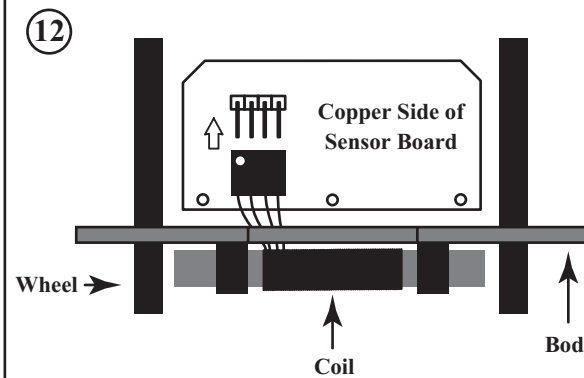
⑩

Install the wheels onto the shaft of the motors and secure them with two 2 x 1/4" screws.



⑪

Sensor Board



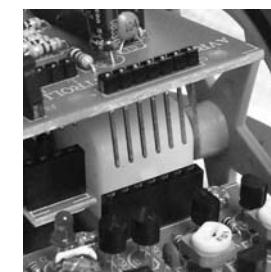
⑫

Insert the coil socket to the IDE 90° port of sensor board.



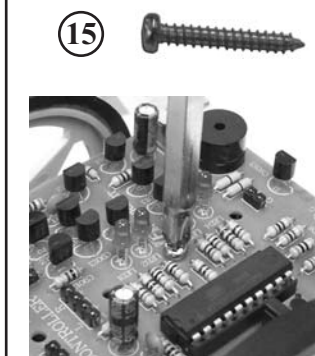
⑬

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



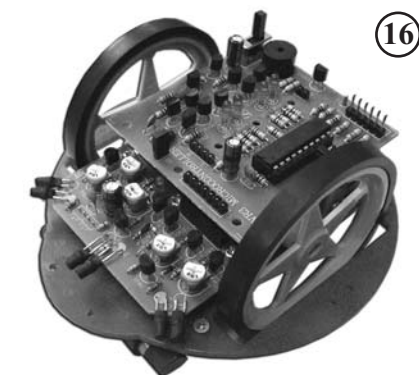
⑭

Install the control board into BR002-1 and sensor board.



⑮

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



⑯

The robot is promptly for working and playing.