

This super sumo can be controlled to attack or retreat and ready for battle with opponent. This robot is using the AVR microcontroller, so the user can re-program into IC for getting new applications.

Technical Specifications:

- Power supply : 2 AA batteries (not included).
- Consumption : 15mA. @ 6VDC. (no load).
- PCB dimensions : 2.54 x 2.70 in.

(1) ROBOT CONTROL CIRCUIT

How To Work:

The circuit is composed of 2 major parts, sensor board (optional code FK1109S) and control board, as shown in Fig. 1.

Sensor board have 3 sets, in set as transmitter and receiver of infrared light. Transmitter part is consist TR4 and LED INF. VR4 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 to TR3 will work when the photo-transistor received infrared light.

Control board, at the heart of the circuit is the AVR microcontroller IC1. When below photo-transistor is not receiving infrared light (white ground), TR1 to TR3 are not working. IC1 will send the voltage to pin 12 and pin 15, causing both motor is running forward. If some below photo-transistor received infrared light (black ground), motor is

running backward. For center sensor, when sensor detects the object, IC1 will send the voltage pin 9 and pin 14, causing motor is rotate faster. IDE port is used for connect AVR programmer.

Circuit Assembling:

The AVR1-2 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. 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.

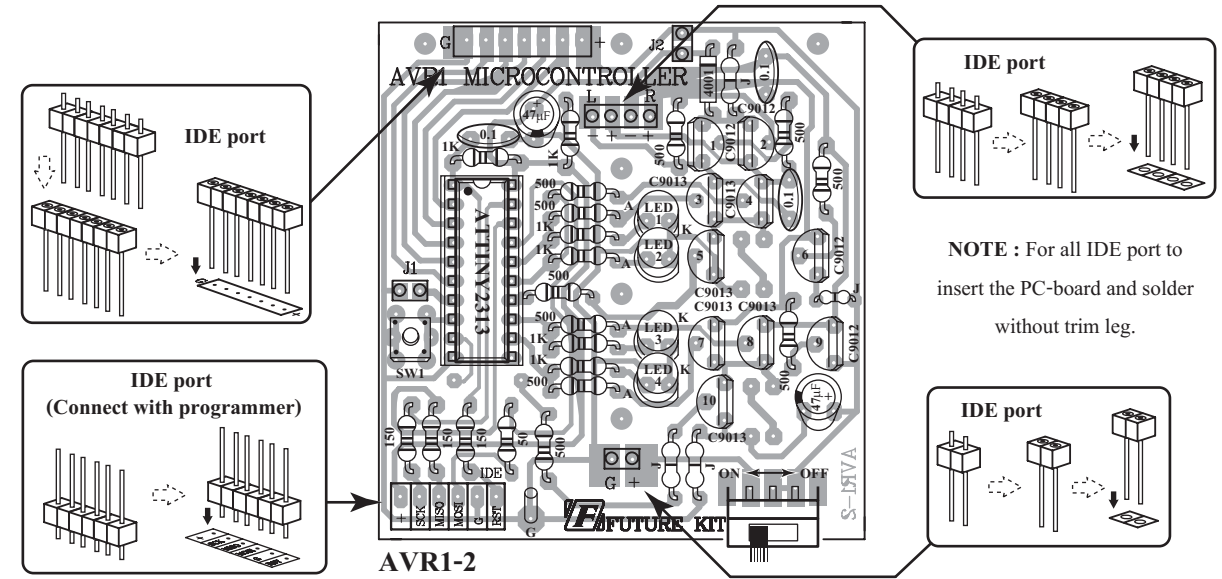
Testing:

When the control board have been completely assembled. Insert the control circuit board into robot body and four AA batteries into the battery holder. Then adjust VR1 to VR4 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 test paper. Robot is running inside the black frame. The robot will backward and turn when below sensor detecting the black line. But front sensor detects the any object, the robot will run forward and running up the speed to bump.

VR1 to VR3 will act as sensitivity of photo-transistor. Adjust the left hand side for decreasing sensitivity and to the right hand side for increasing sensitivity. VR4 will act as level of infrared light.

SW1 is used for set the speed of robot. When you want to setting the speed, slide switch SW to "off" position then push and hold SW1. Slide SW to "on" position. Seeing LED at control board. LED will chasing step by step. LED1 is slowly speed and LED4 is higher speed.

Figure 2. AVR1-2 Circuit Board Assembling



CONTROL BOARD

RESISTOR 1/4W

- R1,R2,R4 150Ω - brown-green-brown-gold
- R3 50Ω - green-black-black-gold
- R5,R6,R12,R14,R19,R20 1kΩ - brown-black-red-gold
- R7-R11,R13,R15-R18 500Ω - green-black-brown-gold

CERAMIC CAPACITORS

- C1,C4,C5 = 0.1μF or 104

ELECTROLYTIC CAPACITORS

- C2-C3 = 47μF

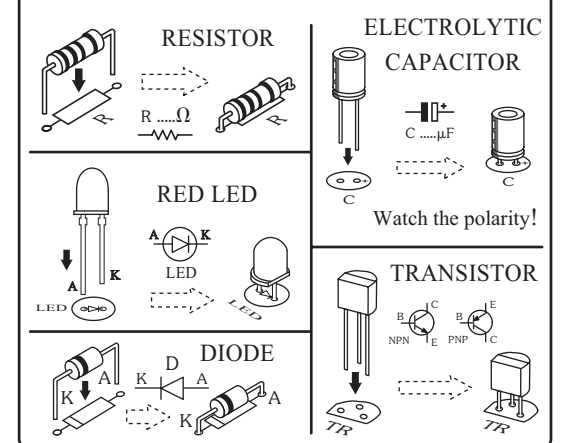
DIODE D1 = 1N4001

TRANSISTORS

- TR1,TR2,TR6,TR9 = C9012
- TR3-TR5,TR7,TR8,TR10 = C9013

IC IC1 = ATTINY2313

Figure 3. Components Installing



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.

NOTE : This circuit has the control board only. For the sensor board and body robot aren't included.

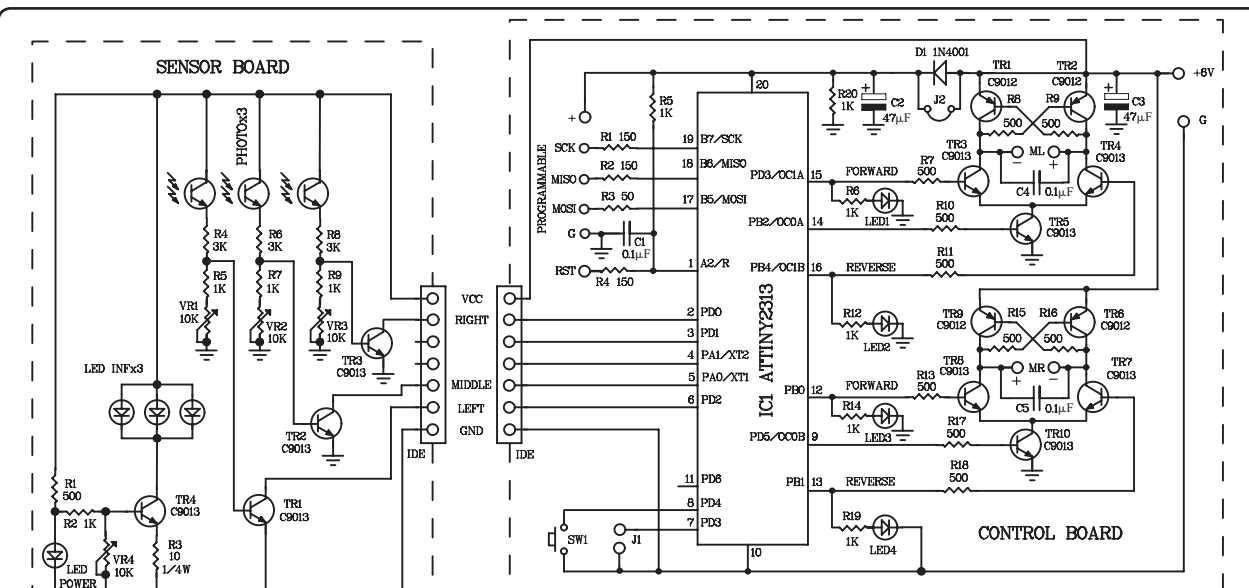


Figure 1. AVR1 Super Sumo Robot Controller Circuit