GEAR DACON DARK CONTROL ROBOT
CODE 1107
LEVEL 2

This robot will start moving wherever any sensor isn't detecting light. The moving whether ahead or aside depends upon the light volume received by the sensor.

Technical Specifications:
- Power supply : 2 AA batteries (not included).
- Consumption : 150mA.
- Light detecting speed : controllable.
- PCB dimensions : 2.18 x 2.63 in.

(1) ROBOT CONTROL CIRCUIT

How To Work:

The circuit is composed of 2 major parts, light detecting and light flashing, as shown in Fig. 1.

The light detecting part is composed of 2 alike circuits that will work in the same manner. Each circuit will start working when the photo isn't received light, causing voltage being passed through VR1 and R1. The more reflected light will lessen the internal resistance and give less passing through voltage. Less reflected light will enlarge the internal resistance and give bigger passing through voltage.

When there is voltage being passed through VR1 and R1, it will cause TR2 and TR1 to work and force motor M1 to rotate. Moreover, this voltage will feed the light flashing part to work as well. Therefore, if any photo receives less light volume, the robot will move to the direction of that photo position. The VR1 and VR2 will work as a light detecting speed controller of each photo.

TR5 and TR6 will be assembled as a multivibrator circuit and work alternatively. When TR5 works, it will light up LED1. And when TR6 works, LED2 will be lit up. The flashing speed will be depended upon R6, R7, C1 and C2. R4 and R9 will reduce the current for LED1 and LED2.

Circuit Assembling:

The PCB will be divided into two boards, FK1102-1 for circuit controlling and Body set for body, motor gear, wheel and battery holder assembling.

The FK1102-1 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, insert two AA batteries into the battery holder. Then adjust VR1 and VR2 at the 1 o'clock position and slide switch SW to "on" position.

Lay down the assembled robot on the smooth area, then cover the photo with hand. The robot will move to the photo side following the darkness which we cover. The robot will always move towards the darker side wherever we cover.

VR1 and VR2 will act as a light detecting speed controller of the photos. Adjust VR1 and VR2 to the right hand side for increasing speed and to the left hand side for decreasing speed.
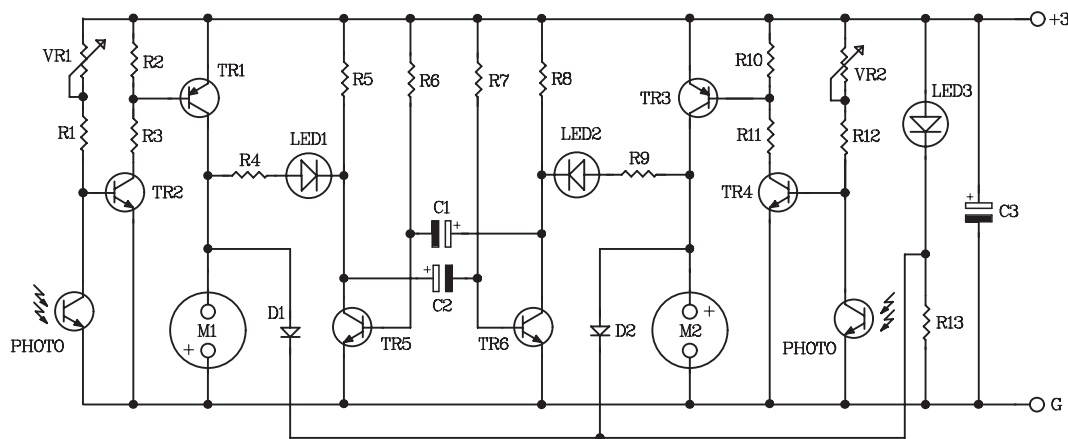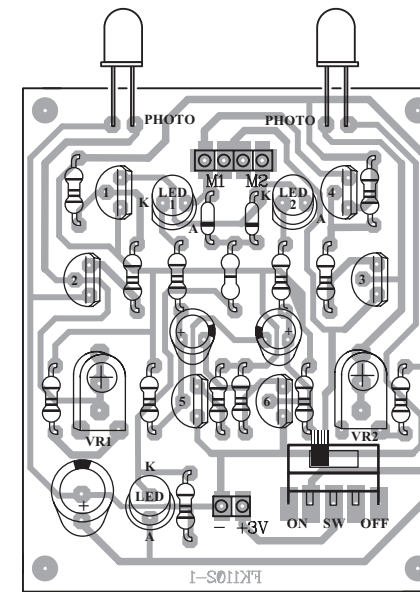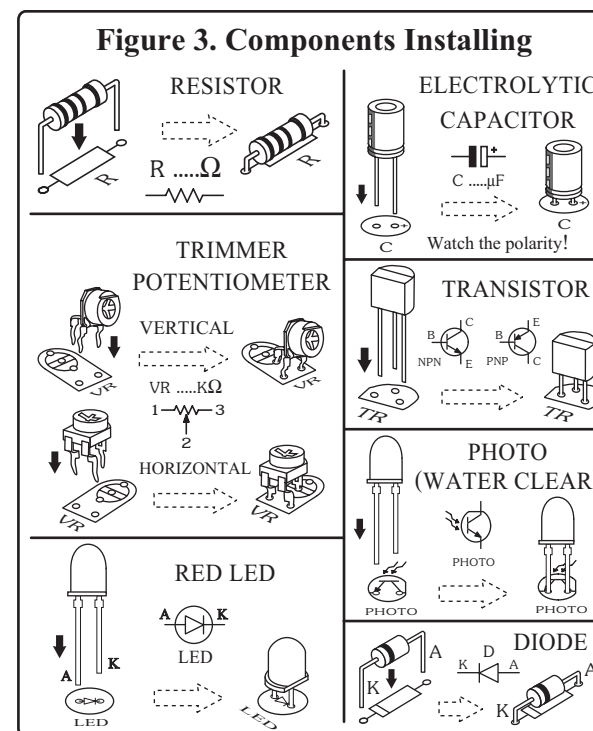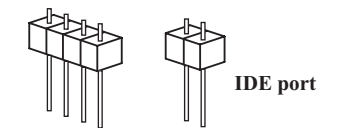

Figure 1. DACON Dark Control Robot Circuit

Figure 2. FK1102-1 Circuit Board Assembling

FK1102-1

Figure 3. Components Installing

RESISTOR

$R \ldots\ldots\Omega$

ELECTROLYTIC CAPACITOR

$C \ldots\ldots\mu F$

Watch the polarity!

TRIMMER POTENTIOMETER

VERTICAL

$VR \ldots\ldots K\Omega$

HORIZONTAL

TRANSISTOR

B C / NPN E   B E / PNP C

PHOTO (WATER CLEAR)

PHOTO

RED LED

A K / LED

DIODE

A D A / K

Figure 4. IDE Port Assembling To The FK1102-1 Circuit Board.

IDE port

Press the pin of IDE port to be level with the black plastic.
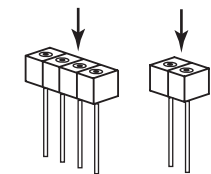
Install IDE port to PC-board and soldering.

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.
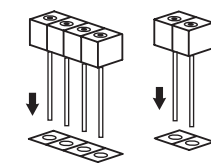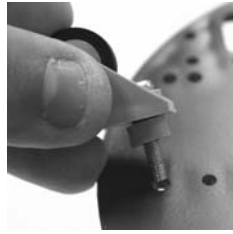
(2) ROBOT BODY

Assembling Steps of the Body set.

① Fix a mini caster wheel set to the Body set with using a 12 mm. bolt as a holder.

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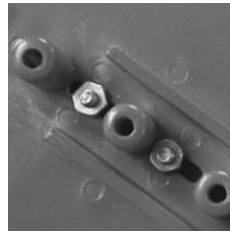
② Install battery holder to body robot with flat head nut 2.5x10 and nut M2.5.
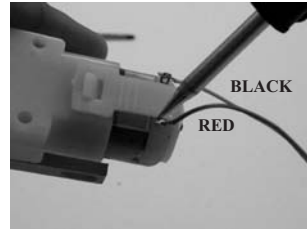
Flat head nut 2.5x10 and NUT M2.5

③ Insert the electric wire battery holder into body robot.
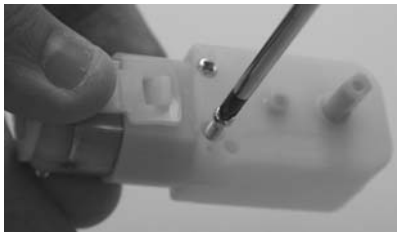
④ Take off the both screw of motor gear and then mount the motor lock. Secure with the both screw of motor gear.

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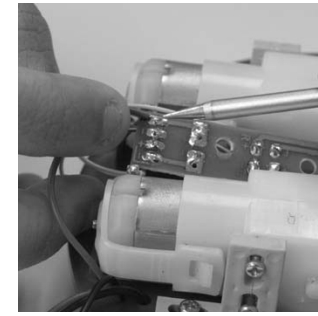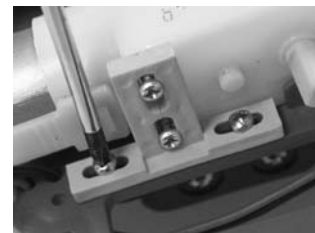
BLACK
RED

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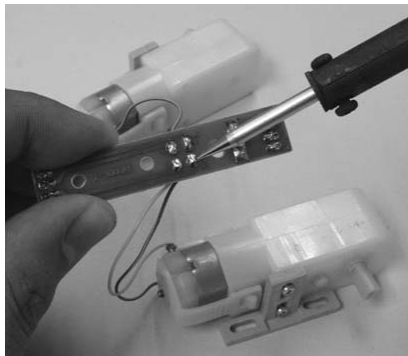
⑥ Mount motors, each with two #4 x 1/4" screws

Screw 4x1/4

⑦ Solder battery holder wire to BR002-1 PC-board at B1 and B2. Red wire is positive pole and Black is negative pole.
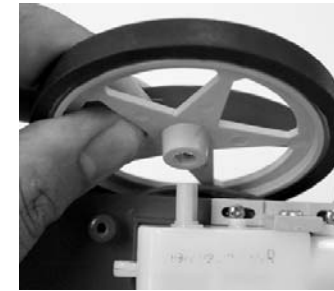
⑧ Mount BR002-1 PC-board into body robot and secure them with two #2 x 1/4" screws.
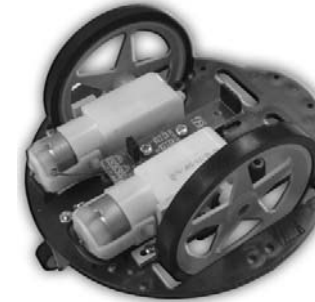
Screw 2x1/4

⑨ Install the wheels onto the shaft of the gear motors and secure them with the remaining two #4 x 1/4" pointy screws.
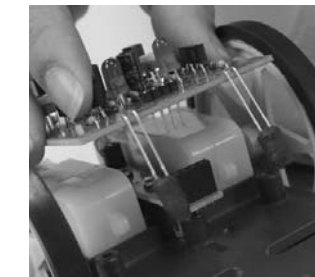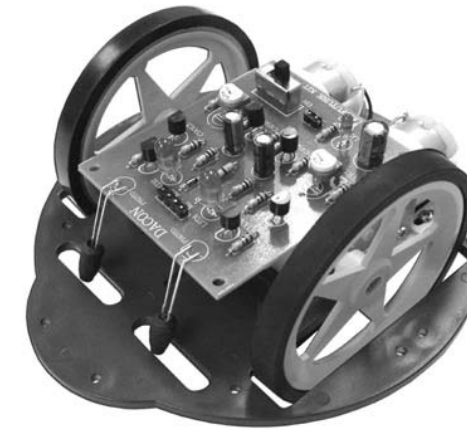
Screw 4x1/4

⑩ Body robot is completely installed.

⑪ Install the control board into body robot.

⑫ The robot is prompt working and playing.

NOTE:

1. This robot has to be played at low light place for protect error working of sensor.

2. Use a searchlight for control this robot because it is easy to control.