AI Dark Line Tracer

Warning! Not suitable for children under 36 months because of small part(s) – Choking hazard. Only for use by children over 8 years old. To be used solely under the strict supervision of adults that have studied the precautions given in the experimental set. Hair entanglement may result if the child's head is too close to the motorized unit of this toy. This toy contains functional sharp point – on the component leads. Do not short-circuit the battery terminals and motors, which may cause overheating. Do not lock the motor or other moving parts, which may cause overheating. Use with care and only under supervision of adult.

Packaging materials are not toys. Please remove all packaging and packing tags/wires before giving this toy to your child.

CAUTION! Take extra care during unpacking and use.
Please take note: As an extra precaution, check this toy regularly for signs of wear or damage. Read the instructions carefully before use, then follow them and keep them for reference.

Warning! Do not short-circuit the battery terminals and motor, which may cause overheating. The wires are not to be inserted into socket outlets.

Batteries required: 3 x AAA (Not included)

IMPORTANT: Keep these instructions. DO NOT DISCARD.

1. Only adults should install and replace batteries.
2. Alkaline batteries are recommended.
3. If the device has not been used for a long time, remove the batteries.
4. Do not use rechargeable batteries.
5. Do not mix old and new batteries.
6. Do not mix alkaline, standard (carbon zinc) or rechargeable (nickel cadmium) batteries.
7. Exhausted batteries are to be removed from the toy.
8. Non-rechargeable batteries are not to be recharged.
9. The supply terminals are not to be short-circuited.
10. Only batteries of the same or equivalent type as recommended are to be used.
11. Batteries are to be inserted with the correct polarity.
12. Do not dispose of batteries in fire, batteries may explode or leak.
13. Batteries may explode or leak if misused.

If at any time in the future you should need to dispose of this product please note that Waste electrical products should not be disposed of with household waste. Please recycle where facilities exist. Check with your Local Authority or retailer for recycling advice.(Waste Electrical and Electronic Equipment Directive)

Introduction

Artificial Intelligence (A.I.) is a branch of *Science* which deals with helping machines find solutions to complex problems in a more human-like fashion. This generally involves borrowing characteristics from human intelligence, and applying them in a language the computer understands. Researchers are creating systems which can mimic human thought, understand speech, beat the best human chess player, and countless other feats never before possible.

The word "robot" originates from the Czech word robota, meaning drudgery. A robot is something that senses the world in some way, does some sort of computation, deciding what to do, and then acts on the world outside itself as a result. Basically a robot consists of:

- A mechanical device, such as a wheeled platform, arm, or other construction, capable of interacting with its environment
- Sensors on or around the device that are able to sense the environment and give useful feedback to the device
- Systems that process sensory input and instruct the device to perform actions in response to the situation

The science and technology that deals with robots is called robotics. These AI robot kits let you explore how robot sensors work to connect them to the outside world.

What does it do?

The AI Dark Line Tracer will seek and follow a dark line. For example, use a black felt pen or marker pen (not included) to draw a large circle on a piece of white paper. Put the unit on the dark line and it will follow the line and move around.

How does it work?

The dark line is detected by two light sensors which act as the eyes of the micro-controller on the circuit board. The red LED acts as a light source. A dark and white area gives an ON and OFF signal respectively to the micro-controller. For example, when the light sensor on the left detects a dark area, the unit moves left until the right sensor detects this dark area. When this happens, the unit will move in opposite direction and the dark area will move back towards the left sensor. In this way, the line will stay in between the left and right sensor. The net effect is the unit will follow the line while moving forward.

Components:

1 Track x2
2 Chassis x1
3 Front wheel x2
4 Rear wheel x2
5 Middle wheel x2
6 Long screw x4
7 Short screw x2
8 Arm x1
9 Sensor frame x1
10 Battery box x1
11 Flag x1
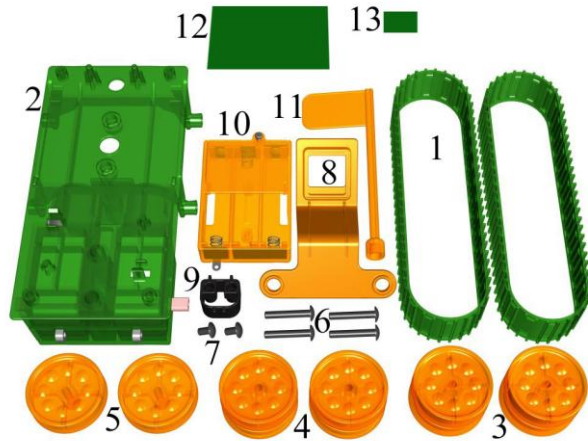12 Main circuit board x1
13 Sensor circuit board x1

Fig. 1

Steps:

1. Attach the front wheels (3) to the axle of the chassis (2) using the short screws (7). Use the long screws (6) to fix the middle (5) and rear wheels (4) to the chassis as shown in Fig. 2.
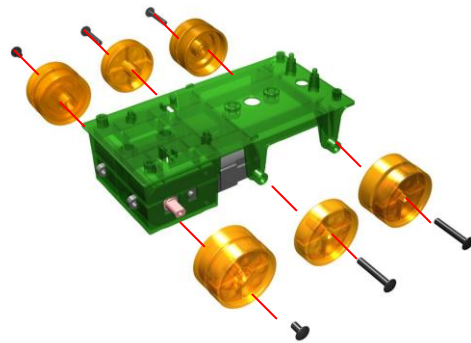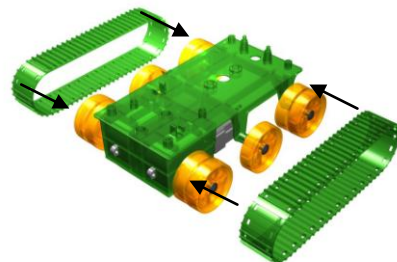
Fig. 2

2. Cover the wheels with the tracks (1). (Fig. 3)

Fig. 3

3. Fit the arm (8) to the front of the chassis. (Fig. 4)
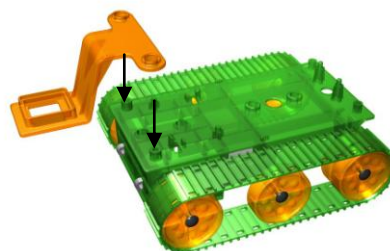
Fig. 4

4. Attach the sensor frame (9) to the hole of the arm. (Fig. 5)
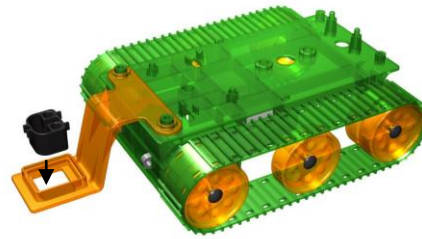
Fig. 5

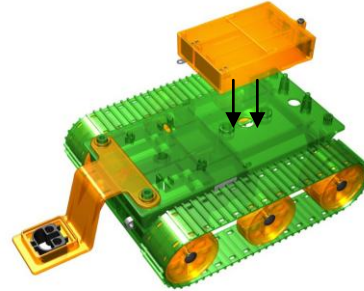5. Insert the battery box (10) on the chassis as shown in Fig. 6.

Fig. 6

6. Use a screwdriver (not included) to loosen the screw of the battery cover and install 3 AAA size batteries into the battery box according to the polarity mark. Replace the battery cover and tighten the screw. (Fig. 7)
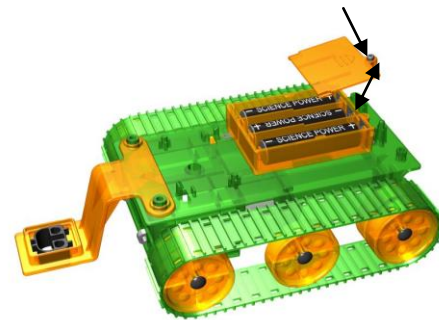
Fig. 7

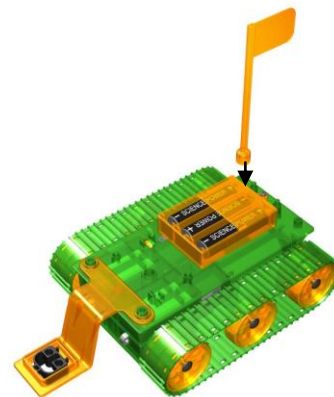7. Install the flag (11). (Fig. 8)

Fig. 8

8. As shown in Fig.9 and 10, install the main circuit board (12) on the chassis and connect the wires:
   i. Battery plug to the socket "3V" (A).
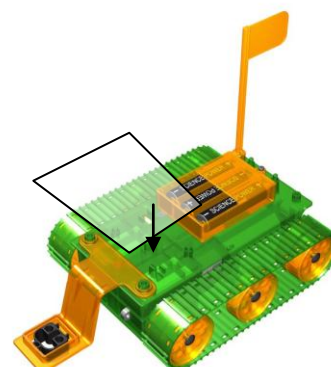   ii. Left motor plug to socket "Left" (L).

Fig. 9

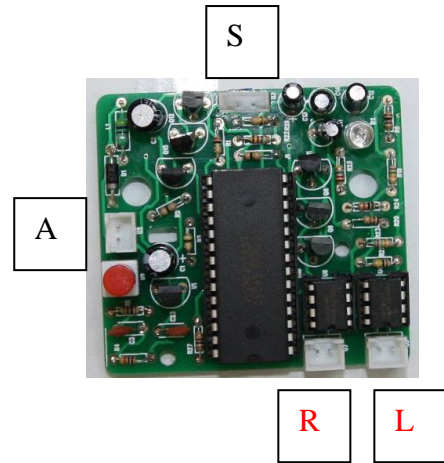   iii.   Right motor plug to socket "Right" (R).

S

A

Fig. 10

R   L

9. Install the sensor circuit board (13) on the sensor frame and connect the wires to the socket (S) on the main circuit board. (Fig. 11) Now you are done!
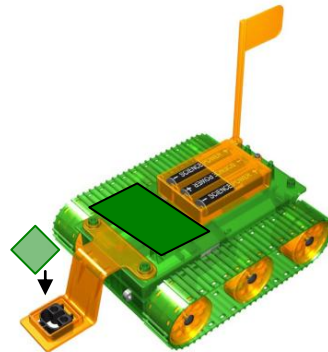

Fig. 11

How to Play

1. Draw a thick black line *about 7mm wide* with a marker pen on a piece of white paper.

2. Place the unit with its sensor head over the black line. Press the red button on the circuit board to start! (Fig. 12)

3. You can see it moving forward along the line! Try drawing a shaped track for it to follow.
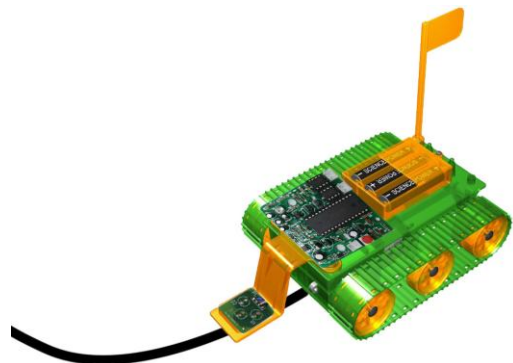

Fig. 12

Battery Installation:

The unit uses three AAA/LR03 (1.5V X 3) batteries (not included)

1. Refer to Step 6 above to install batteries.
2. Replace with new batteries when the movement becomes slow or it does not respond.
3. Insert new batteries according to the polarity marks.