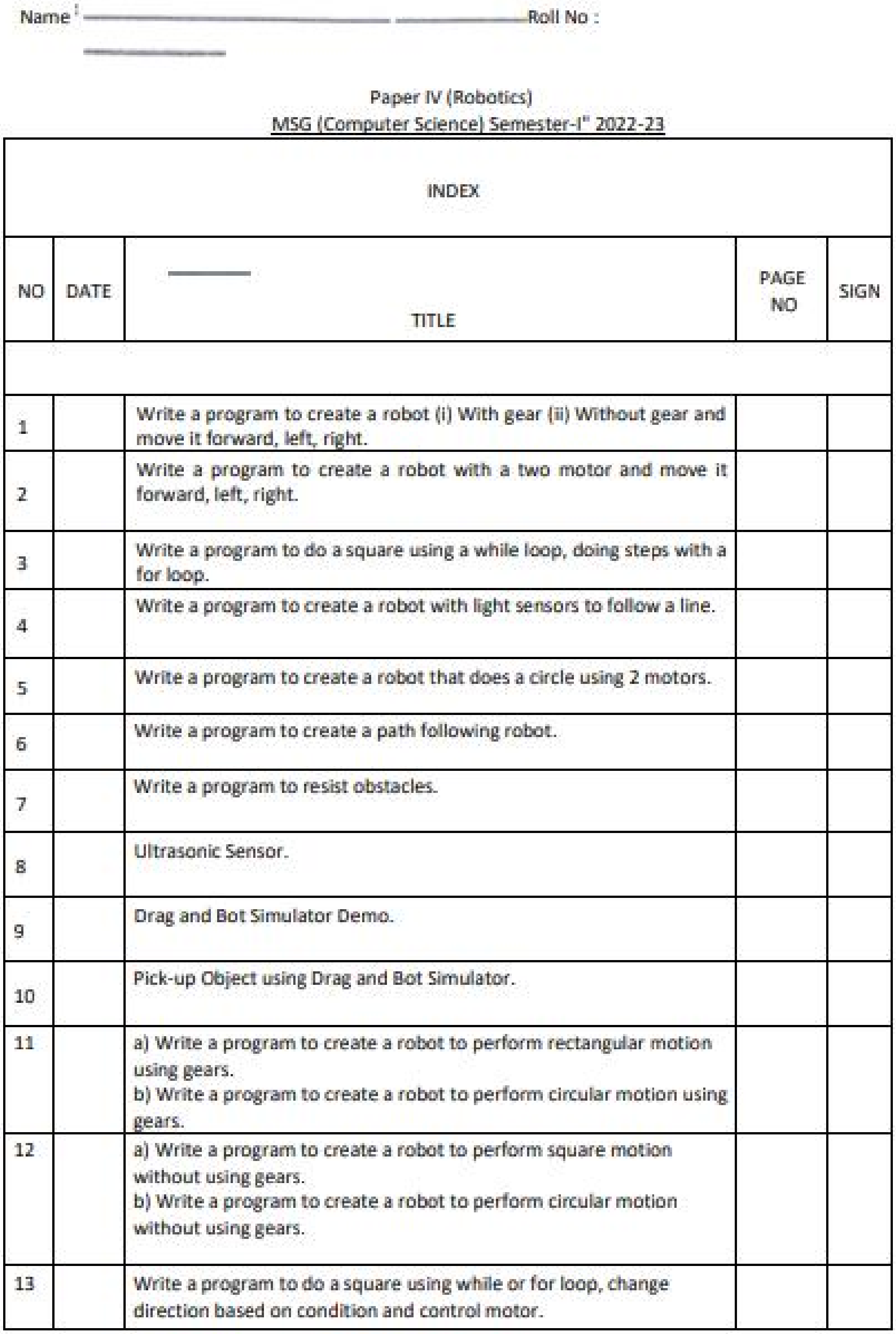
Name : Anjali Vitthal Pingle Roll no - 528



Name : ______________________ ____________Roll No :

____

Paper IV (Robotics)

MSG (Computer Science) Semester-I" 2022-23

INDEX

PRACTICAL 1A

AIM: WRITE A PROGRAM TO CREATE A ROBOT WITH GEAR AND MOVE IT FORWARD, LEFT, RIGHT.

Description:

1] NxtRobot() –

Class that represents a simulated NXT robot brick. Parts (e.g. motors, sensors) may be assembled into the robot to make it doing the desired job.

2] Gear() -

Creates a gear instance with right motor plugged into port A, left motor plugged into port B.

3] addPart(Part) -

Assembles the given part into the robot.

4] setSpeed(int) -

Sets the speed to the given value (arbitrary units).

5] forward() -

Starts the forward movement.

6] left() -

Starts to rotate left (center of rotation at middle of the wheel axes).

7] right() -

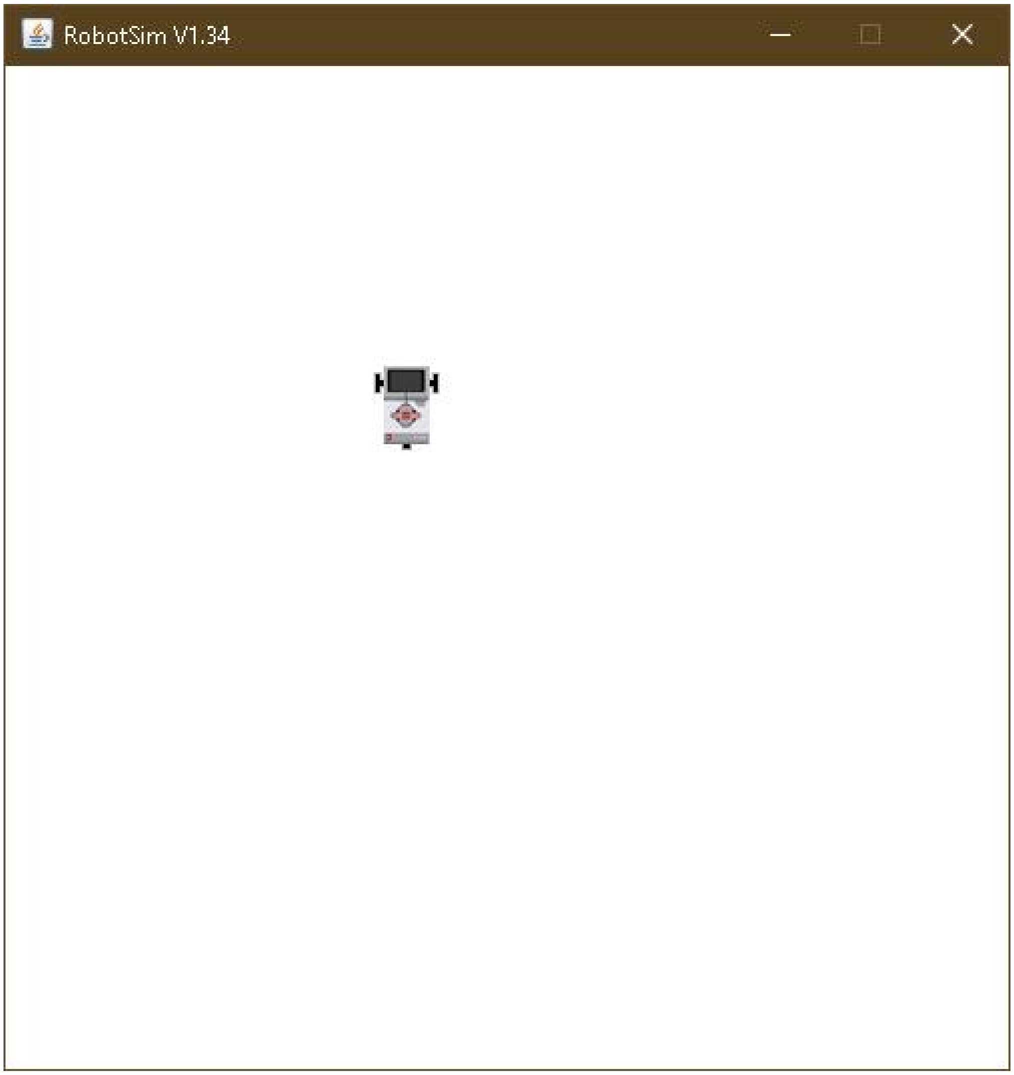
Starts to rotate right (center of rotation at middle of the wheel axes).

CODE:

```
import ch.aplu.robotsim.*;

public class Prac_1a {

   Prac_1a(){

      NxtRobot robot = new NxtRobot();

      Gear g = new Gear();

      robot.addPart(g);

      g.setSpeed(100);

      g.forward(500);

      g.left(250);

      g.forward(500);

      g.right(250);

      g.forward(500);

   }

public static void main (String[] args) {

      new Prac_1a();

   }

}
```

Name : Anjali Vitthal Pingle Roll no - 528

OUTPUT:



PRACTICAL 1B

AIM: WRITE A PROGRAM TO CREATE A ROBOT WITHOUT GEAR AND MOVE IT FORWARD, LEFT, RIGHT.

Description:

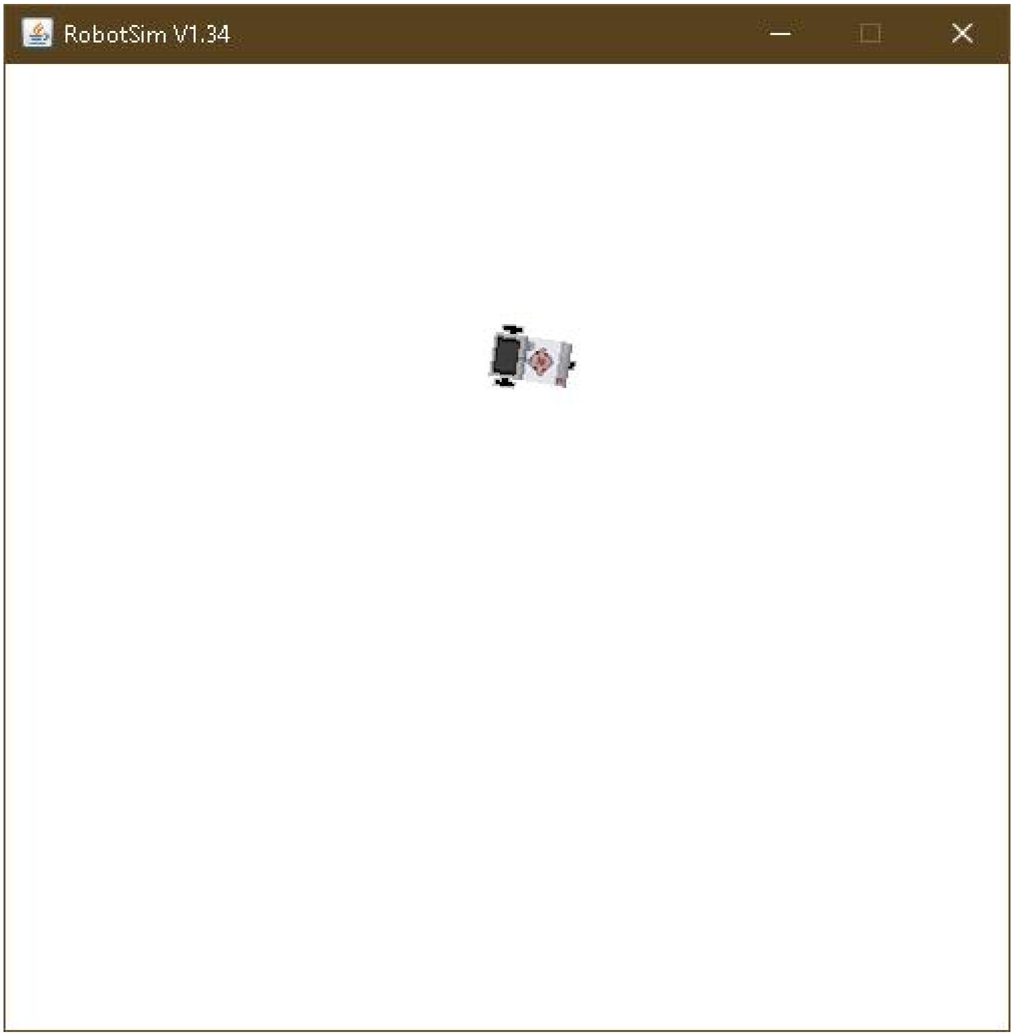
TurtleRobot() -

Creates a turtle robot instance.

CODE:

```
import ch.aplu.robotsim.*;
public class Prac_1b {
   Prac_1b(){
      TurtleRobot t = new TurtleRobot();
      t.forward(100);
      t.left(90);
      t.forward(100);
      t.right(90);
      t.forward(100);
   }
   public static void main (String[] args) {
      new Prac_1b();
   }
}
```

OUTPUT:



PRACTICAL 2

AIM: WRITE A PROGRAM TO CREATE A ROBOT WITH 2 MOTORS AND MOVE IT FORWARD, LEFT, RIGHT.

DESC:

1] Motor() -
Creates a motor instance that is plugged into given port.

2] Tools.delay() -
Suspends execution of the current thread for the given amount of time.

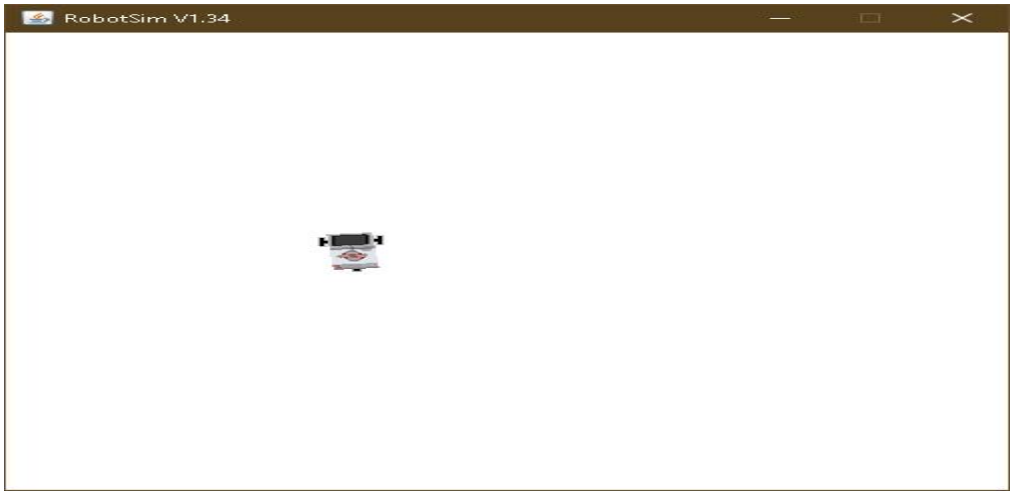
3] stop() –
Stops the rotation.

CODE:

```
import ch.aplu.robotsim.*;
public class Prac_2 {
   Prac_2(){
      NxtRobot r = new NxtRobot();
      Motor m1 = new Motor(MotorPort.A);
      Motor m2 = new Motor(MotorPort.B);
      r.addPart(m1);
      r.addPart(m2);

      m1.forward();
      Tools.delay(1090);
      m2.forward();
```

```
        Tools.delay(1090);
        m1.stop();
        m2.forward();
        Tools.delay(1090);
        m1.forward();
        m1.stop();
        m2.stop();
    }
    public static void main(String args[]){
        new Prac_2();
    }
}
```

OUTPUT:



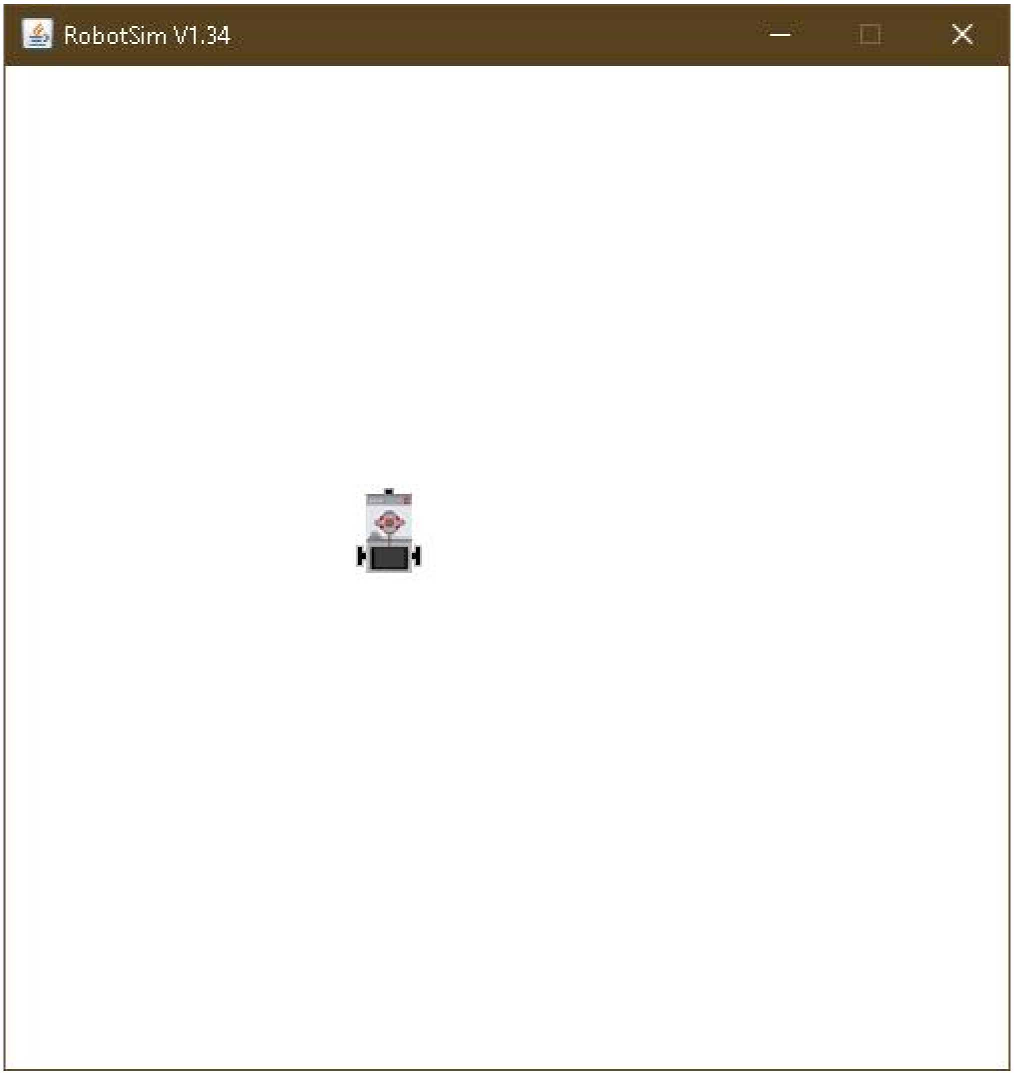
PRACTICAL 3

AIM: WRITE A PROGRAM TO DO A SQUARE USING A WHILE LOOP.

CODE:

```
import ch.aplu.robotsim.*;
public class Prac_3 {
  Prac_3(){
    NxtRobot robot = new NxtRobot();
    Gear g = new Gear();
    robot.addPart(g);
    g.setSpeed(100);
    while (true){
      g.forward(600);
      g.left(280);
    }
  }
  public static void main (String[] args) {
    new Prac_3();
  }
}
```

OUTPUT:



PRACTICAL 4

AIM: WRITE A PROGRAM TO CREATE A ROBOT WITH LIGHT SENSORS TO FOLLOW A LINE.

Description:

1] RobotContext() -

Creates a RobotContext instance.

2] setStartPosition(int, int) –

Sets the Nxt starting position (x-y-coordinates 0..500, origin at upper left).

3] useBackground(String) –

Use the given image as background (playground size 501 x 501).

4] LegoRobot() –

Creates a robot with its playground using defaults from RobotContext.

5] LightSensor(SensorPort) -

Creates a sensor instance pointing downwards connected to the given port.

6] getValue() –

For sensor ports 1, 2, 3, 4: returns the brightness of the background at the current location.

7] leftArc() –

Starts to move to the left on an arc with given radius.

8] rightArc() -

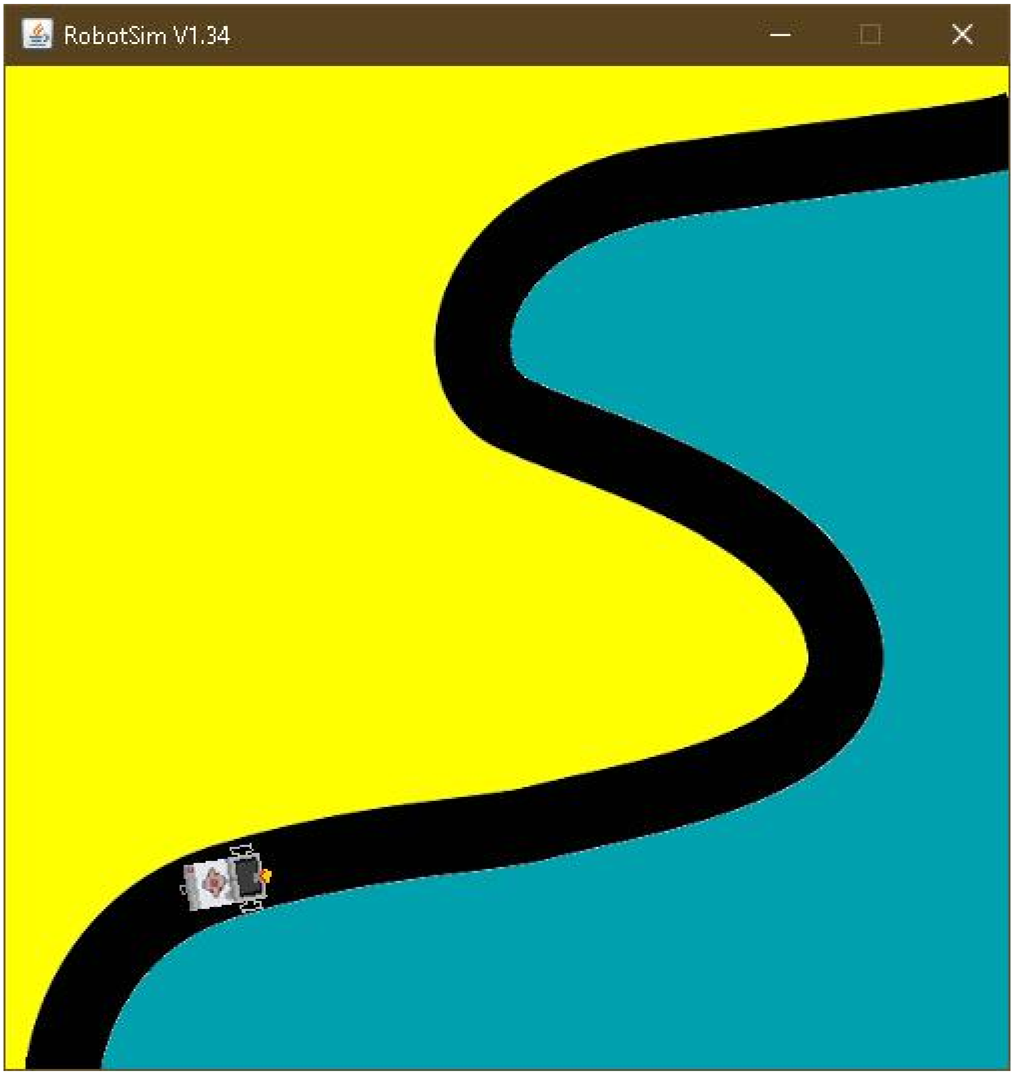
Starts to move to the right on an arc with given radius.

CODE:

```
import ch.aplu.robotsim.*;
public class Prac_4 {
   static {
      RobotContext.setStartPosition(32,495);
      RobotContext.useBackground("sprites/road.gif");
    }
   Prac_4(){
      LegoRobot r=new LegoRobot();
      Gear g = new Gear();
      LightSensor ls= new LightSensor(SensorPort.S3);
      r.addPart(g);
      r.addPart(ls);
      g.forward();
      g.setSpeed(50);
      while(true){
         int v =ls.getValue();
         if(v < 100)
            g.forward();
         if(v > 350 && v<750)
            g.leftArc(0.005);
         if(v > 800)
            g.rightArc(0.005);
```

```
        }
    }
    public static void main (String args[]){
        new Prac_4();
    }
}
```

OUTPUT:



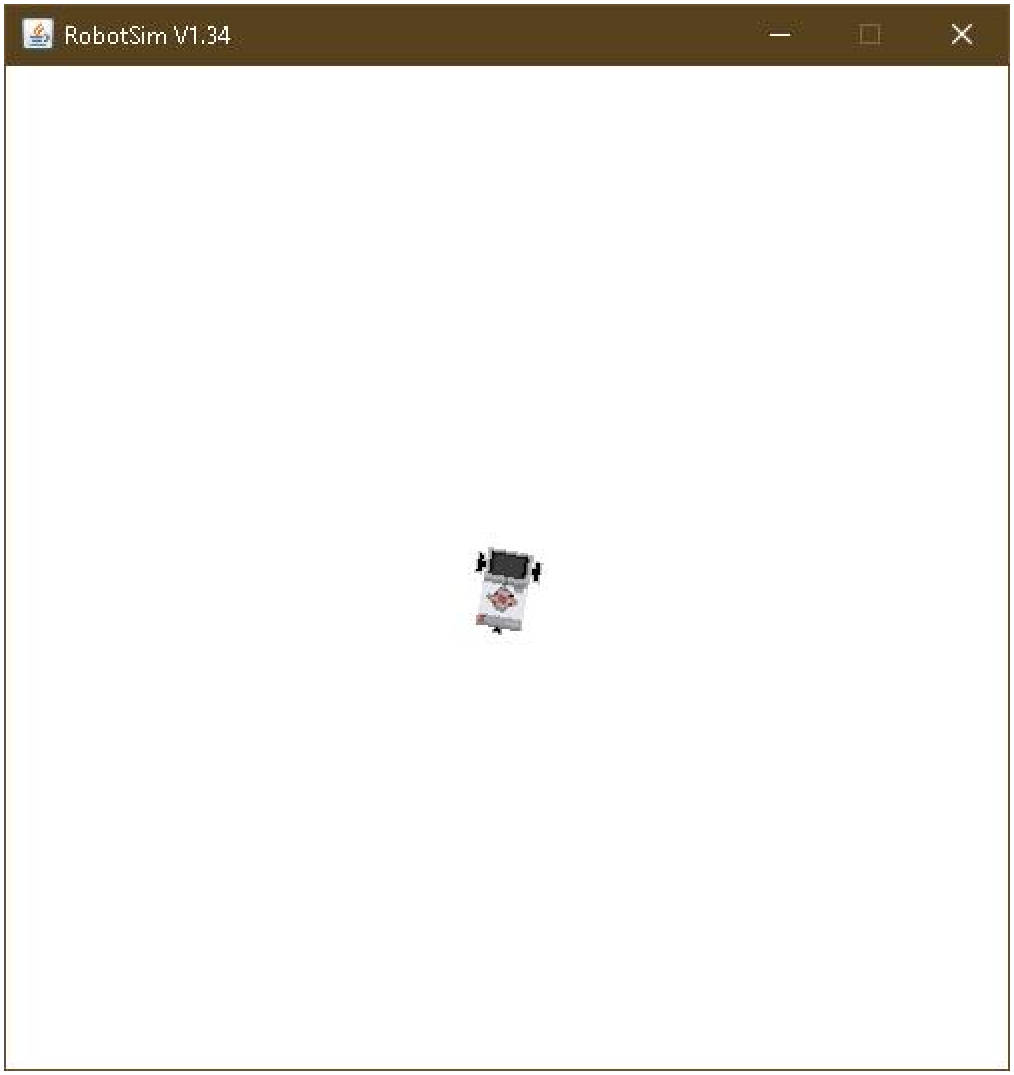
PRACTICAL 5

AIM: WRITE A PROGRAM TO CREATE A ROBOT THAT DOES A CIRCLE USING 2 MOTORS.

CODE:

```
import ch.aplu.robotsim.*;

public class Prac_5 {

    Prac_5() {

        NxtRobot r = new NxtRobot();

        Motor A = new Motor(MotorPort.A);

        Motor B = new Motor(MotorPort.B);

        r.addPart(B);

        r.addPart(A);

        A.setSpeed(100);

        B.setSpeed(100);

        A.forward();

        B.forward();

        while (true){

            Tools.delay(200);

            A.stop();

            Tools.delay(200);

            A.forward();

        }

    }
    public static void main(String arg[]) {
        new Prac_5();
    }
}
```

OUTPUT:



PRACTICAL 6

AIM: WRITE A PROGRAM TO CREATE A PATH FOLLOWING ROBOT.

Description:

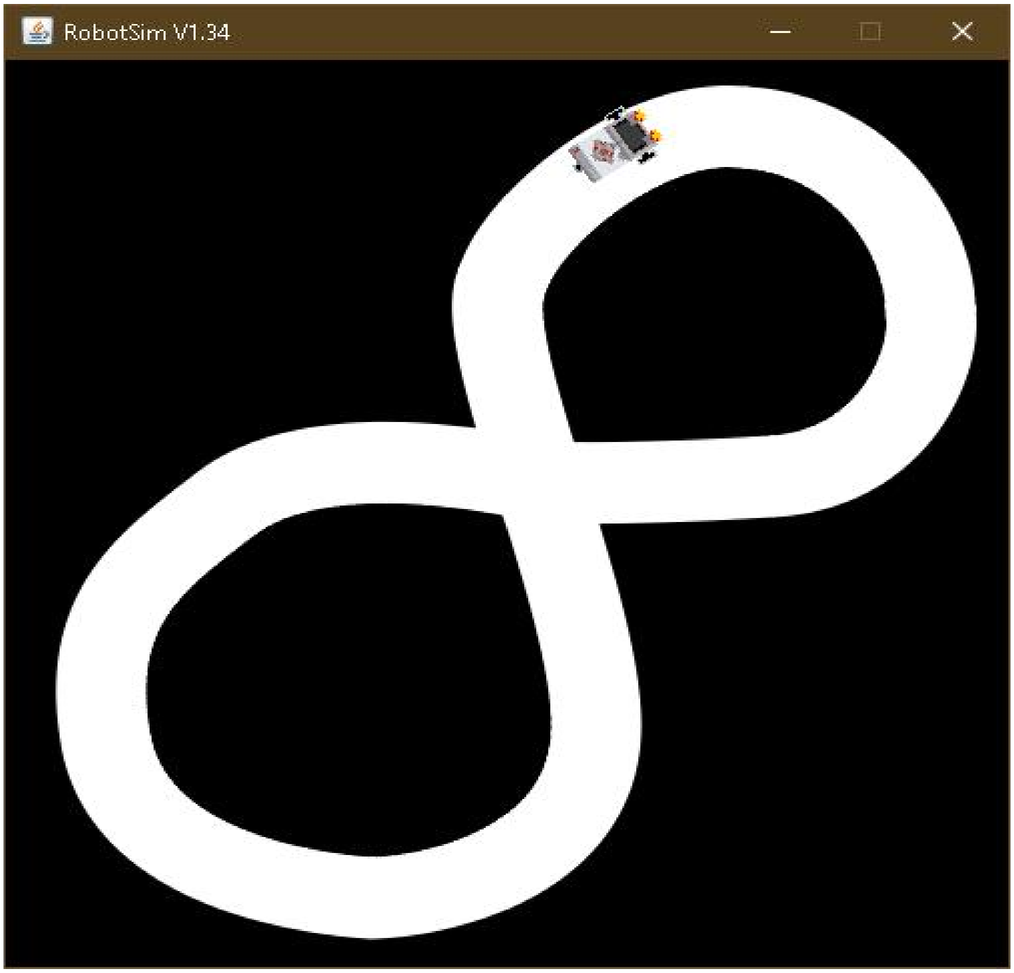
1] setStartDirection(double) -

Sets the Nxt starting direction (zero to EAST).

CODE:

```
import ch.aplu.robotsim.*;
public class Prac_6 {
  Prac_6(){
    NxtRobot robot=new NxtRobot();
    Gear gear=new Gear();
    LightSensor ls1=new LightSensor(SensorPort.S1);
    LightSensor ls2=new LightSensor(SensorPort.S2);
    robot.addPart(gear);
    robot.addPart(ls1);
    robot.addPart(ls2);
    gear.forward();
    gear.setSpeed(100);
    while(true)
    {
      int rightValue=ls1.getValue();
      int leftValue=ls2.getValue();
      if(leftValue < 10)
        gear.rightArc(0.05);
      if(rightValue < 10)
        gear.leftArc(0.05);
      if(leftValue > 10 && rightValue > 10)
        gear.forward();
    }
  }
  public static void main(String args[])
  {
    new Prac_6();
  }
  static
  {
    NxtContext.setStartPosition(267,232);
    NxtContext.setStartDirection(-90);
    NxtContext.useBackground("sprites/path.gif");
  }
}
```

OUTPUT:



PRACTICAL 7

AIM: WRITE A PROGRAM TO RESIST OBSTACLES.

Description:

1] TouchSensor(SensorPort) -

Creates a sensor instance connected to the given port.

2] isPressed() –

Polls the touch sensor and returns true, if there is a collision with any of the collision obstacles.

3] backward() –

Starts moving backward and returns immediately.

4] useObstacle(Obstacle) –

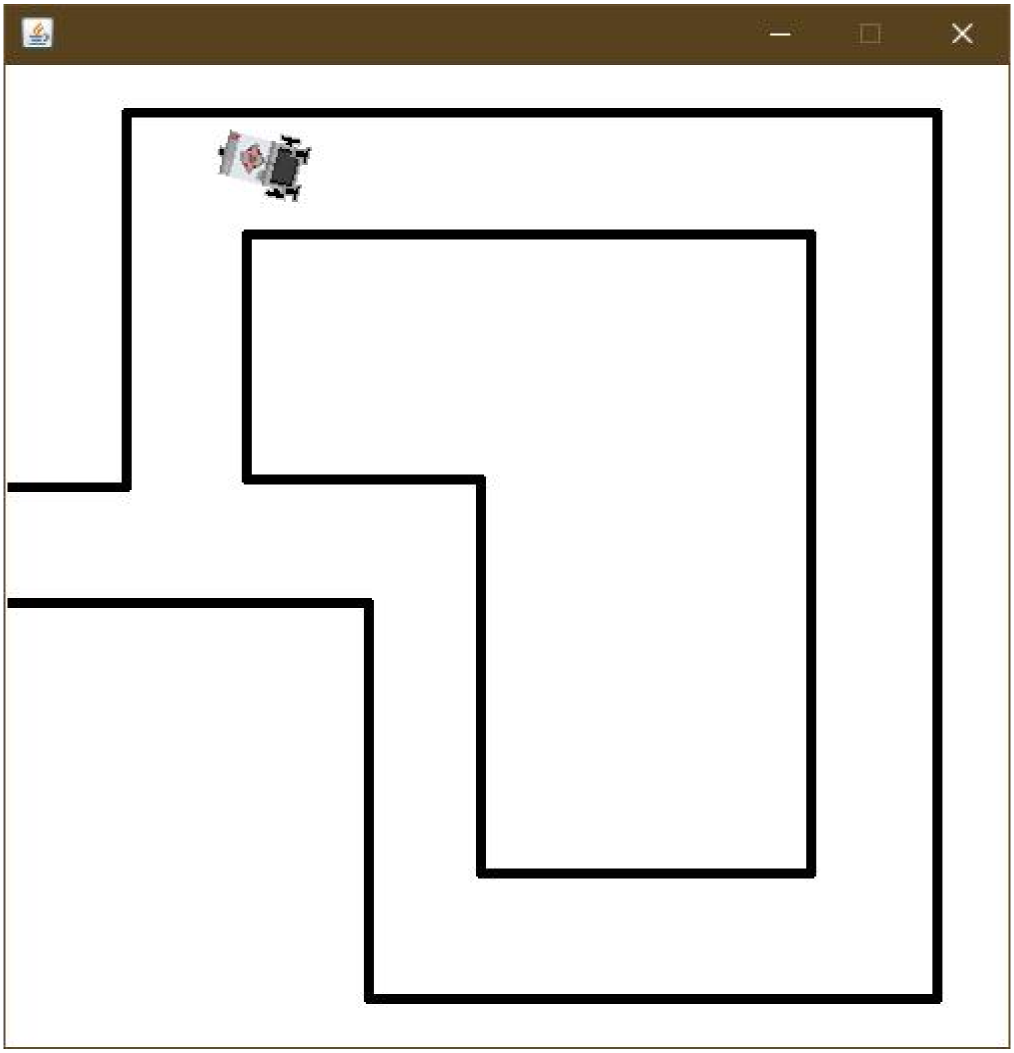
Defines the given obstacle to be used as touch obstacle.

CODE:

```
import ch.aplu.robotsim.*;

public class Prac_7 {
```

```
Prac_7(){
    LegoRobot r=new LegoRobot();
    Gear g = new Gear();
    TouchSensor t1= new TouchSensor(SensorPort.S1);
    TouchSensor t2 = new TouchSensor(SensorPort.S2);
    r.addPart(g);
    r.addPart(t1);
    r.addPart(t2);
    g.forward();
    g.setSpeed(50);
    while(true){
        Boolean b1 = t1.isPressed();
        Boolean b2 = t2.isPressed();
        if(b1 && b2){
            g.backward(150);
            g.right(400);
            g.forward();
        }
        if(b1){
            g.backward(150);
            g.left(200);
            g.forward();
        }
        if(b2){
            g.backward(150);
            g.right(200);
        g.forward();
      }
    }
  }
  static {
    RobotContext.setStartPosition(100,250);
    RobotContext.useObstacle(RobotContext.channel);
   }
  public static void main(String args[]){
    new Prac_7();
  }
}
```

OUTPUT:



PRACTICAL 8

AIM: ULTRASONIC SENSOR.

DESC:

1] UltrasonicSensor(SensorPort) -

The port selection determines the position of the sensor and the direction of the beam axis.

2] setBeamAreaColor(Color) -

Sets the color of the beam area (two sector border lines and axis).

3] setProximityCircleColor(Color) –

Sets the color of the circle with center at sensor location and radius equals to the current distance value.

4] getDistance() –

Returns the distance to the nearest target object.

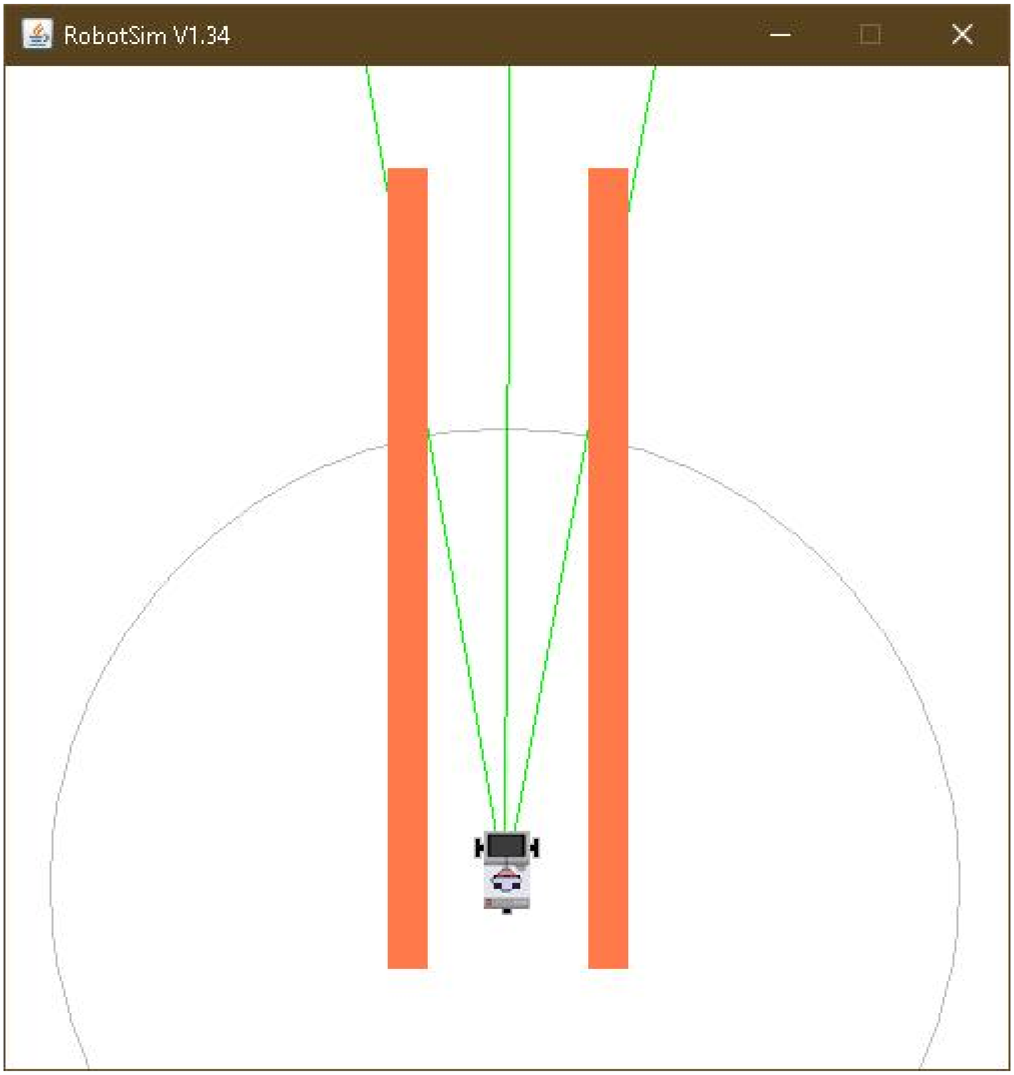
5] useTarget(String, Point[], int, int) –

Creates a target for the ultrasonic sensor using the given sprite image.

CODE:

```
import ch.aplu.robotsim.*;
import java.awt.Color;
import java.awt.Point;
public class Prac_8 {
  Prac_8() {
    LegoRobot robot = new LegoRobot();
    Gear gear = new Gear();
    robot.addPart(gear);
    UltrasonicSensor us = new UltrasonicSensor(SensorPort.S1);
    robot.addPart(us);
    us.setBeamAreaColor(Color.green);
    us.setProximityCircleColor(Color.lightGray);
    double arc = 0.5;
    gear.setSpeed(50);
    gear.rightArc(arc);
    boolean isRightArc = true;
    int oldDistance = 0;
    while (true)
    {
     Tools.delay(100);
     int distance = us.getDistance();
     if (distance == -1)
      continue;
     if (distance < oldDistance)
     {
      if (isRightArc)
      {
       gear.leftArc(arc);
       isRightArc = false;
      }
      else
      {
       gear.rightArc(arc);
       isRightArc = true;
      }
     }
     oldDistance = distance;
    }
   }
   static{
    Point[] mesh_bar =
    {
     new Point(10, 200), new Point(-10, 200),
     new Point(-10, -200), new Point(10, -200)
    };
    RobotContext.useTarget("sprites/bar1.gif", mesh_bar, 200, 250);
    RobotContext.useTarget("sprites/bar1.gif", mesh_bar, 300, 250);
    RobotContext.setStartPosition(250, 460);
   }
  public static void main(String[] args) {
    new Prac_8();
    }
}
```

OUTPUT:



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Assignment 1(A):

Aim: Write a program to create a robot to perform rectangular motion using gears

Description:

1] NxtRobot() :

Class that represents a simulated NXT robot brick. Parts (e.g. motors, sensors) may be assembled into the robot to make it doing the desired job.

2] Gear() :

Creates a gear instance with right motor plugged into port A, left motor plugged into port B.

3] addPart() :

Assembles the given part into the robot.

4] setSpeed() :

Sets the speed to the given value (arbitrary units).

5] forward() :

Starts the forward movement for the given duration (in ms) and stops. Method returns at the end of the given duration.

6] left() :

Starts to rotate left (center of rotation at middle of the wheel axes). Method returns immediately, while the movement continues

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Code:

```
import ch.aplu.robotsim.NxtRobot;
import ch.aplu.robotsim.Gear;
public class assignment1A {
   public assignment1A() {
      NxtRobot r = new NxtRobot ();
      Gear g = new Gear();
      r.addPart (g);
      g.setSpeed (100);
      while (true){
         g.forward (800);
         g.left (280);
      }
   }
   public static void main (String [] args){
      new assignment1A ();
   }
}
```

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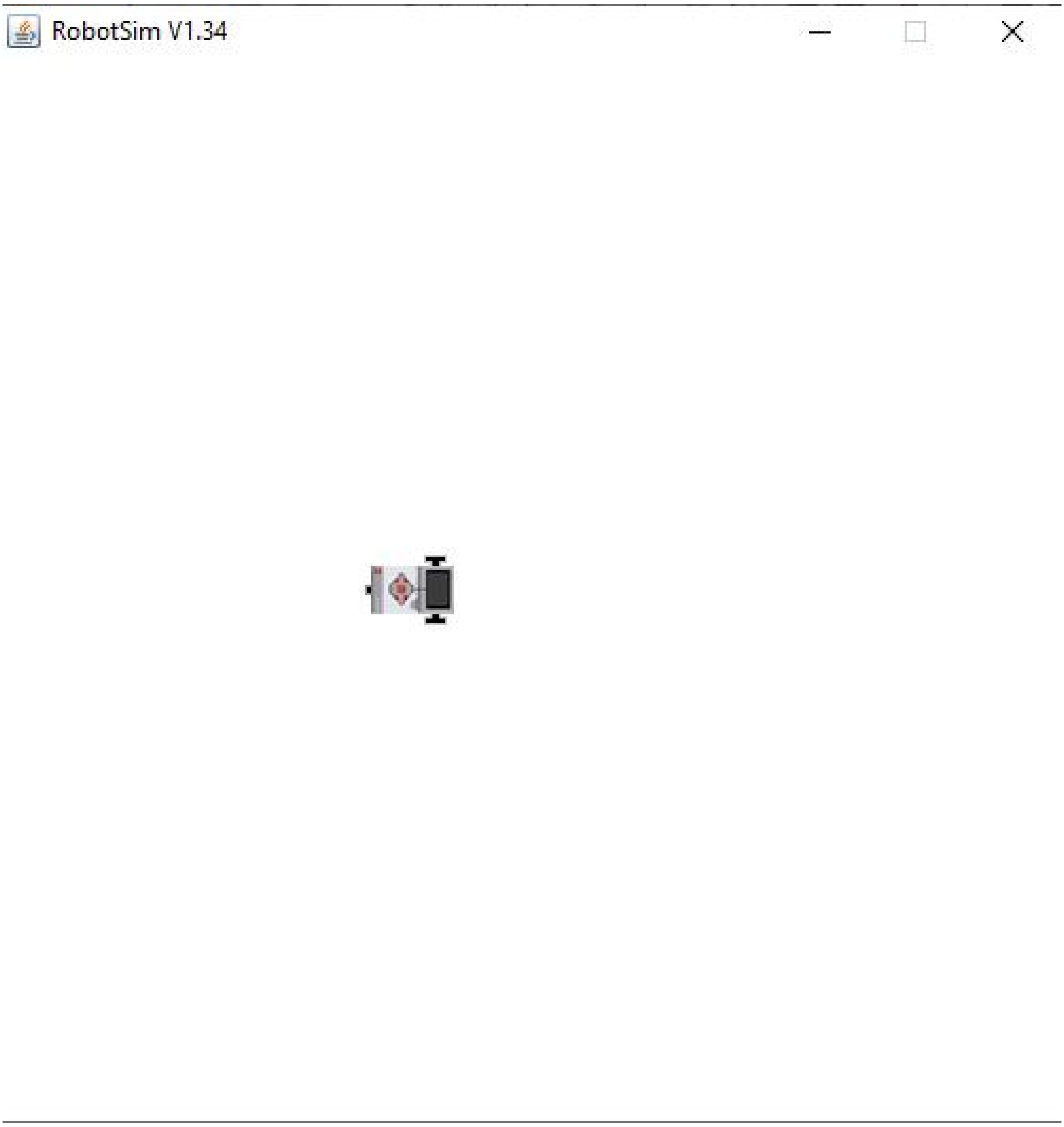
Output:



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Assignment 1(B):

Aim: Write a program to create a robot to perform circular motion using gears

Description:

1] rightArc() :

> Starts to move to the right on arc with given radius. Method returns immediately, while the movement continues.

.

Code:

```
import ch.aplu.robotsim.NxtRobot;
import ch.aplu.robotsim.Gear;
public class assignment1B {
   public assignment1B () {
      NxtRobot r = new NxtRobot ();
      Gear g = new Gear ();
      r.addPart (g);
      g.setSpeed (100);
      while (true) {
         g.rightArc (0.5);
      }
   }
   public static void main (String [] args){
      new assignment1B ();
   }
```

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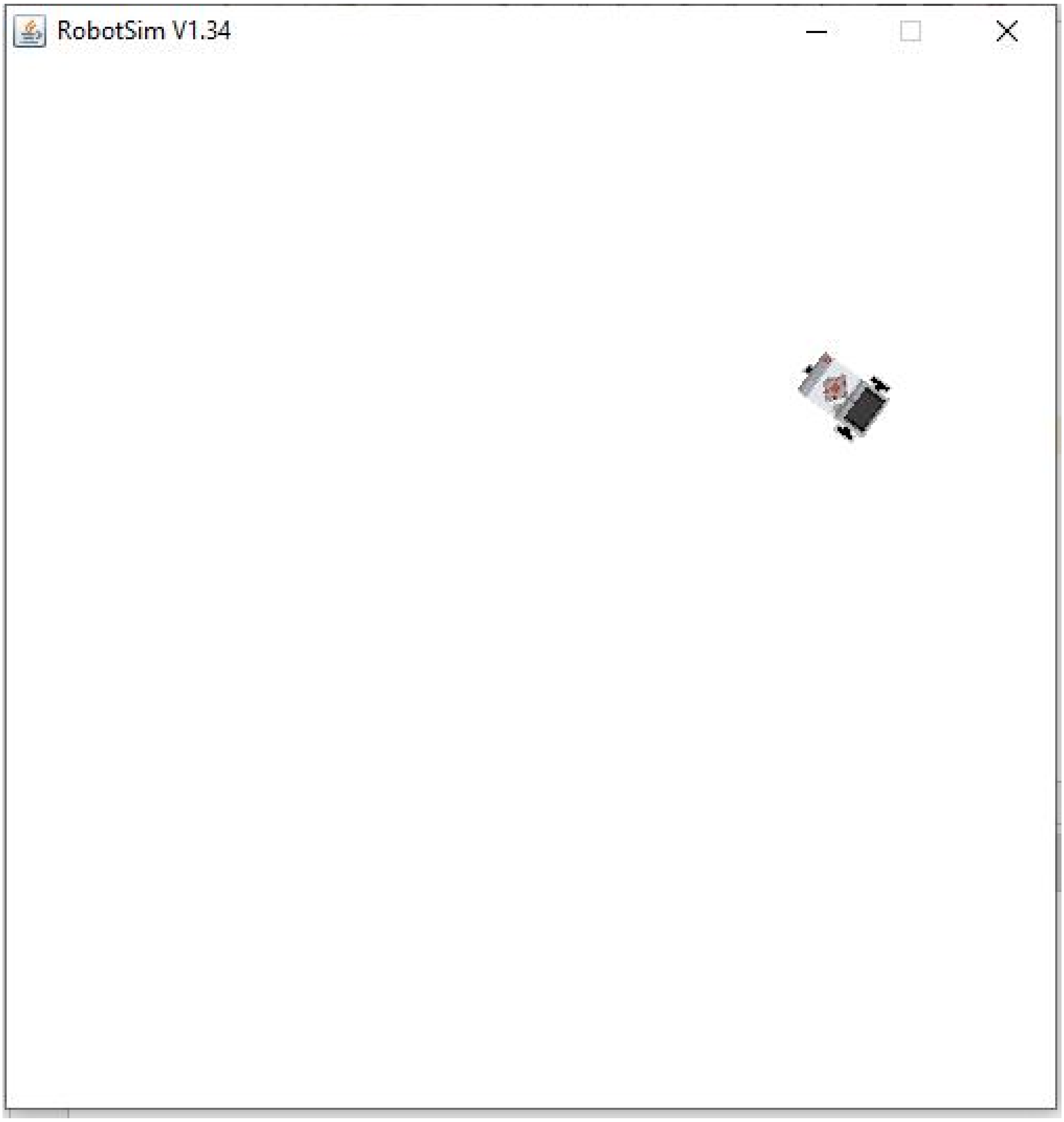
```
}
```

Output:



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Assignment 2 (A):

Aim: Write a program to create robot to perform a square motion without using gear.

Code:

```
import ch.aplu.robotsim.*;

public class Assignment_2a {

  Assignment_2a () {

        TurtleRobot t = new TurtleRobot ();

        t.setTurtleSpeed (100);

        while (true){

          t.forward(200);

          t.left (90);

        }

     }

  public static void main (String [] args) {

     new Assignment_1a ();

  }

}
```

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Output:

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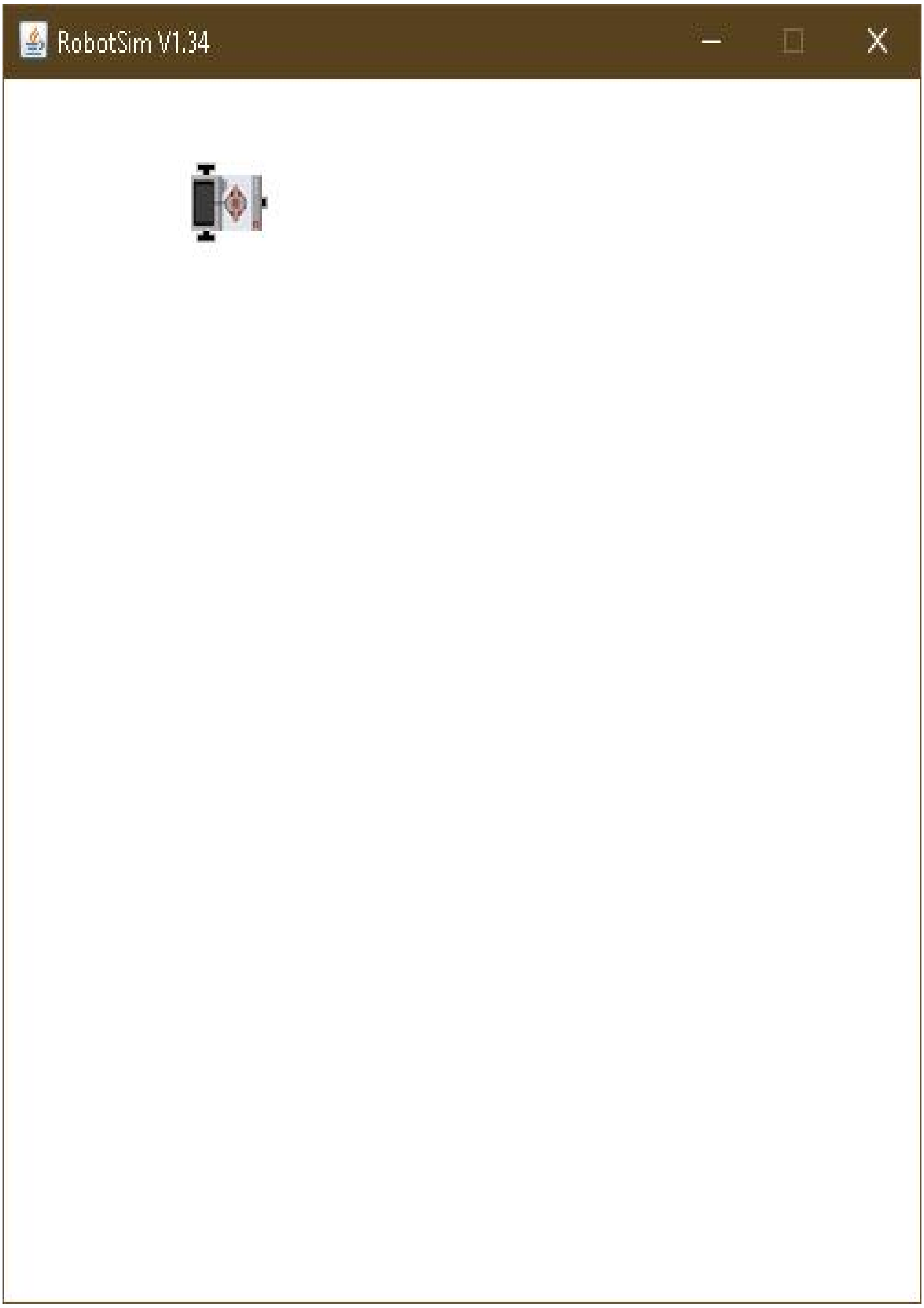

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Assignment 2 (B):

Aim: Write a program to create robot to perform a circular motion without using gear.

Code:

```
import ch.aplu.robotsim.*;

public class Assignment_2b {

  Assignment_2b () {

      TurtleRobot t = new TurtleRobot ();

      t.setTurtleSpeed (100);

      while (true) {

         t.forward (2);

         t.left (2);

      }

   }

   public static void main (String [] args)  {

      new Assignment_1b ();

   }

}
```

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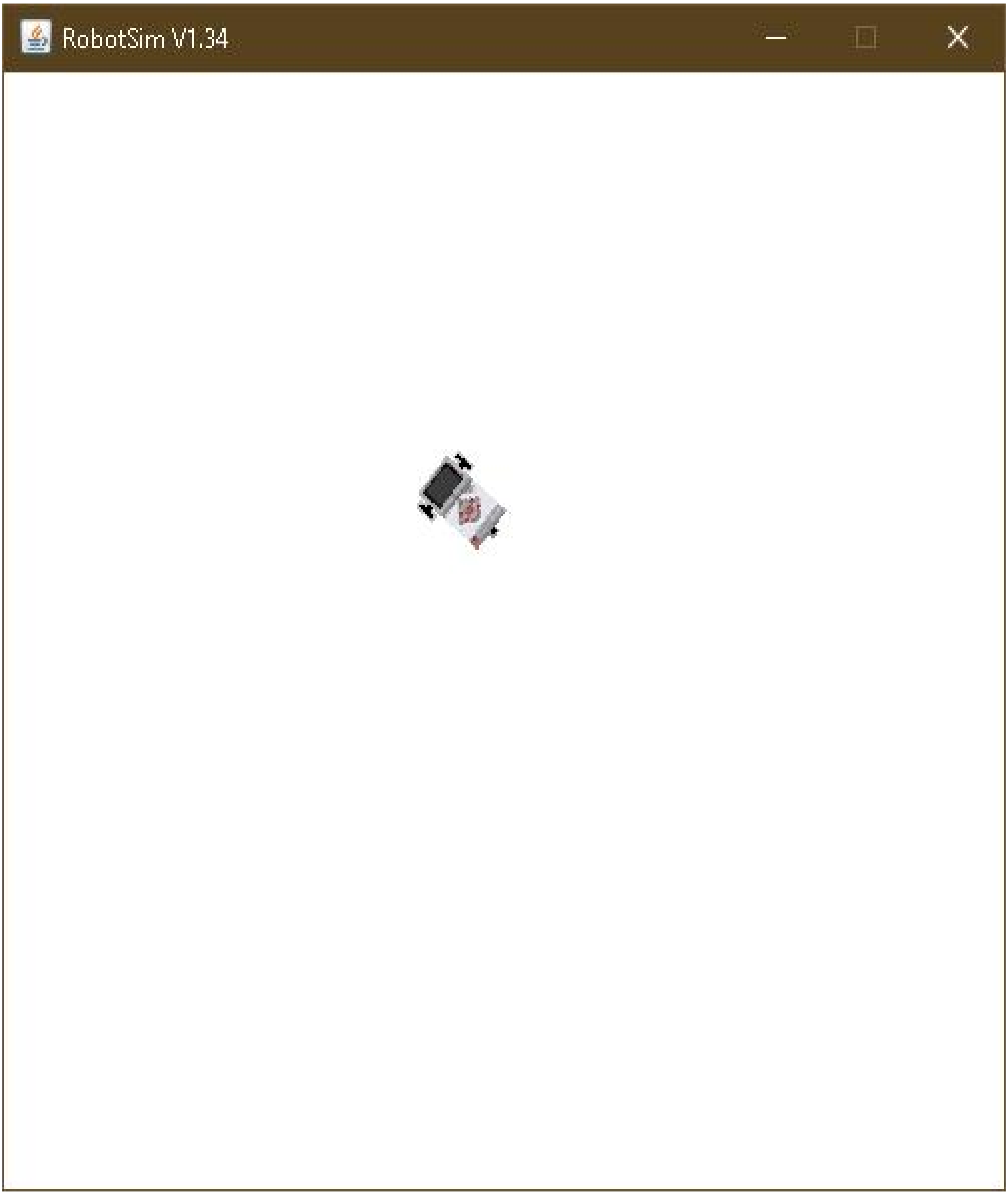
Output:



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Assignment 3:

Aim: Write a program to do a square using while or for loop, change direction based on condition and control motor movement

Description:

1] Motor() :

Creates a motor instance that is plugged into given port.

2] Tools.delay() :

Suspends execution of the current thread for the given amount of time.

Code:

```
import ch.aplu.robotsim.*;
import java.util.*;
public class assignment2 {
   assignment2 () {
      Scanner sc = new Scanner (System.in);
      NxtRobot r = new NxtRobot ();
      Motor m1 = new Motor (MotorPort.A);
      Motor m2 = new Motor (MotorPort.B);
      r.addPart (m1);
      r.addPart (m2);
      System.out.println ("Enter 1 for left and 2 for right :");
      int direction = sc.nextInt ();
      switch (direction) {
```

```
      case 1:
        for (int i=0; i<4; i++){
          m1.forward ();
          Tools.delay (1090);
          m2.forward ();

          Tools.delay (1090);
          m1.stop ();
          m2.stop ();
        }
      break;
      case 2:
        for (int i=0; i<4; i++){
          m2.forward ();
          Tools.delay (1090);
          m1.forward ();
          Tools.delay (1090);
          m1.stop ();
          m2.stop ();
        }
      break;
    }
  }
  public static void main (String args[]){
    new assignment2 ();
  }
}
```

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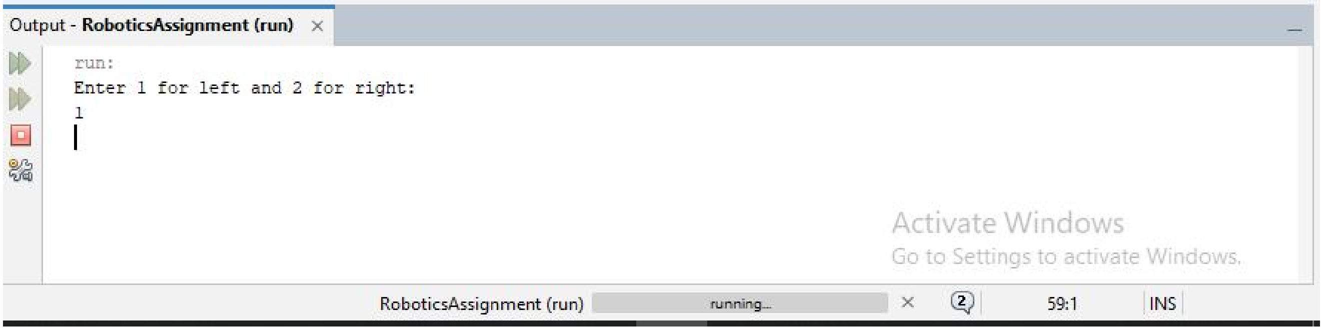
Output:



```
run:
Enter 1 for left and 2 for right:
1
```

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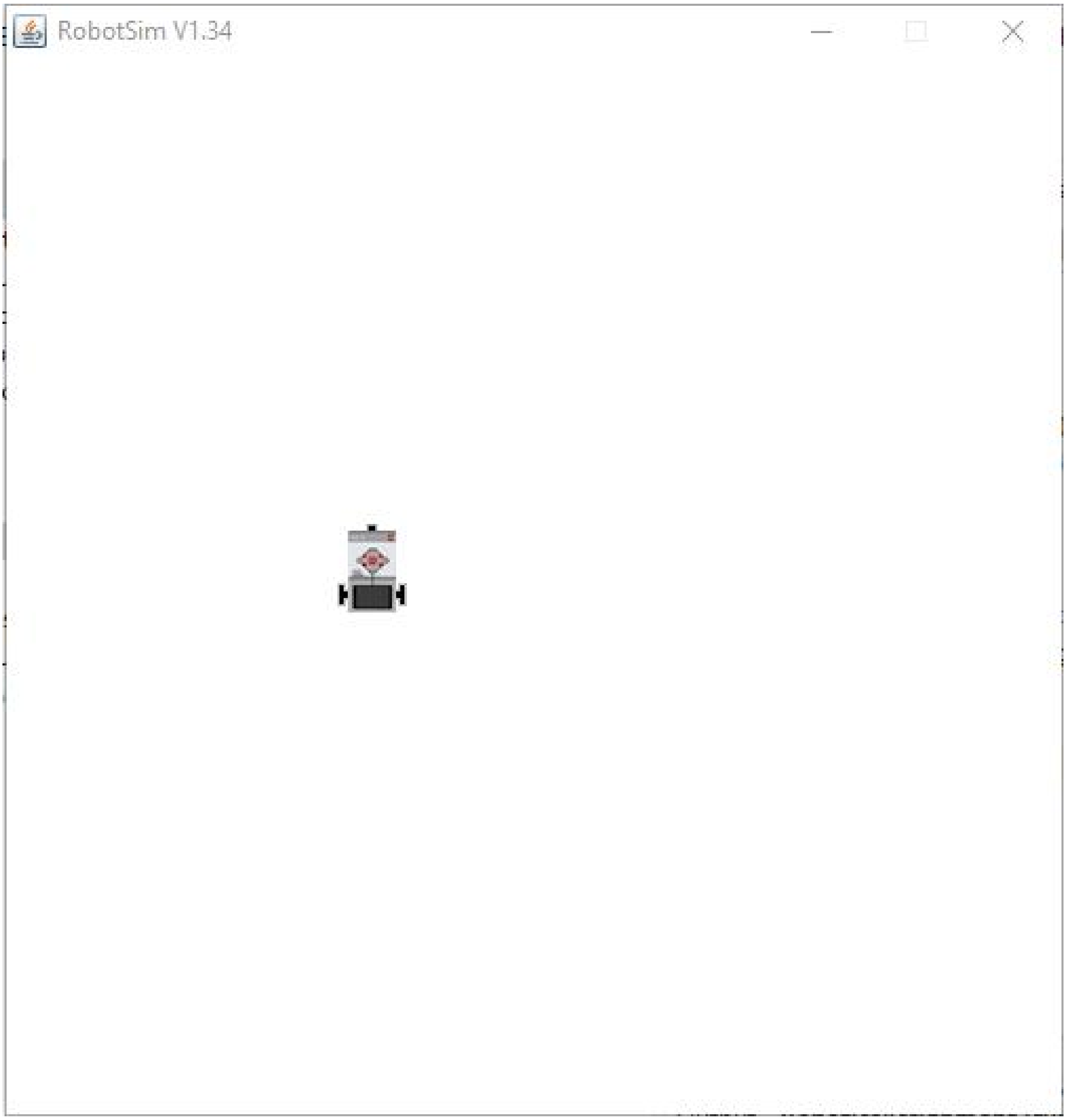

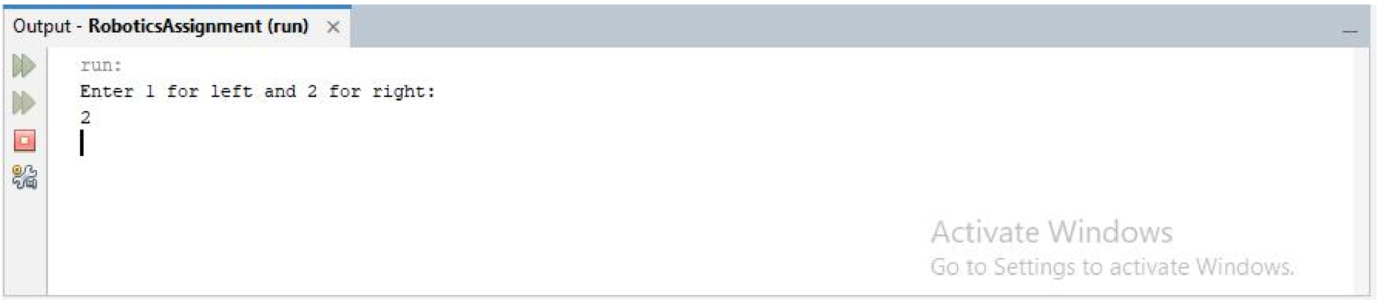
Output - RoboticsAssignment (run)
Activate Windows
Go to Settings to activate Windows.

```
run:
Enter 1 for left and 2 for right:
2
```

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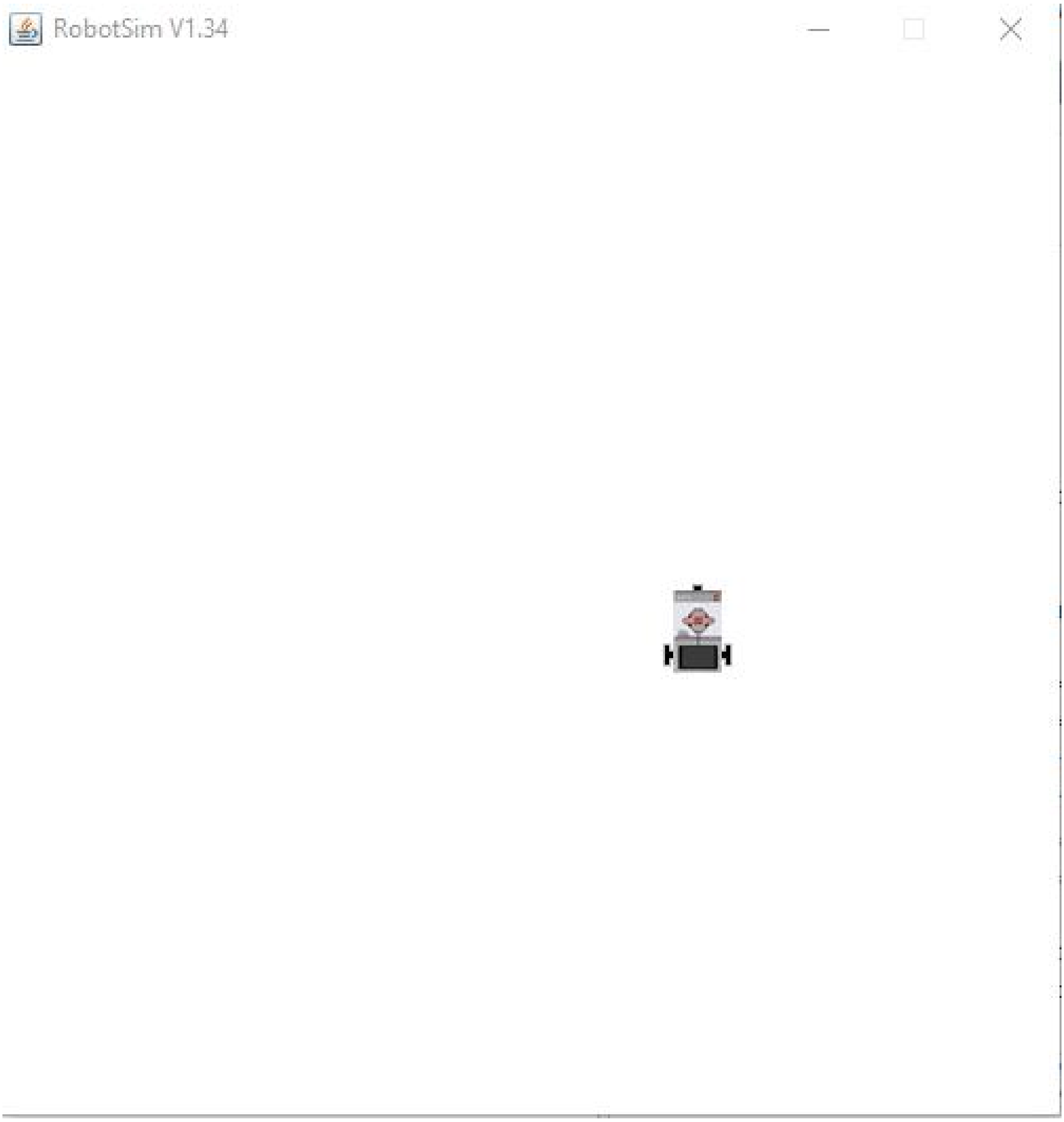

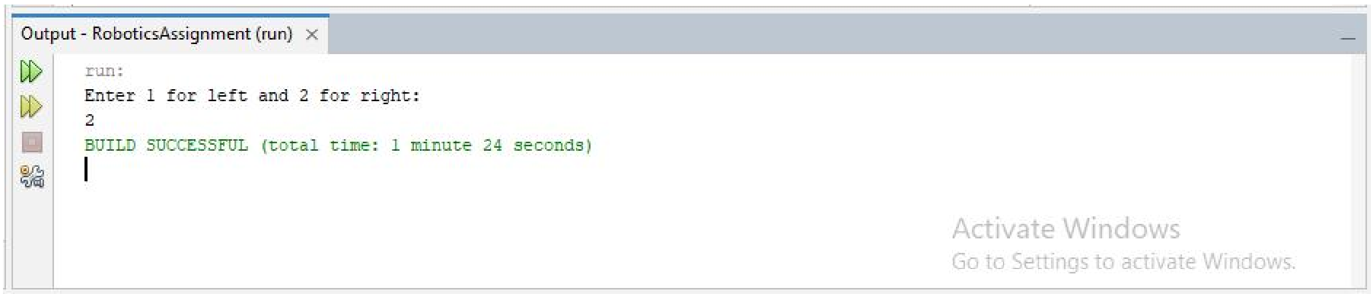
Output - RoboticsAssignment (run)
Activate Windows
Go to Settings to activate Windows.

```
run:
Enter 1 for left and 2 for right:
2
BUILD SUCCESSFUL (total time: 1 minute 24 seconds)
```

Ravina yadav chandraman
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