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Paper IV(Robotics and Artificial Intelligence **)**

INDEX				
NO	**DATE**	**TITLE**	**PAGE NO**	**SIGN**
1		Write a program to create a robot (i) With gear (ii) Without gear and move it forward, left, right		
2		Write a program to create a robot with a two motor and move it forward, left, right		
3		Write a program to do a square using a while loop, doing steps with a for loop, to change directions based on condition, controlling motor speed using switch case,		
4		Write a program to create a robot with light sensors to follow a line		
5		Write a program to create a robot that does a circle using 2 motors		
6		Write a program to create a path following robot		
7		Write a program to resist obstacles		
8		Write a program to implement Torch following robot		

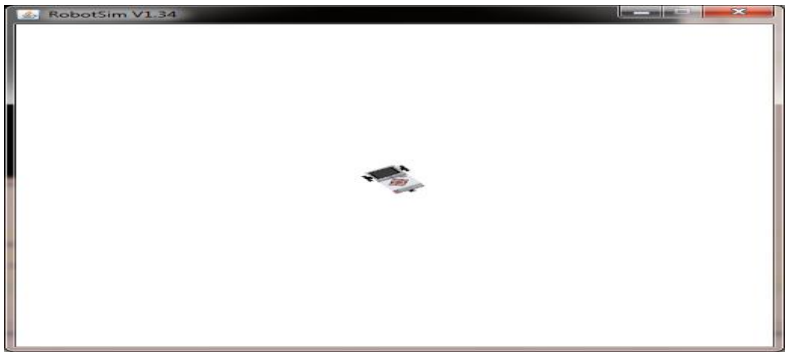
Practical no. 1(a)

```
import ch.aplu.robotsim.*;
class MoveWithGear
{
MoveWithGear()
  {
NxtRobot robot=new NxtRobot();
    Gear gear=new Gear();
robot.addPart(gear);

gear.forward(400);
gear.setSpeed(30);

gear.left(800);
gear.forward(200);
gear.right(480);
robot.exit();
  }
  public static void main(String args[])
  {
MoveWithGear  m=new MoveWithGear();
  }
}
```

Output:



Practical no. 1(b)

```
import ch.aplu.robotsim.*;
class MoveWithoutGears
{
MoveWithoutGears()
  {
TurtleRobot robot=new TurtleRobot();
robot.forward(100);
robot.left(45);
robot.forward(200);
robot.right(90);
robot.backward(100);
robot.exit();
   }
    public static void main(String args[])
    {
MoveWithoutGears  m=new MoveWithoutGears();
    }
}
```

Output :

Practical No. 2

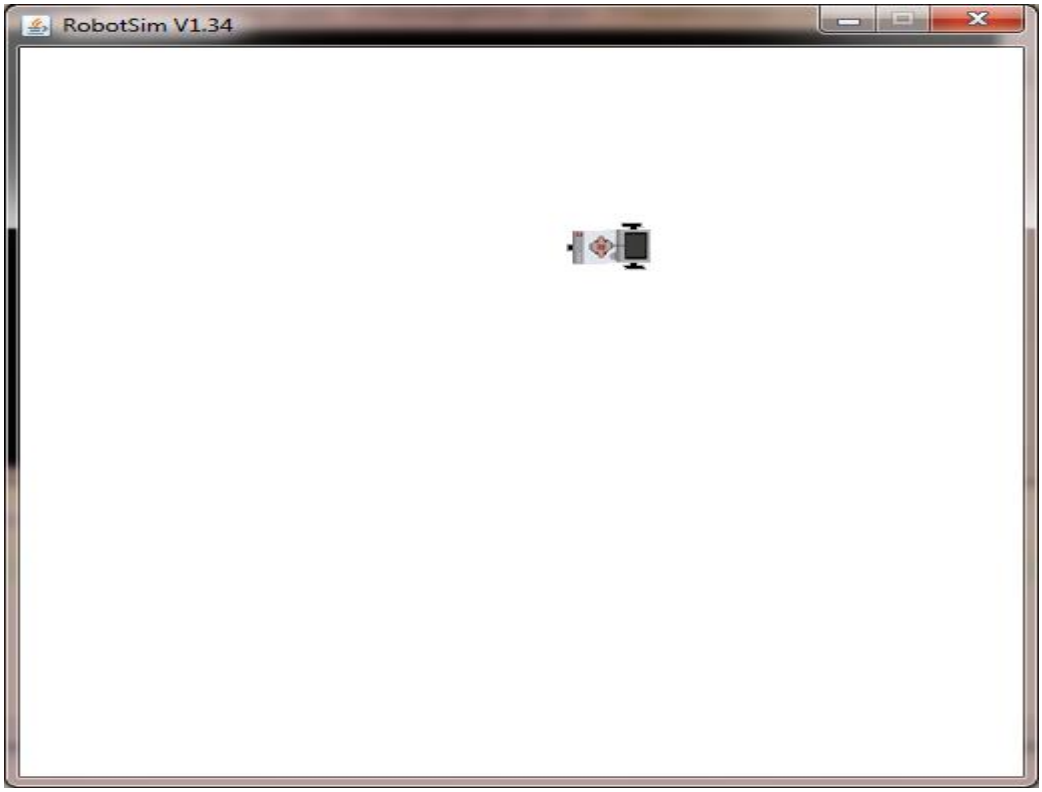
```
import ch.aplu.robotsim.*;
public class MoveWithMotors
{
public  MoveWithMotors()
  {
NxtRobot robot=new  NxtRobot();
    Motor motA=new Motor(MotorPort.A);
    Motor motB=new Motor(MotorPort.B);
robot.addPart(motA);
robot.addPart(motB);
motA.forward();
motB.forward();
Tools.delay(2000);

motA.stop();
Tools.delay(1050);
motA.forward();
Tools.delay(2000);

motB.stop();
Tools.delay(1050);
motB.forward();
Tools.delay(2000);

robot.exit();
  }
  public static void main(String args[])
  {
    new MoveWithMotors();
  }
}
```

Output:



Practical no. 3

```
import ch.aplu.robotsim.*;
class square
{
square()
  {
NxtRobot r = new NxtRobot();
    Gear g = new Gear();
r.addPart(g);
g.setSpeed(100);
g.forward(1000);
g.left(275);
g.forward(1000);
g.left(275);
g.forward(1000);
g.left(275);
g.forward(1000);

Tools.delay(2000);
r.exit();
  }
  public static void main(String[] args)
  {
    new square();
  }
}
```

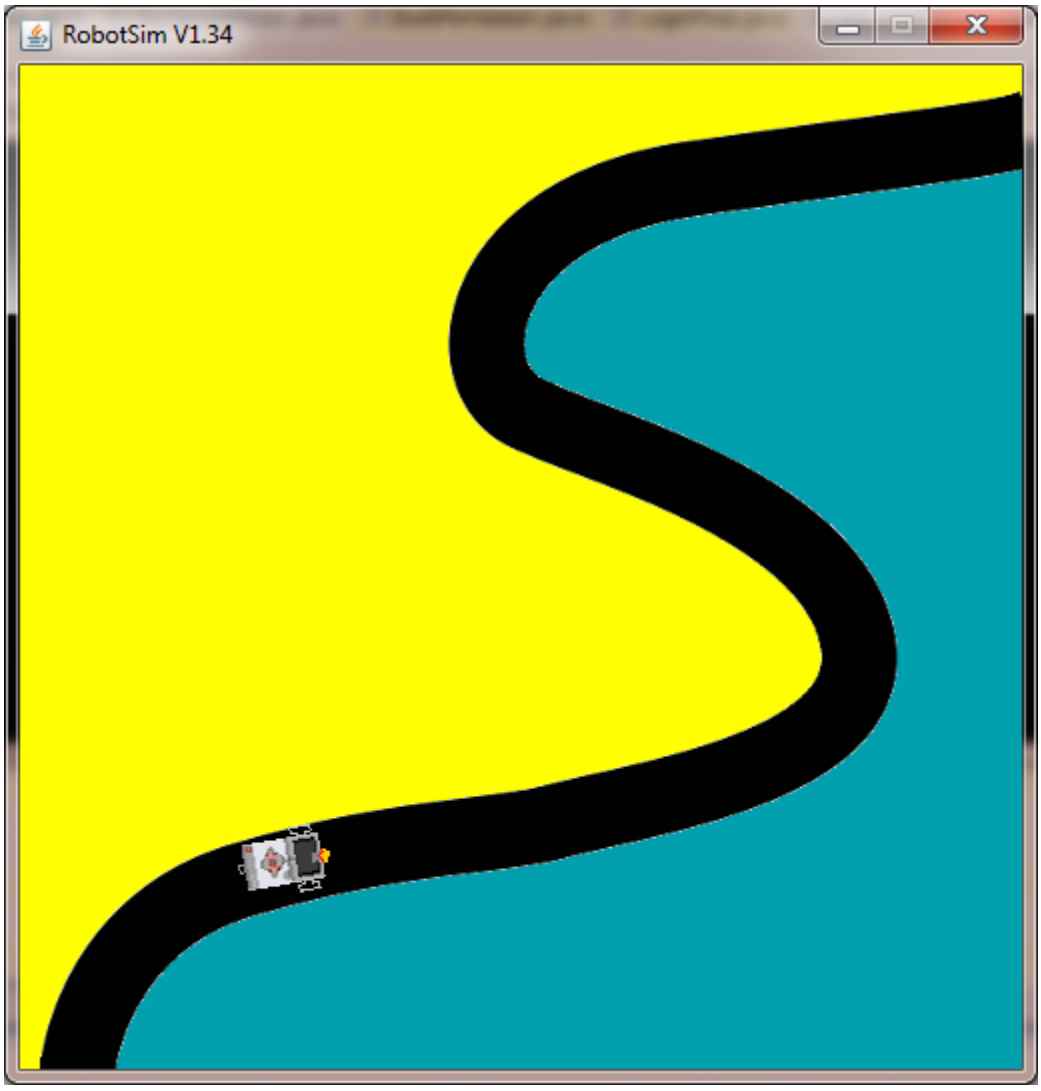
Output:

Practical no. 4

```
import ch.aplu.robotsim.*;
public class LineFollower
{
LineFollower()
  {
LegoRobot robot=new LegoRobot();
   Gear gear=new Gear();
LightSensor ls=new LightSensor(SensorPort.S3);
robot.addPart(gear);
gear.setSpeed(20);
robot.addPart(ls);
   while(true)
   {
     int v=ls.getValue();
if(v < 100)//black
gear.forward();
if(v > 300 && v < 750)  //blue
gear.leftArc(0.05);
     if(v> 800)  //yellow
gear.rightArc(0.05);
   }
  }
  public static void main(String args[])
  {
   new LineFollower();

  }
  static
  {
RobotContext.setStartPosition(50,490);
RobotContext.setStartDirection(-90);
RobotContext.useBackground("sprites/road.gif");
  }
}
```

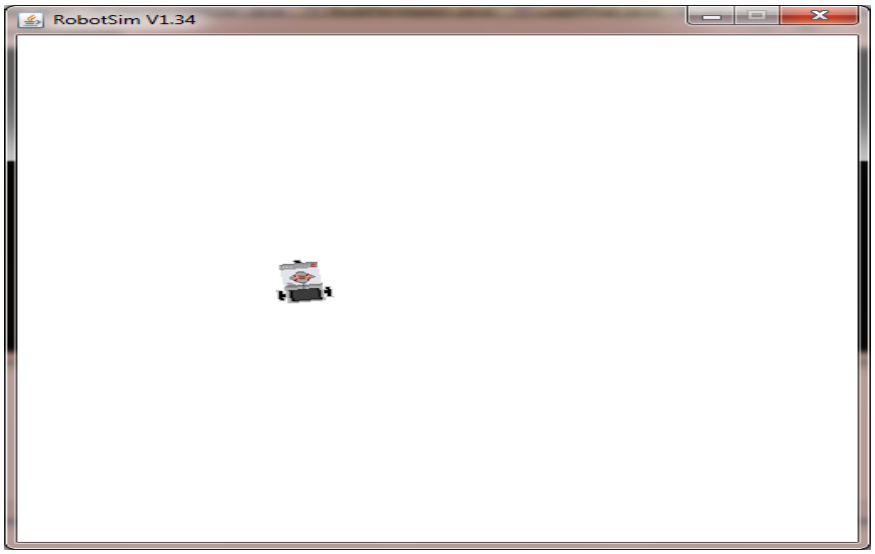
Output:



Practical No. 5(a)

```
import ch.aplu.robotsim.*;
public class Circlem
{
Circlem()
  {
NxtRobot robot=new NxtRobot();
    Gear gear=new Gear();
robot.addPart(gear);
gear.setSpeed(60);
gear.leftArc(0.2,7000);
gear.rightArc(0.2);
Tools.delay(5000);
robot.exit();
  }
  public static void main(String args[])
  {
    new Circlem();
  }
  }
```

Output:



Practical No. 5(b)

```
import ch.aplu.robotsim.*;
class CircularGear
{
CircularGear()
 {
NxtRobot robot=new NxtRobot();
   Gear gear=new Gear();
robot.addPart(gear);
gear.forward(200);
gear.setSpeed(20);
gear.leftArc(0.2,7000);
gear.forward(200);
gear.leftArc(0.2,7000);
gear.forward(200);
gear.leftArc(0.2,7000);
gear.forward(200);
gear.leftArc(0.2,7000);
gear.forward(200);
robot.exit();
}
 public static void main(String args[])
{
CircularGear  m=new  CircularGear();
NxtContext.setStartPosition(250,200);
NxtContext.setStartDirection(90);
  }
}
```

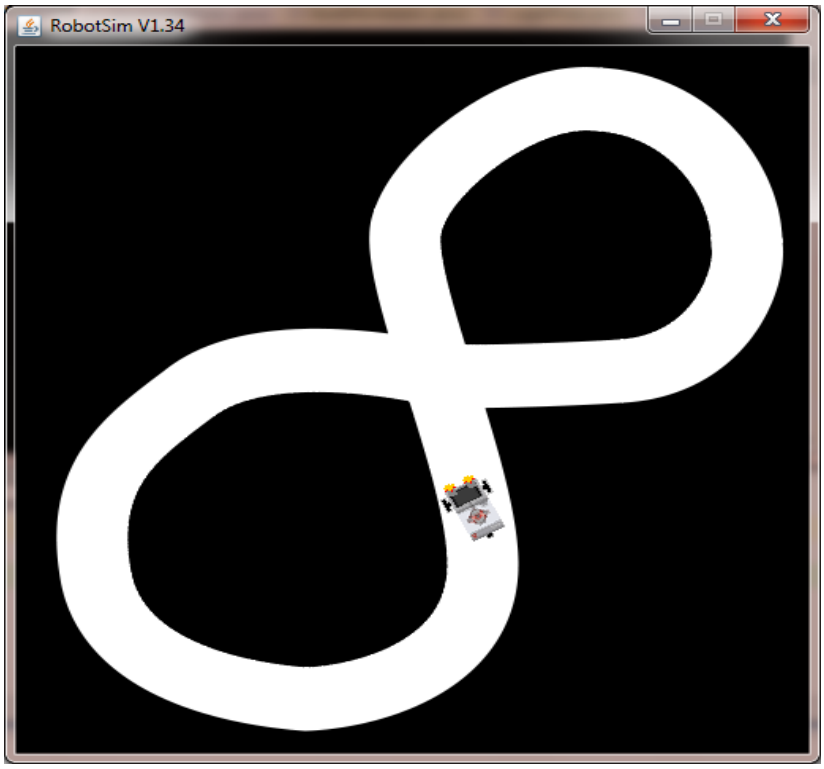
Output:

Practical No. 6

```
import ch.aplu.robotsim.*;
public class PathFinder
{
  public PathFinder()
  {
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();

   while(true)
   {
     int rightValue=ls1.getValue();
     int leftValue=ls2.getValue();
     int d=rightValue - leftValue;
     if(d>100)
gear.rightArc(0.1);
if(d < -100)
gear.leftArc(0.1);
if(d > -100 && d < 100 &&rightValue> 500)
gear.forward();
   }
  }
  public static void main(String args[])
  {
    new PathFinder();
  }
  static
  {
NxtContext.setStartPosition(250,490);
NxtContext.setStartDirection(-90);
NxtContext.useBackground("sprites/path.gif");
  }
  }
```

Output:



Practical no. 7

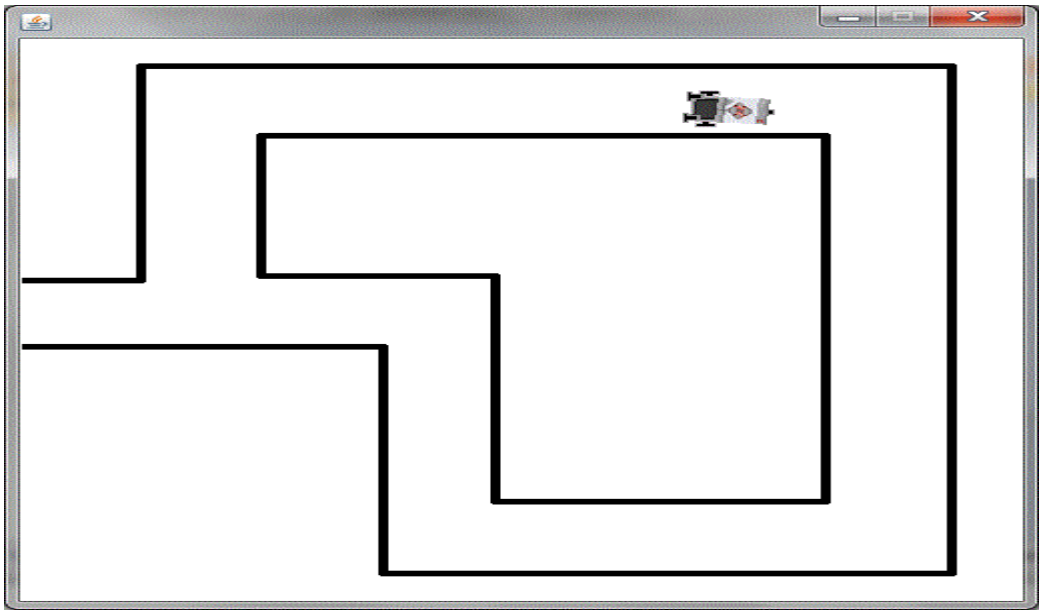
```
import ch.aplu.robotsim.*;
import ch.aplu.util.*;
public class resistobst
{
  public resistobst()
  {
LegoRobot robot = new LegoRobot();
    Gear g = new Gear();

TouchSensor ts1 = new TouchSensor(SensorPort.S1);
TouchSensor ts2 = new TouchSensor(SensorPort.S2);
robot.addPart(g);
robot.addPart(ts1);
robot.addPart(ts2);
g.forward();
while(!QuitPane.quit())
    {
Boolean t1 = ts1.isPressed();
Boolean t2 = ts2.isPressed();
if(t1 && t2)
      {
g.backward(500);
g.left(400);
g.forward();
      }
      else
      {
        if(t1)
        {
g.backward(500);
g.left(400);
g.forward();

        }
        else
        {
          if(t2)
          {
```

```
g.backward(500);
g.right(100);
g.forward();
          }
        }
      }
Tools.delay(20);
    }
robot.exit();
  }
  public static void main(String [] args)
  {
    new resistobst();
  }
  static
  {
RobotContext.setLocation(10,10);
RobotContext.setStartDirection(5);
RobotContext.setStartPosition(100,240);
RobotContext.useObstacle(RobotContext.channel);
  }
}
```

Output:



Practical no. 8

```
package TorchFollower;

import ch.aplu.robotsim.Gear;
import ch.aplu.robotsim.LegoRobot;
import ch.aplu.robotsim.LightSensor;
import ch.aplu.robotsim.RobotContext;
import ch.aplu.robotsim.SensorPort;
import ch.aplu.robotsim.Tools;

/**
 *
 */
public class TorchFollower {
TorchFollower()
   {
LegoRobot robot = new LegoRobot();
LightSensorlsFR = new LightSensor(SensorPort.S1, true);
LightSensorlsFL = new LightSensor(SensorPort.S2, true);
LightSensorlsRR = new LightSensor(SensorPort.S3, true);
LightSensorlsRL = new LightSensor(SensorPort.S4, true);

   Gear gear = new Gear();
robot.addPart(gear);
robot.addPart(lsFR);
robot.addPart(lsFL);
robot.addPart(lsRL);
robot.addPart(lsRR);

gear.setSpeed(25);
gear.forward();
   double s = 0.02;
   while (!robot.isEscapeHit())
   {
     int vFR = lsFR.getValue();
     int vFL = lsFL.getValue();
     int vRR = lsRR.getValue();
     int vRL = lsRL.getValue();
```

```
      double d = 1.0 * (vFL - vFR) / (vFL + vFR);

      if (vRL + vRR>vFL + vFR)  // torch behind robot
gear.left();
      else if (d > -s && d < s)
gear.forward();
      else
      {
        if (d >= s)
gear.leftArc(0.05);
        else
gear.rightArc(0.05);
      }
Tools.delay(100);
    }
robot.exit();
  }

 public static void main(String[] args)
  {
TorchFollower t =new TorchFollower();
  }
  // ------------------ Environment --------------------------
  static
  {
RobotContext.useTorch(1, 150, 250, 100);
  }
}
```

Output