COMP101 LAB4

Requirements

- Write a program which calculates and prints:
    - The horizontal distance travelled by the robot
    - The vertical distance travelled by the robot
    - The distance travelled by the robot
    - An estimate for the battery usage on the robot
- When given:
    - Angle in degrees, between 0 and 90
    - The speed of the robot (real number between 1.0 and 5.0)
    - The Time the robot is Traveling for as a positive or zero real number

Analysis and Design

I will write a program which uses an target class for the robot which will then mean that an object or robot will be created and given the attributes for speed, time and angle. The application class will use this to produce an output which is printed to the console

Each of the things to be calculated had to be broken down:

Distance Travelled = Speed x Time

Horizontal = Distance x sin(angle)

Vertical = Distance x cos(angle)

batteryEstimate = Time x Speed^2 x 3.7

Pseudo code

RobotMovement

setSpeed (INPUT Float S)

      Speed = S

setAngle (INPUT Int A)

      Angle = A

setTime (INPUT Int T)

      Time = T

getDistance()

      RETURN Speed*Time

getHorizontalPos()

      RETURN getDistance()*sin(Angle)

getVerticalPos

      RETURN getDistance()*cos(Angle)

getBatteryEstimate

      RETURN Time * Speed^2 * 3.7

RobotMovementUser

NEW OBJECT TYPE RobotMovement CALLED newRobot

OUTPUT "Input the angle, measured clockwise from the vertical a real number between 0-90:"

setAngle (INPUT INTEGER) BELONGING TO newRobot

OUTPUT "Input the speed, as a real number between 1.0 - 5.0:"

setSpeed (INPUT FLOAT) BELONGING TO newRobot

OUTPUT "Input the time travelled as a positive or zero real number:"
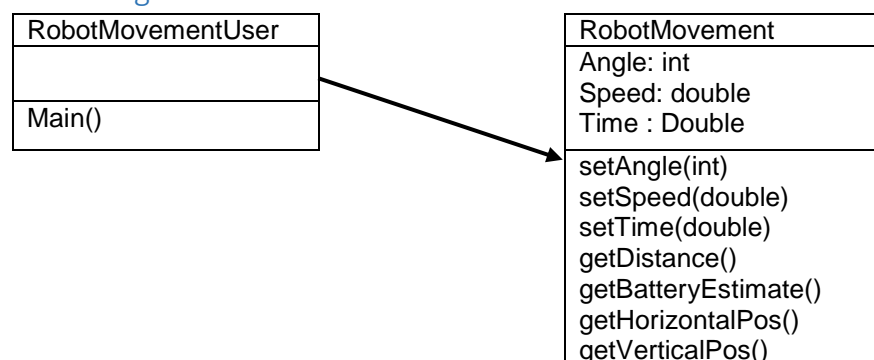
setTime (INPUT FLOAT) BELONGING TO newRobot

OUTPUT "A robot moving with angle" + newRobot.Angle + "at a speed of "+ newRobot.Speed to

1dp+" for"+ newRobot.Time to 1dp +"seconds has:"

OUTPUT "the distance travelled: " + newRobot.getDistance() to 2dp

OUTPUT "horizontal movement: " + newRobot.getHorizontalPos() to 2dp

OUTPUT "vertical movement:" + newRobot.getVerticalPos() to 2dp

OUTPUT "the estimated battery usage (in idle-battery seconds):" + newRobot.getBatteryEstimate() to

2dp

Class Diagram

RobotMovementUser
Main()

RobotMovement
Angle: int Speed: double Time : Double
setAngle(int) setSpeed(double) setTime(double) getDistance() getBatteryEstimate() getHorizontalPos() getVerticalPos()

Testing

Inputs			Outputs				As Expected
Angle	Speed	Time	Distance	Horizontal	Vertical	Battery Estimate	
45	1.0	0	0	0	0	0	Yes
20	2.5	100	250.0	85.51	234.92	2313.50	Yes
0	5.0	10	50.0	0.00	50.00	925.00	Yes

C:\Users\BenHa\OneDrive\Documents\JAVA\Lab 4>java RobotMovementUser

Input the angle, measured clockwise from the vertical a real number between 0-90:
20

Input the speed, as a real number between 1.0 - 5.0: 2.5

Input the time travelled as a positive or zero real number: 100

A robot moving with angle 20 at a speed of 2.5 for 100.0 seconds has:

the distance travelled: 250.0

horizontal movement: 85.51

vertical movement: 234.92

the estimated battery usage (in idle-battery seconds): 2312.50

C:\Users\BenHa\OneDrive\Documents\JAVA\Lab 4>java RobotMovementUser

Input the angle, measured clockwise from the vertical a real number between 0-90:
0

Input the speed, as a real number between 1.0 - 5.0: 5.0

Input the time travelled as a positive or zero real number: 10

A robot moving with angle 0 at a speed of 5.0 for 10.0 seconds has:

the distance travelled: 50.0

horizontal movement: 0.00

vertical movement: 50.00

the estimated battery usage (in idle-battery seconds): 925.00