CMPSC 132:
Programming and Computation II: Data Structures
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Project 1
Turtles Graphics Applications

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Introduction

In this report, I will discuss the following project, which utilizes the turtle graphics application to draw a car. The report will go over the design, and implementations and also also show the results of the project.

Design and Implementation

In this project, I wanted to design a regular sedan/SUV that was very simple to draw. As was the main topic when we first discussed of the project. We wanted something that was basic and anyone could do and replicate. First I looked up designs like the Honda Civic and I tried to draw it at a side view so it gets a better idea of what I'm planning to code. I knew I wanted the car to have an antenna, headlights, wheels, and lastly windows. When implementing these designs what helped me was splitting the classes with each of the key design features having its own class. This made it easy to change the code because I knew exactly what to change and where to change it.

project.py

```
5   class Body:#body class  1 usage
9       def draw(self, x, y, pen):#main drawing code  1 usage
36          pen.end_fill()
37
38  class Wheel:#wheels of the car  2 usages
39      def __init__(self, color):
40          self.color = color
41
42      def draw(self, x, y, pen):#used to make a circular shape  2 usages
43          pen.penup()
44          pen.goto(x, y)
45          pen.pendown()
46          pen.fillcolor(self.color)
47          pen.begin_fill()
48          pen.circle(20)
49          pen.end_fill()
50
51  class Window:#creates the windows of the car  2 usages
52      def __init__(self, color):
53          self.color = color
54
55      def draw(self, x, y, pen):#makes the windows rectangular  2 usages
56          pen.penup()
57          pen.goto(x, y)
58          pen.pendown()
59          pen.fillcolor(self.color)
60          pen.begin_fill()
61          for _ in range(2):
62              pen.forward(40)
63              pen.left(90)
64              pen.forward(30)
65              pen.left(90)
66          pen.end_fill()
67
68  class Antenna:#class for the antenna  1 usage
69      def __init__(self, color):
70          self.color = color
71
72      def draw(self, x, y, pen):  1 usage
```

Essentially the car was a rectangle with a trapezoid on top of it. Then the windows and wheels are drawn in along with the headlight and antenna. Also, choosing the colors

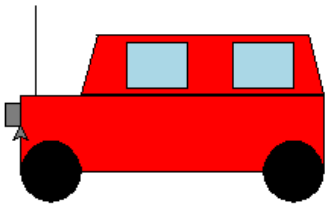
was important to me as well. I chose red for the car because it simply looked the best. Then I had to find the colors for the windows which was hard as well. The same thing was repeated for the headlight and wheels. Lastly, I implemented the classes by using

```
#executes and draws the whole car
def draw_vehicle(pen, body_color):  1 usage
    Body(body_color).draw(-100,  y: 0, pen)
    Wheel("black").draw(-80, -20, pen)
    Wheel("black").draw( x: 80, -20, pen)
    Window("lightblue").draw(-30,  y: 55, pen)
    Window("lightblue").draw( x: 40,  y: 55, pen)
    Antenna("black").draw(-90,  y: 70, pen)
    Headlights("gray").draw(-100,  y: 30, pen)

# Main execution function
def main():  1 usage
    screen = turtle.Screen()
    screen.bgcolor("white")
    pen = turtle.Turtle()
    pen.speed(3)
    draw_vehicle(pen,  body_color: "red")
    screen.mainloop()
```

one draw_vehicle function that finally executes the code and draws the whole car.

Results/ Sample Output



The result was something that I had imagined when we first started the project. A very simple car that anyone was able to draw. It actually took a long time to finally figure out how to fill the car and everything else. It really pushed us to think outside the box on how to implement what was in our head and finally through many trials and errors we were able to create this amazing simplistic vehicle. Although it may not look like much it took a lot of time and effort to finally come up with this design. A lot of revamps and changing of the code were done to finally get this output.

Conclusion

In conclusion, we were able to utilize the turtle graphics to draw a car that had most of the features of a real car. This project pushed and opened my eyes. It shows that virtually anything is able to be coded and you can also do many great and amazing things with it. It also brought an appreciation for coding as this project really makes me think about what I have taken for granted so far when scrolling the internet or watching a video. This also taught me a lot about coding in general as well and to keep and open mind.