

Hour of Code: Python – Turtle and Game Development

Cannon Daniel, Cameron Strahley, Jared Dixon, Keaton Frick, Samantha Sweet and the Choose Ohio First and Schmidlapp Scholars

About Us

We are recipients of the Choose Ohio First and Schmidlapp grants. Choose Ohio First is a scholarship designed to strengthen Ohio's competitiveness in Science, Technology, Engineering, Math, and Medicine. As computer science majors in these two programs, one of our responsibilities is to put on an Hour of Code event for the Marathon IT Explorers. The Explorers are a group of middle school and high school students interested in computer science. The Hour of Code event is designed to give them experience with aspects of computer science.



Introduction

For this year's Hour of Code events, we will be virtually giving a two-part Python introduction for the Marathon IT Explorers to give them experience with Python. This past semester, we have been designing two Python activities for the students to complete that involves the turtle draw functions and simple game development. The goal is to allow students to write and manipulate code to create an interactive drawing and game. These same coding sections can also be used in real world applications. Upon completion of the project, students are encouraged to continue expanding their creation using their own creativity.

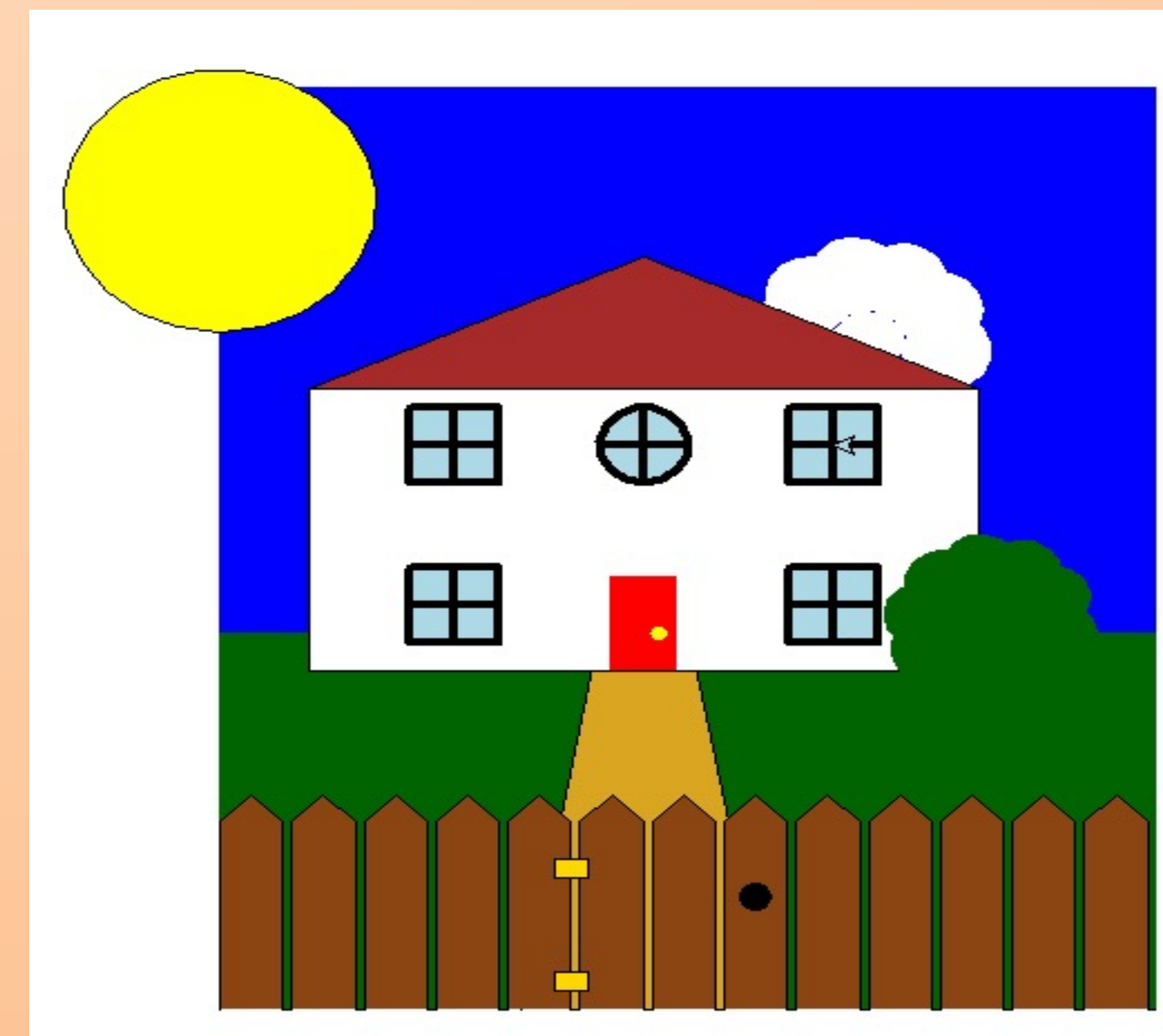
Python

Python is a programming language first released in 1991. It is known for its readability, making efficient use of whitespace (the spacing before lines of code which helps separate different code blocks). It is consistently one of the most popular languages according to the TIOBE Programming Community Index. Python is used by companies such as Wikipedia, Google, Yahoo!, NASA, Amazon, Spotify, etc. as well as in scientific computing.

```
95 # Main gameplay
96 while True:
97     wn.update()
98     if head.xcor() > 250 or head.xcor() < -250 or head.ycor() > 250 or head.ycor() < -250:
99         time.sleep(1)
100         head.goto(0, 0)
101         head.direction = "Stop"
102         colors = random.choice(["red", "blue", "green"])
103         shapes = random.choice(["square", "circle"])
104         for segment in segments:
105             segment.goto(1000, 1000)
106         segments.clear()
107         score = 0
108         delay = 0.1
109         pen.clear()
110         pen.write("Score : {} High Score : {}".format(
111             score, high_score), align="center", font=("candara", 24, "bold"))
112         if head.distance(food) < 20:
113             x = random.randint(-270, 270)
114             y = random.randint(-270, 270)
115             food.goto(x, y)
116             # Adding segment
117             new_segment = turtle.Turtle()
118             new_segment.speed(0)
119             new_segment.shape("circle")
120             new_segment.color("red") # tail colour
121             new_segment.penup()
122             segments.append(new_segment)
123             delay -= 0.001
124             score += 10
125             if score > high_score:
126                 high_score = score
127             pen.clear()
128             pen.write("Score : {} High Score : {}".format(
129                 score, high_score), align="center", font=("candara", 24, "bold"))
130             # Checking for head collisions with body segments
131             for index in range(len(segments)-1, 0, -1):
132                 x = segments[index].xcor()
133                 y = segments[index-1].ycor()
134                 segments[index].goto(x, y)
135             if len(segments) > 0:
136                 x = head.xcor()
137                 y = head.ycor()
138                 segments[0].goto(x, y)
139             move()
140         move()
```

Turtle

Turtle graphics is a popular way for introducing programming to kids. It was part of the original Logo programming language developed by Wally Feurzeig, Seymour Papert and Cynthia Solomon in 1967. By combining simple commands in Python, any programmer is able to create intricate shapes and pictures. We used these turtle functions to give the Explorers a pre-written program that they were able to read over and visually see how the turtle functions work. We then gave the Explorers a chance to write and create their own shapes and images with the turtle.



Game Development

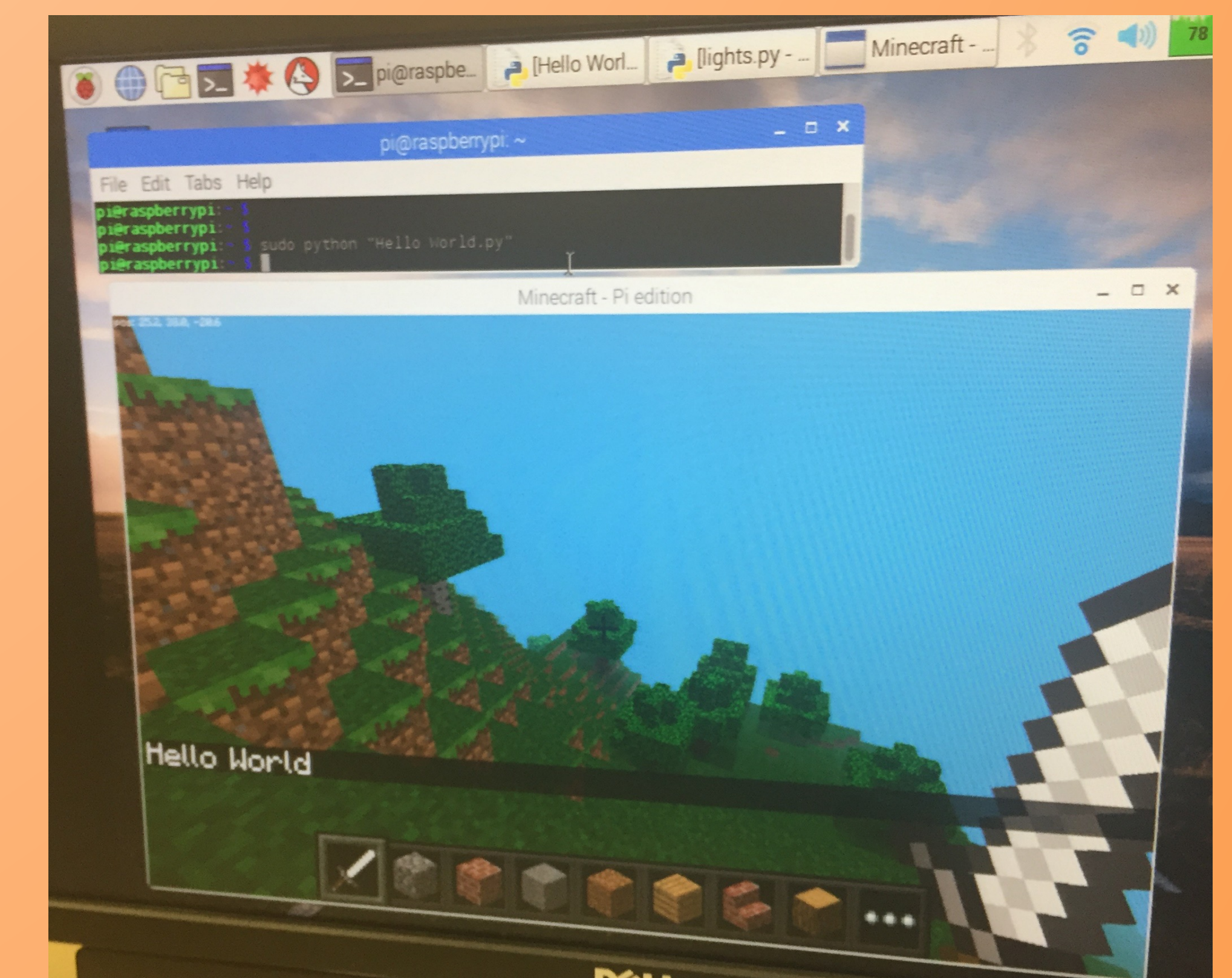
Using aspects of the turtle functions that students were introduced to in the first event, we showed how you can implement these with other functions to create and design simple games. The snake game is a popular pre-written program we provided to the Explorers. They were able to modify and change aspects of the game incorporating what they learned from the first session.



Previous Work

The Computer Science Choose Ohio First Group has worked with the Marathon IT Explorers for the past seven years. Some of the more recent projects have involved:

- Creating games in Minecraft with Python with Raspberry Pi Integrations
- Building an Android smart phone app
- Google Cardboard and virtual reality
- 3D Modeling and Printing



Thanks To...

- University of Findlay Computer Science Department
- Dr. Mary Jo Geise, Primary Advisor
- COF and Schmidlapp Scholar Supporters and Contributors
- Dr. Jeff Frye, COF Coordinator
- Marathon IT Explorers