**Lesson Plan for Final Project using Robots**

**Project Time: 2 weeks**

**Objectives:**

Define Functions in Python
Use Functions to create movement routine

Use Functions to take photos
Use Iteration to repeat tasks or commands
Identify Syntax rules in Python:
    Colons (:)
    Tabs

**Standards:**
 **BCS-BP-5:** Students will design algorithms and programming solutions for a variety of computational problems.
**BCS-BP-6:** Students will design solutions for simple programs using basic programming techniques and constructs.
**BCS-BP-7:** Students will use and develop algorithms to solve simple problems.

**Prior Knowledge:**

Students will know how to start IDLE environment and initialize communication with the Scribbler Robot.

**Equipment:**

1 Computer with IDLE installed for every 2 students
1 Scribbler Robot with Fluke Board for every 2 students
Students work in Pairs.

**Vocabulary of Code for Activity:**

|  |  |
| --- | --- |
| forward(1,1) | forward Power Level 1 for 1 second |
| backward(1,1) | backwards Power Level 1 for 1 second |
| turnRight(1,1) | Turn right Power Level 1 for 1 second |
| turnLeft(1,1) | Turn left Power Level 1 for 1 second |
|  |  |
| motors(1,1) | Motors on forward at Full Power |
| motors(-1,-1) | Motors on backwards at Full Power |
| stop() | Stops the motors |
|  |  |
| for i in range(4):    Do something | repeat something 4 times |
| takePicture()  | color picture |
|  show(p)  | show the picture |
| takePicture("gray") | Grayscale picture |
|  savePicture("name.jpg")  | write to a file |
| pics.append(pic) | Adds the picture(pic) to a list called pics |

 **Project Requirements:**

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| **Required:**1. Create scenes for scrapbook photos2. Physical diagram and/or storyboard  |

**Process:**1.  Group students into pairs and start IDLE and connect Scribblers
2.  As a group: Review movement commands using Python Shell
    a. forward, backward, turnRight, turnLeft
    b. motors on and off with stop

 c. take pictures

 d. create a list of pictures and create an animated gif from the list.

3. Storyboard the code to follow flashlight. Set up drive time and then take photos when IR sensors are blocked.

4.  Start a new IDLE file and save it as "ScrapbookTour.py" into the student's file area.
5.  Guide students in coding their movements.
6.  Save file and run it on the Myro Robot.

7. Students must upload file as an animated gif and present before the class.

|  |  |  |  |
| --- | --- | --- | --- |
| **Beginning** | **Developing** | **Accomplished** | **Exemplary** |
| 1. Code Format |  No use of CommentsImproper syntax. |  Some use of Comments  |  Detailed comments. |
| 2. Code Content | Robot does not follow flashlightRobot takes less than 3 different photos at each landmark or random photosFunctions are not defined and/or used | Robot follows flashlight with minimal errorsRobot takes at least 3 different photos per landmark with minimal movement between photosUses 1 function. | Robot follows flashlight without error Robot takes at least 6 photos per landmark with noticeable movement between photosUses at least 3 functions. |
| 3. Functionality and Creativity(Wow! Factor), | Code does not run.More than 4 mistakes.Little variety in moves. | Code runs with less than 3 mistakes. | Code runs without mistakes. Use looping to extend movements.  |
| 4. Presentation | No presentation or code failed Not prepared | Adequate presentationMinimal enthusiasmand preparedness | Stellar presentationEnthusiastic and prepared |