

## Spider – Lesson Plan #3

**\*Instructors MUST fill out the attendance sheet.**

### 1. Assembly of motors/servos (30 mins)

- If the group is already at an advanced level, you may hand out the tools and let them assemble the model on their own without instructor's aid.
- Otherwise, explain and present the servo's placement on the body. Then explain the reason for the location of the hinge (the hinge is parallel is the black and red wire that comes out of the motor. Thus, you can explain the motor's directions with the electrical wire that feeds the motor).
- Demonstrate how to insert the motors, from up to down, first the wire and only then the rest of the body.
- There is a circular hole in the rectangle in which the motor is inserted (see photo below).
- If the motor doesn't go in smoothly, file the wooden frame (the fit should be tight, but you don't want it to cause cracks in the wood. If there's no other choice THE INSTRUCTOR ONLY may use a utility knife to file the wood.
- Insert the engine, connect it with standard screws and strengthen the connection with a regular locknut. Students may work in pairs to help each other. The screws should be opposite to each other. There should be one screw on each side of the motor (not one next to the other or one across from the other)

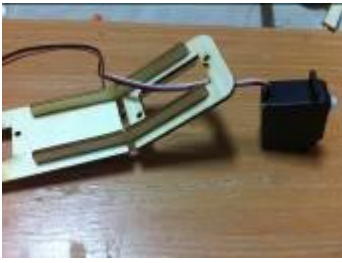
### 2. Go over programming guide (30 mins)

- Teach the following programming key terms:
- **Frame** – in our case, we can also call a frame an "action." Each movement or action we program will be saved as a "frame."
- **Channel settings** – Each motor will have different channel settings s.a. speed and movement limits. This way, we will be able to use the engine to program the robot.
- **Sequence** – Several saved frames that will make the robot operate in a certain order of actions.
- **Script** – This is the stage where our sequence takes the form of a programming language. Our Controller will know how to read this language and send orders to the servo.
- Go through all the interface windows with the students and make sure they can recognize and understand these terms when using the programs.

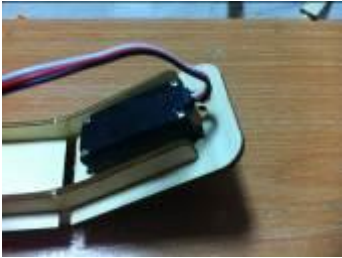
### 3. Collect robots (5 mins)

- Check students' gluing, screws and connections in each robot.
- Make sure each student's name is on their robot and store in a safe place.

Time in minutes	Name of activity	Additional comments
30	Assemble servos	Explain assembly process and directions
30	Teach programming terms	Familiarize students with terms and programming interface
5	Collect robots	
Total: 60 minutes		



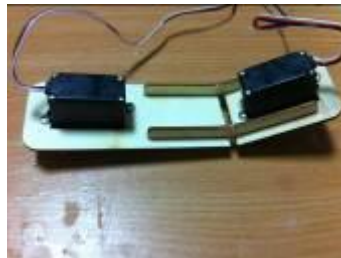
Thread the servo into its place. First insert the wire, and only then insert the entire servo. Notice the circular hole. It hints the wire's direction (servo's direction).



After confirming the directions are correct, insert the entire servo. If the servo does not go in smoothly, file the wood a bit.



Each servo is connected with 2 servo screws ("10 screw"= 1 cm) and 2 regular locknuts. You may let students assemble on their own by looking at an assembled model. Tighten the screws well using locknuts in order to prevent unnecessary movement of the servo.



Notice the servos' directions. This photo shows both sides. Make sure all students' models look exactly like the ones in the photos!



Put the legs in their place when the servo's cross is already on the servo.

**You may connect the legs using a small bug screw as shown in the photo below only after resetting the engine (get it to its default point)!**

