


<b>CodeAIR Mission 10 Assignment</b>	Name: <b>Answer Key</b>	
<b>Pre-Mission Preparation</b>		
What do you remember about RANGER data?	<p>Answers will vary, but can include:</p> <ul style="list-style-type: none"> <li>• The drone has three RANGER sensors.</li> <li>• The sensors are positioned forward, up and down.</li> <li>• The sensors return distance in millimeters</li> <li>• Use the function <code>get_data(RANGERS)</code> to access the range data.</li> <li>• You can unpack the ranger data with: <code>fwd, up, down = get_data(RANGERS)</code></li> </ul>	
What do you remember about state handler functions?	<p>Answers will vary, but can include:</p> <ul style="list-style-type: none"> <li>• Each state handler is a function that acts as a mini-director for the scheduler.</li> <li>• It is executed when it is its turn, and then reports back to the main director.</li> <li>• It makes the flight plan into a smooth series of easy-to-manage scenes.</li> <li>• Each state has a state handler function that is added using <code>sm.add_state()</code></li> </ul>	
<b>Mission 10 Objectives – Survey</b>		
Objective #1 Run the program a few times, and vary the wall distance and altitude. What are the values that work best for your box? Did you make any other changes?	<p>WALL_DISTANCE = 0.25 ALTITUDE = 0.075</p>	
Objective #2 Describe the algorithm for the “side_end” state handler function.	<p>Possible answer: After ascending and flying forward to detect the box:</p> <ul style="list-style-type: none"> <li>• fly to the right.</li> <li>• continue to read data from the sensors</li> <li>• When the front ranger detects the distance to an object is larger than the distance to the box, it has detected a corner</li> <li>• transition to land</li> </ul>	
Objective #3 Which sensor will measure the box?  What difficulty does this create for the code?  How will you manage this difficulty?	<p>The forward ranger</p> <hr/> <p>The drone will always need to face the box.</p> <hr/> <p>It will need to be rotated 90 degrees after each corner. The drone cannot be too close to the box to turn, so the drone will fly a bit further.</p>	
Objective #4 What is the purpose of the “side_start” state handler function?	<p>It needs to detect the new starting corner of the box after rotating.</p>	

<p>Objective #5 What data is used to measure the length of a side?</p> <p>How does the program know that all four sides have been measured?</p>	<p>Data from the state estimator. It returns the x and y position of the drone (the coordinates).</p> <p>The state estimator data is recorded from corner to corner, and then the distance is calculated. The distance is added to the list. When the list has four measurements, the program knows all four sides have been measured.</p>
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Objective #5  
Fly the drone around two different objects. Record the side lengths from the drone's flight recorder and the actual measurements of the object.

	Drone measurements				Actual measurements			
Object	Side1	Side2	Side3	Side4	Side1	Side2	Side3	Side4
Object #1								
Object #2								

**Post-Mission Reflection**

<p>List some skills and concepts you used in this mission that were introduced in earlier missions.</p>	<p>Answers will vary. Possibilities are:</p> <ul style="list-style-type: none"> <li>● Using ranger data</li> <li>● Using state handler functions</li> <li>● Using the task scheduler to check the sensor readings</li> <li>● Using the pixels as indicators on what function is currently being executed</li> <li>● Recording progress on a report and printing it</li> <li>● Using constants</li> <li>● Importing modules</li> <li>● Going through a sequence of states</li> </ul>
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<p>List new skills and concepts used in this mission.</p>	<p>Answers will vary, but should be a short list. Possibilities:</p> <ul style="list-style-type: none"> <li>● Using data from the state estimator</li> <li>● Using a list for measurements</li> <li>● Defining and calling a function that uses the Pythagorean theorem.</li> <li>● Global variables that are updated in a local setting, such as a function</li> </ul>
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