# Worksheet 5

An interface is a collection of related methods. In the example file, an interface called EulerAngles defines methods of calculatePitch() and calculateRoll(). Since Roll and Pitch angles are both Euler angles, it follows that methods for their calculations would be part of an interface called EulerAngles.

In order for a class to use an interface, the keyword “implements” is used in the class definition. In the example file, the RobotOrientation class implements the interface EulerAngles. The Roll and Pitch Euler angles provide information on how the LocoXtreme robot, or an object in general, is oriented.

1. **Why is an interface a more applicable choice in this instance than an abstract class?**

In the example file, the RobotOrientation class simply read in acceleration data from LocoXtreme and implemented the Euler angle calculations.

1. **Consider the RobotOrientation class and other applications of the EulerAngles interface. What change could be made that would make the interface even more applicable to other LocoXtreme class possibilities?**

Suppose you had two separate classes that implemented the EulerAngles interface.

1. **If you had two separate applications that needed to use Euler angles, however, they each used different units for angles in all their calculations. How would having the methods defined as an interface in the example code be useful?**
2. **How would the previous lesson, which used an abstract class with an abstract method animate() change if it were to be made into an interface?**

The actual calculations of roll and pitch angles use the Math package’s inverse tangent, or arctangent, function atan2. Different from atan, atan2 returns an angle value over the range of negative pi radians to positive pi radians.

Both the roll and pitch angle calculations depend on the accelerometer data in all three axes, x, y, and z.

1. **Experiment with the program to determine how the roll and pitch change as you tilt LocoXtreme different ways. List the sign of the angle and whether roll or pitch is the primary changing angle when you tilt LocoXtreme under the following conditions: to the left, to the right, backwards, forwards.**