ARCHITENTERPRISES

Team 20

Lab number 5

Design

March 22nd, 2013

Version 1.0

By signing below, each group member approves of this document and contributed fairly to its completion.

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On our honors, as students of the University of Virginia, we have neither given nor received unauthorized aid on this assignment.

Raymond Tang, Andrew McMillion, Archit Rupakhetee, Tyler Lenig

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Design Overview

BaseStation

The BaseStation class will be the main driver for the entire software. All the other classes will be ran through this class. This class will contain the main logic and decision making as well as the logic for controlling the robot's motors. Therefore, this class will interact with all the other classes. The BaseStation class will receive information from hardware buttons, display the information onto the GUI via an overloaded handleEvent() in the GUI class. It will also send that information to the robot through the Bluetooth class, which will be explained in more detail later. The BaseStation class will also receive information from the robot's on-board sensors, via classes that implement SensorInterface, and relay it to the GUI. This allows the BaseStation to hide how our entire system interacts and relays information to the GUI which enables greater modularity, lower coupling and increase cohesion.

GUI

The GUI class is driven by the base station class. It only interacts with the BaseStation class. It will receive information to display from the base station, as well as present information to the BaseStation class if given any information in the GUI from the user. The GUI class will include functionality to accept input from the user via text fields, as well as display information given by the sensors and errors an embedded textbox.

Bluetooth

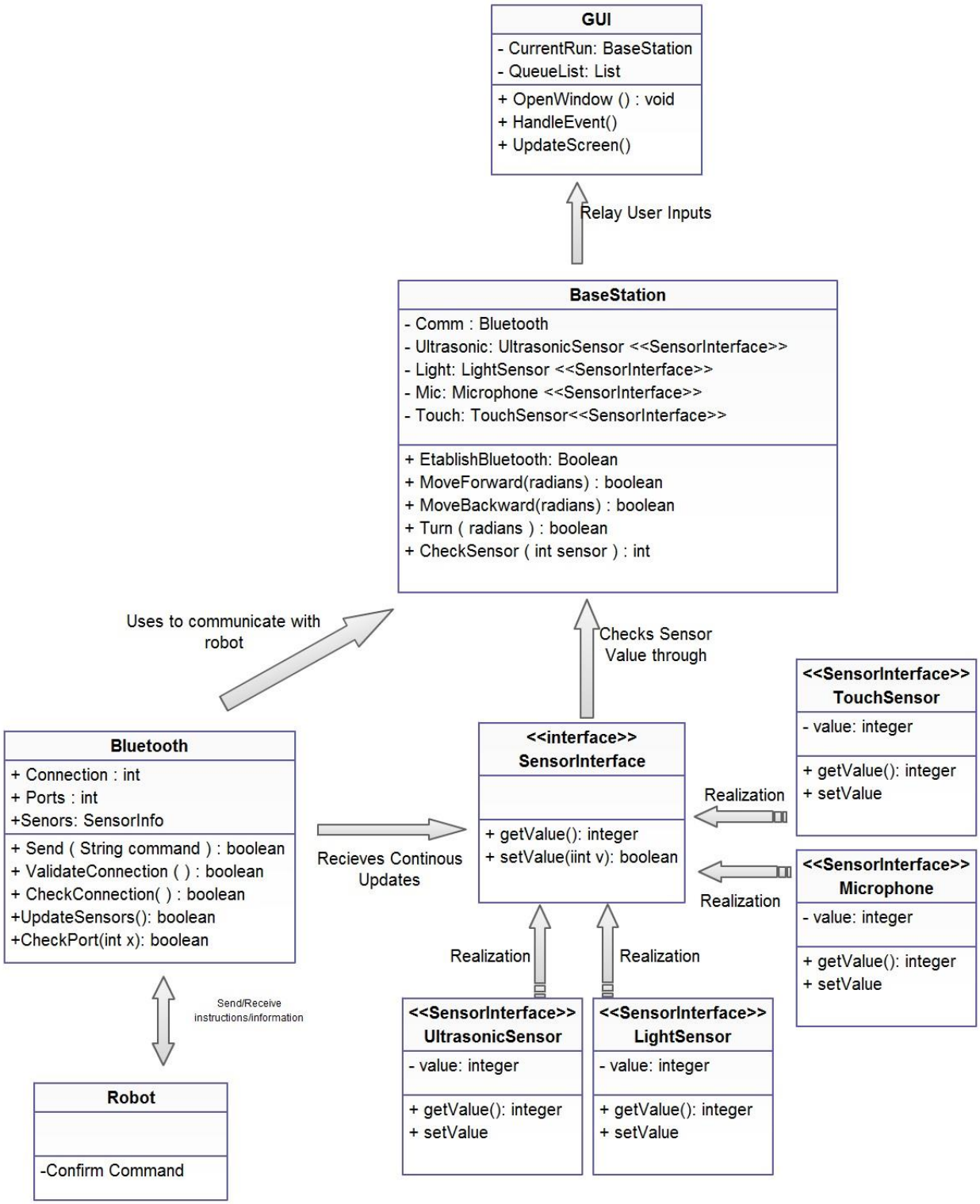
The Bluetooth class will be responsible for encoding and decoding the 11 character string as specified by our communications protocol. It will send and receive information from the robot via the built-in Lejos Bluetooth connection. The Bluetooth class will also be responsible for sending information to the correct places based on the type of the decoded information. It will send the information to the BaseStation class if the information is an error message or an acknowledgement that a command was received. It will also send information to the correct sensor if the command in question holds telemetry data. The Bluetooth class will therefore interact with both the BaseStation class and any class that implements SensorInterface.

SensorInterface

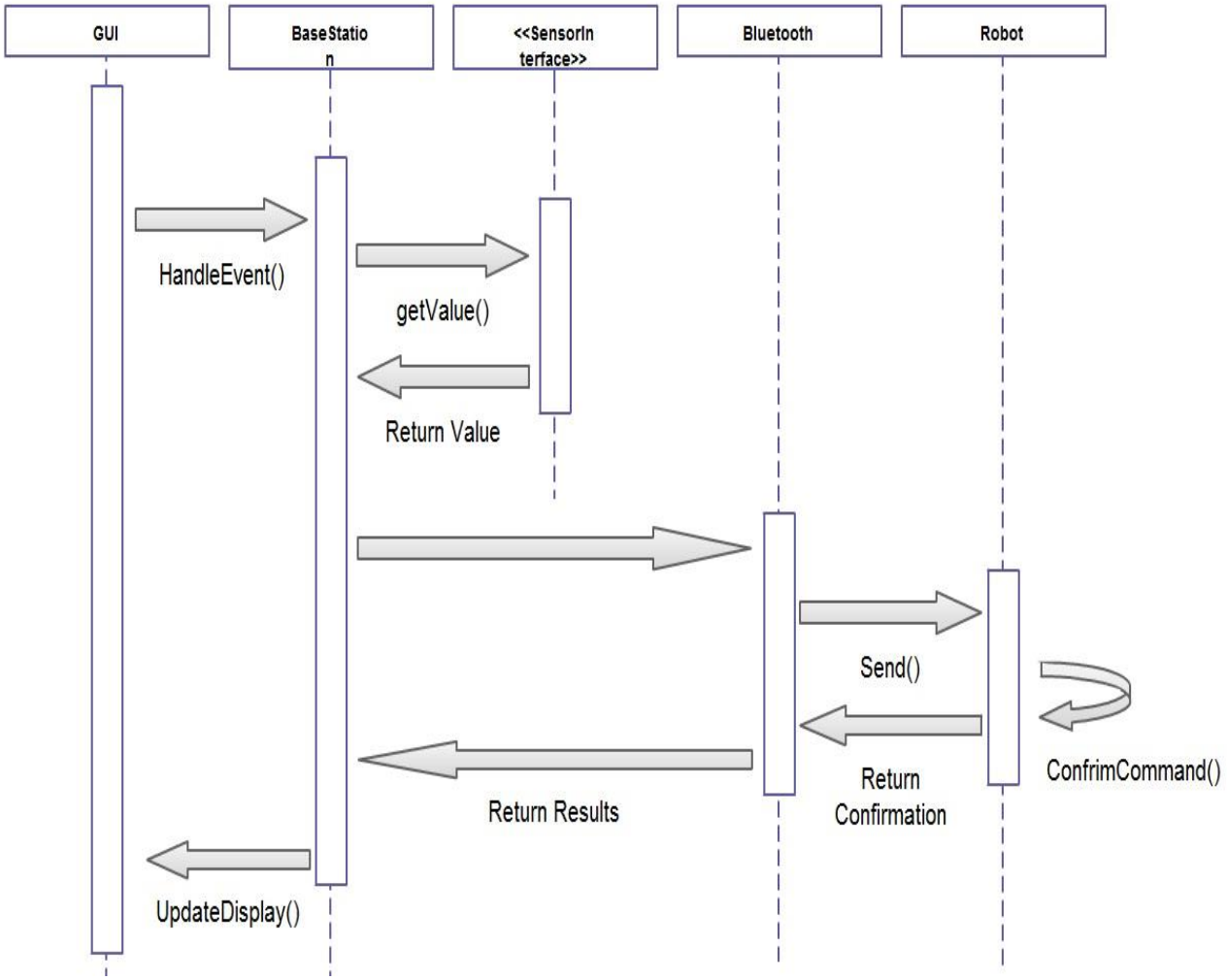
This is an interface that outlines the basic methods that each sensor will implement. It will interact with the Bluetooth and BaseStation classes in order to send information to the GUI and receive telemetry information from the robot. Each sensor, Microphone, UltrasonicSensor, TouchSensor and LightSensor, will implement this interface and also include other methods specific to the given type of sensor.

UML Diagrams

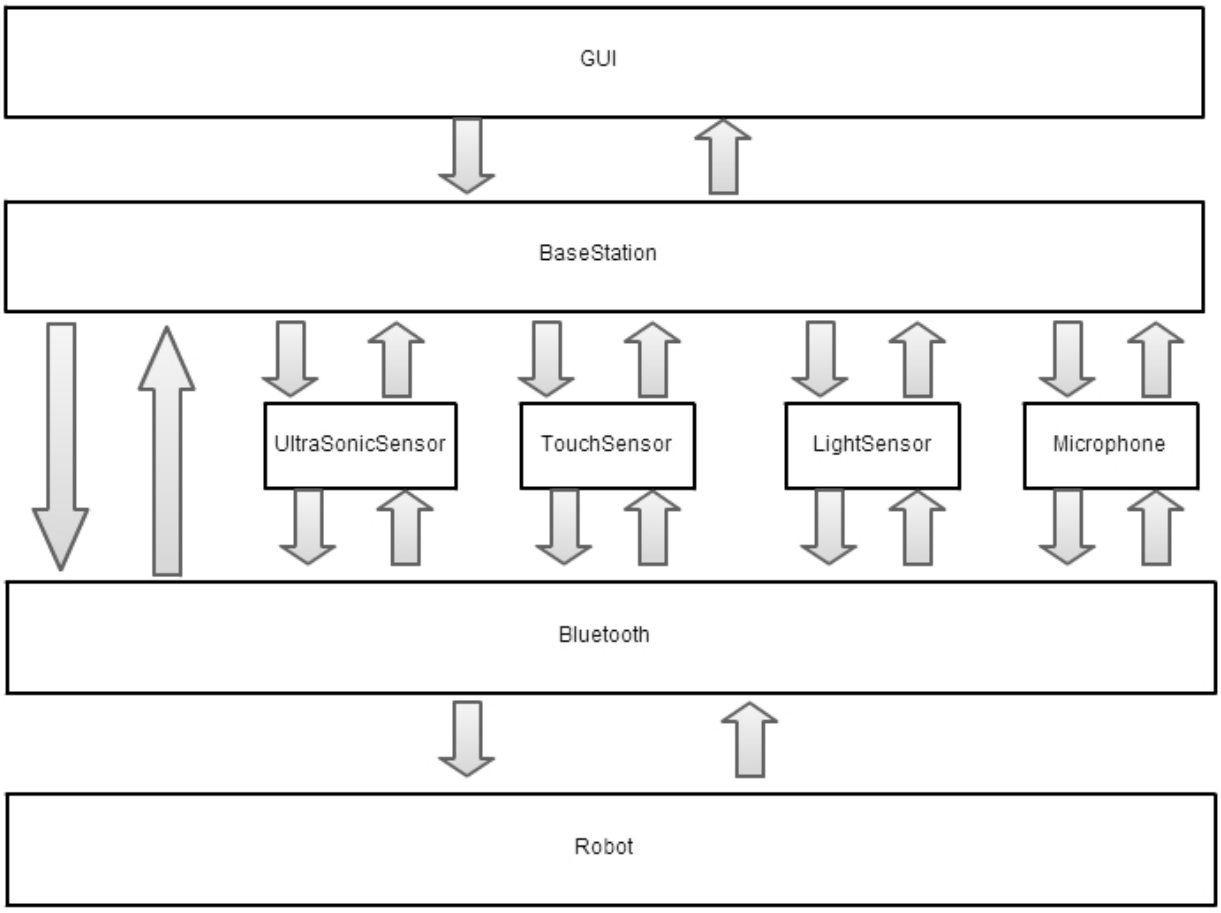
Class Diagram



Sequence Diagram



Concurrency Diagram



Class Interfaces

Our class interfaces are located on our website along with our other Lab 5 deliverables.

Anticipated Changes and Risks

Since this document is a living document, it is going to be changed as we further investigate our design. As we analyze our design from a usability perspective, we will more than likely change our GUI to make it as usable as possible. We will make changes to our communications protocol after extensive testing and evaluation of our design to ensure that our communications protocol and design will function harmoniously. Our classes will be supplemented with more functionality as we see fit throughout our design and implementation process to validate our design.

We also have various risks that we have already identified as negatively affecting our design. We anticipate having issues communicating with our robot through our system which will inhibit the system overall. Another risk we are facing is that our system might be too large to fit within the constraints of the hardware. Our schedule also presents a risk to us in the manner that we might not be able to complete all of the milestones we have set before the given deadline. In order to rectify these risks and other risks that may arise, we might have to implement the aforementioned changes and other changes to the system.