# VRPN - Android

# Functional Specification

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# VRPN USE CASES

**End User Use Cases:**

As an End User of the Android Application, you will be using the phone as a device to control your interaction with a Virtual World.  When launched, the application turns the Droid into a handheld controller.  The controller will have a variety of features including a tracking area, buttons, sliders, and the accelerometer.  The End User will use these features to interact with the client application.

- Button
    - Example: When this button is pushed, the message sent to the VRPN game could be interpreted as jumping over an obstacle within the virtual world.
    - Example: Upon pushing the button, the communication across the VRPNetwork could indicate a gun or laser being shot into the virtual world.

- Slider
    - Example: The analog change sent across the network may be used to change the view within the virtual world.  When the User slides his/her thumb right, it could be used to 'zoom in' while sliding his/her thumb back left would be used to 'zoom out' changing the display to normal view.
    - Example: The analog change communicated across the network when the User slides his/her thumb left and right changes the amount of light in the virtual world. It may be that the whole world changes brightness or that the 'player' is holding a flashlight that changes brightness as they are interacting in the virtual world.

- Multi-touch Area
    - Example: The analog change along the touch screen section of the Droid, could be used to update a position in the Virtual World.  As the user drags his/her finger along the screen, this will translate into him/her walking through the Virtual World.

- Accelerometer
    - Example: These accelerometer coordinates could be used for controlling what the user sees in the virtual world.  As the user lifts and lowers the phone, the user is effectively looking up and down in the virtual world.  The images displayed in the virtual world are updated according to the movement of the phone.
    - Example: The coordinates could be used for flying through a virtual world in that when the phone gets tilted side to side, it repositions the location within a virtual world and shows the flight view tilting along with the phone.

**Virtual World Application Developers Use Cases**

The Virtual World Application Developer is the Software Developer who creates a Virtual World that will interface over VRPN with the Droid.  When the Droid Application is launched, the controller will have a tracking area and a specified number of buttons and analog sliders.  This display along with the accelerometer in the phone will act together as a handheld controller for the End User.  The Application Developer has created a Client Application that will respond to the Droid's accelerometers, button presses, and analog sliders.  When the End User interacts with the application through the Droid Controller, the updates will be sent to the Client App (through VRPN).

- The Application Developer has programmed the Client Application to interface over VRPN with the phone.  A standard interface between the phone and the Client App is created which responds to the Droid's accelerometer changes, button presses, slider changes and multi-touch values (Accelerometer, slider, and multi-touch values are all sent as analog values).

- Administrator installation:
    - The VRPN Controller Application is launched on the Droid and displays an IP address and port number.  The Administrator uses the port number and IP address to establish a connection between the Client Application and the Droid.  Once the connection is established the User can begin interacting with the Client Application.

**Common Use Cases**

The End User downloads the Application onto his/her Droid phone.  Upon launching, an IP address and port number are displayed on the phone which allows the Client Application to make a connection to the phone.  Over the connection, the phone interfaces with the Application Developer's Client App and the Droid is able to be used as a handheld controller to interact with the world.   The Droid GUI application is written in Java and uses Java Wrappers to send the data from the phone to the VRPN Network.  The Application Developer then interprets these data changes however they want when they program their Client App through VRPN.

# REQUIREMENTS

**Functional -**

Have all physical data from the Droid transferred through VRPN so that the Virtual World Developer may interface easily with the Android application.  This includes not only the accelerometer data from the phone but all data from the GUI including when the buttons are pressed and analog data from multi-touch and sliders.  The IP address and port number on the phone must be displayed so that the Droid and the Virtual World can establish a connection.

- Buttons
  - o Upon selection of a button, send an update from the Droid, across the network to VRPN
- Analog Slider
  - o When the analog value changes from moving a slider, send an update from the Droid across the network to VRPN
- Analog Multi-touch
  - o When the analog value changes from tracking along the touch screen, send an update from the Droid across the network to VRPN
- Analog Accelerometers (Tracker)
  - o Send analog updates of the physical movements of the Droid across the network to VRPN


**Usability -**

- All code conforms and fits into the VRPN API.
  - o http://www.cs.unc.edu/Research/vrpn/index.html
- The application must be "Android Compatible" (able to be installed and correctly run an Android .apk file) and upholds all standards found in the Android Compatibility Definition Document.
  - o Android Compatibility
    - ▪ http://developer.android.com/guide/practices/compatibility.html
  - o User Interface Guidelines
    - ▪ http://developer.android.com/guide/practices/ui_guidelines/index.html

**Error Handling -**

- Conform to the Android error handling procedures within our application to handle events such as receiving a phone call, text message, email, etc.

**Constraints -**

- The Application only implements GUI functionality and retrieves physical data from the accelerometers, buttons, sliders, and multi-touch sensors.
- The Droid uses Wi-Fi to connect to and interact with the Virtual World.
  - The phone does not go through any personal information on the phone including contacts, text messages, emails, phone calls, etc.

# INTERFACES