Update:

Hardware

* Our team designed and printed the newest prototype of the Control System Panel. The new design consists of a 3D-printable, two-part sliding assembly that houses the Raspberry Pi and a 7”-touchscreen. The new panel also features a dock station for the wireless keyboard that would allow for the user to interface with the Raspberry Pi (Figure 1).
* Upgraded to the Raspberry Pi 3, this upgrade features:
  + Built-in WiFi and Bluetooth antennas reduce compatibility issues with 3rd-party adapters and the cost associated with them
  + 50% increase in processing power

Software

* Based on the feedback obtained from the February demo, our team modified the original GUI to include/exclude the following features:
  + Removal of user interface (UI) In order to:
    - Minimize user error – Without the UI, successful scenario execution is independent from the familiarity of the standardize patient to the hardware and software in the room
    - Unload tasks from the standardize patient – Without the UI, the standardized patient has fewer set-up tasks
    - Concentrate scenario control to servers – Without the UI, the all instruments and their respective control programs are triggered from the control room
* Our team overhauled the control and communication protocol between the Control System (Raspberry Pi-based) and the Smart Instruments (Arduino-based) (Figure 2). The updated protocol features:
  + Transition from Java to Python
    - The Control System algorithms have been written in Python to improve speed and integrate mathematical libraries that will help with data processing
  + Transition from Firmware to board-specific Arduino codes
    - Instead of using firmware to translate Control system commands, written in Java or Python, board-specific Arduino codes were developed to enable bidirectional communication and relay data not commands
    - This upgrade increases speed and efficiency by unloading tasks from the Control System
    - Board-specific Arduino codes allow the integration of modules with hardware differences (number of sensors)
  + I2C Communication Protocol between sensors
    - Expands the number of parallel sensor connections
    - Reduces the noise generated by analog ports
    - Reduces the number of connections and components needed
  + Bluetooth Communication
    - As discussed in our previous report, wireless communication through Bluetooth allows for the interaction with at-least seven (7) Smart Instrument modules simultaneously

Moving Forward:

* Our team still has to finish transitioning the Control System algorithms to Python
* Our team has to continue developing the communication protocol between remote system (e.g. server) and the Control System

|  |
| --- |
| C:\Users\flobo\Documents\Gits\ControlSystem\Hardware\V002\controlsystempanelv002img001.jpg |
| Figure 1: Control System Panel |

|  |
| --- |
|  |
| Figure 2: Control and Communication Protocol Flowchart |