Abstract

Project purpose is to create a system that will allow for the planning of heart interventions. Our system is a complete pulsatile flow simulator that allows for the creation of a patient-specific flow and pressure waveform, in order to simulate physiologically accurate heart interventions. The system allows for the introduction of 3D-printed hearts, which models patient anatomy. The main benefit for the interventionalists at Children's is that the use of our system will allow them to determine whether or not they have the tools necessary for the completion of a successful intervention. This will save them time and money from having to re-do interventions or reschedule interventions.

Pump System
- Must allow for flow control
- Communicate with and be controlled by PC
- Produce uploaded pulsatile flow waveform
- Produce flow up to 10 GPM

Software
- Designed through JavaFX
- Control pump system through serial communication with Arduino
- Upload flow waveform chosen by user
- Allow for the safe start and stop of system

3D Models
- Modeled using 3-matics and Mimics
- From patient MR scans
- Printed in TangoPlus VeroClear blend

Camera System
- Visualize 3D-printed anatomy
- Filters to mimic x-ray fluoroscopy images
- Must have a large degree of movement and rotation

Key Results

Test Results
- Pressure Waveform found in system through Catheter
- Matches standard shape of RV pressure waveform

Sponsor Benefits

- Allows for the simulation of catheter interventions
- Simulation enables interventionalists to practice and test equipment
- Increases the success rate of interventions
  - Saves money and time
  - Helps patients

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