

Mocking an Integrated Clinical Environment With JavaScript

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Background

- Every year there are thousands of patient injuries and near-misses are caused by improper or unsafe medical device interactions
- Medical devices are highly complex networkable systems
- Each device can have different safety levels and different real-time requirements for operation
- No standards currently exist to allow devices to communicate with each other

Goals

- Develop a system that mocks an actual clinical environment where devices can communicate with each other
- Create a rule-based system that allows for precise operational constraints to be input into the system
- Use actual hardware devices and integrate them into the system
- Use the system created to simulate several predefined use cases

Fundamental Questions/Challenges

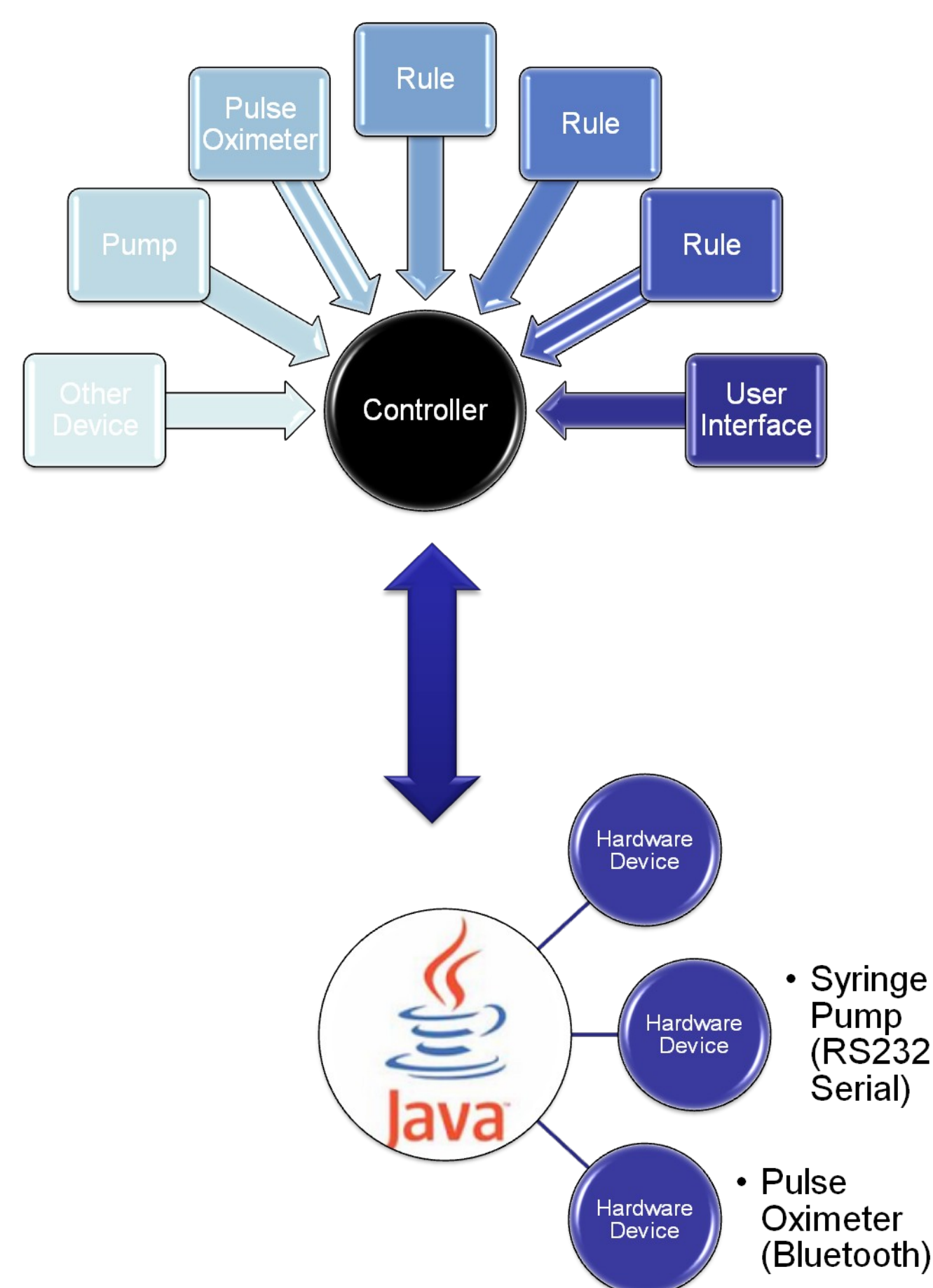
- How do we develop a system that expands easily to accommodate new devices and requirements
- How to balance the desire for the computer to control the environment without having the clinical staff lose authority?
- How can we leverage the best features of JavaScript to efficiently mock the system?
- What design patterns can we integrate to better build the system?
- How can we design a rules system that allows for all the possible rules that users may want to input?

Research Plan

- Learn JavaScript and implement basic framework for object-oriented programming
- Design the system using UML
- Implement the environment using JavaScript
- Develop a back-end service to allow the JavaScript to communicate with hardware
- Design and implement a user interface for the system
- Test the system using the predefined use cases

Research Results

- We tested a variety of configurations to see which ones worked best for our application
 - Distributed Control
 - Centralized Control
- Settled on a centralized controller
- Tested two use cases
 - Patient-Controlled Analgesia
 - Manage Glucose



Related Work/Interaction with Other Projects

- MDPnP - <http://www.mdnp.org>
- UIUC MDPnP SIG - <https://agora.cs.illinois.edu/display/mdnp/>

