

# Virtual Reality Physio Monitor

## *Team Members*

Hope Marshall, Jiaquan (Jason) Yu, Roland Pomfret, Gabriel Bautista

## *Clients*

Professor Robert Radwin, Ph.D

Dr. Ben Mandel, MD.

Department of Biomedical Engineering

Department of Surgery

University of Wisconsin-Madison

University of Wisconsin-Madison

## *Advisor*

Professor John Webster

Professor Emeritus

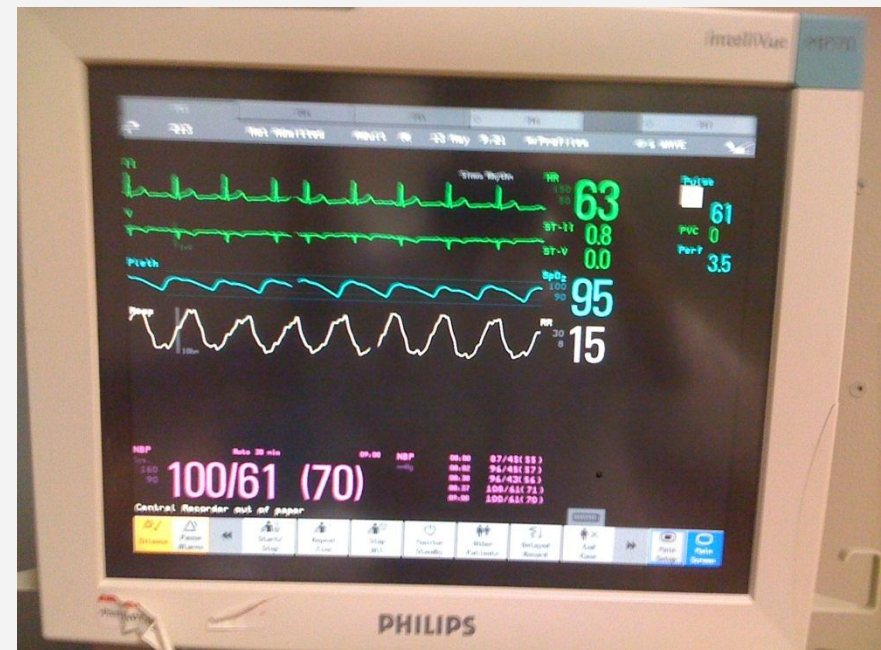
Department of Biomedical Engineering

# Overview

- Background/Motivation
- Problem Statement
- Product Design Specifications
- Alternative Design 1- MATLAB
- Alternative Design 2- C++
- Alternative Design 3- Java
- Design Matrix
- Current Work
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# Background/Motivation

- The Cave Automatic Virtual Environment
  - What is it?
  - Uses for the Virtual ER Trauma Bay
- Current Monitor
  - Static values
  - Current technologies



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# Problem Statement

- Simulate and display dynamic vitals
  - EKG
  - respiration rate
  - blood pressure
  - SpO<sub>2</sub>
- Respond to changing physiological conditions

# Product Design Specifications

- Compatible with Virtual ER Trauma Bay
- Clear and legible display of patient vitals
- Display should include
  - Graphical and digital readings
  - Notify user if vitals cross dangerous threshold
- Expandable to accommodate future ER scenarios

# Alternative Design 1- MATLAB

- Advantages
  - Available as tethered software
  - EKG creator available as a MATLAB program
  - 3D graphics available
  - Advanced numerical computing available
    - Useful in simulating vitals

# Alternative Design 1- MATLAB

- Disadvantages
  - Not multithreaded
  - Accessibility
  - Options for graphics
  - Intended mainly for advanced computing
  - 1 out of 4 team members has experience



# Alternative Design 2- C++

- Advantages
  - Fast
  - Common language
  - Graphics
  - Similar syntax to Java

# Alternative Design 2- C++

- Disadvantages
  - No team members have experience
  - Overly complex
  - GUI apps and software costly
  - Limited standard library
    - Graphics

# Alternative Design 3- Java

- Advantages
  - Platform independent
  - Multithreaded
  - 2 out of 4 team members have experience
  - Accessibility
  - Common language
  - EKG creator accessible in Java program

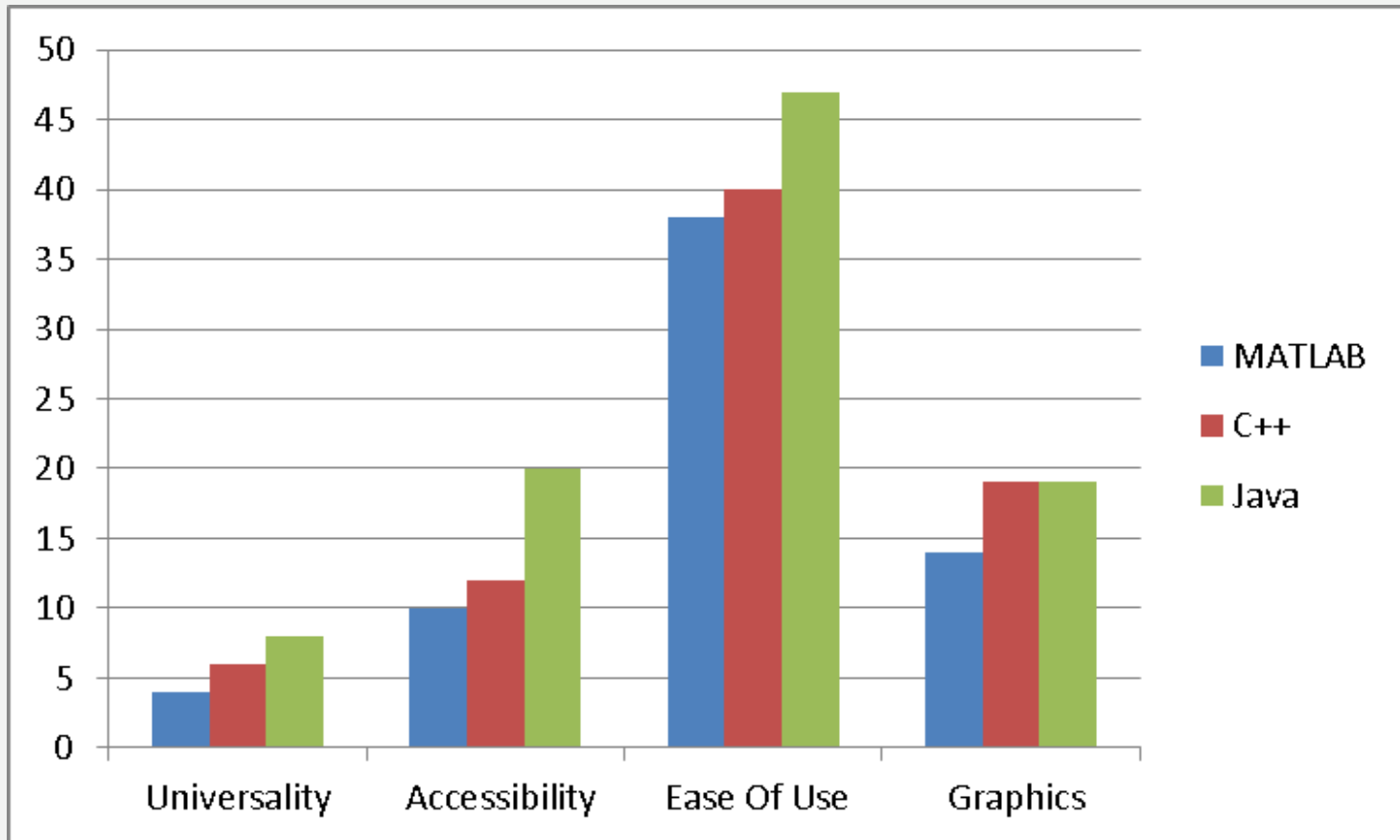
# Alternative Design 3- Java

- Disadvantages
  - Not all team members have experience
  - Simplistic language
  - Slower than C++
    - More memory-consuming

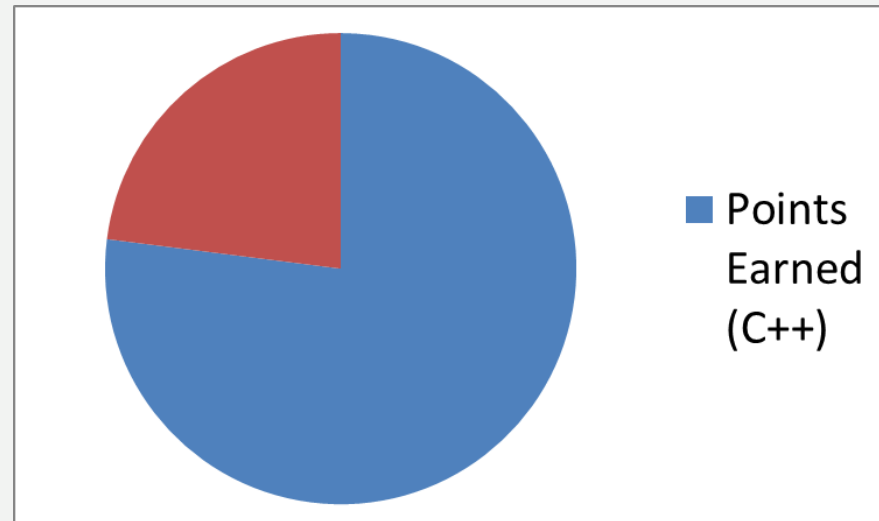
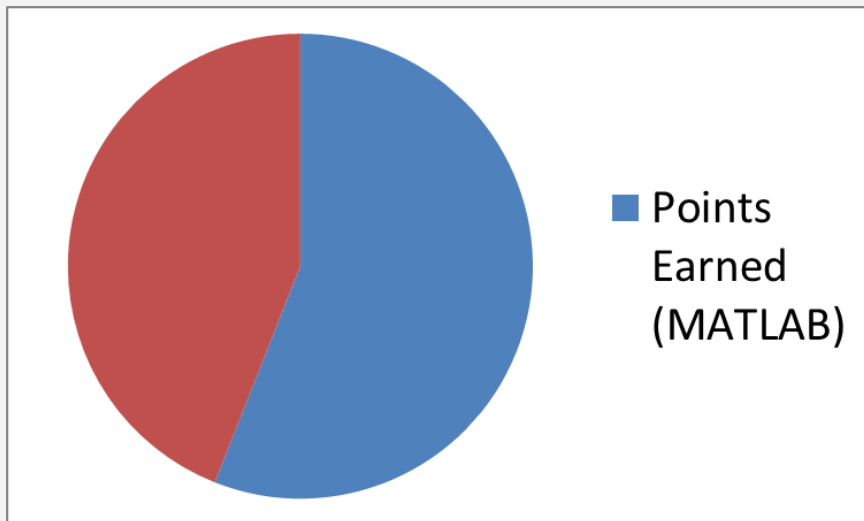
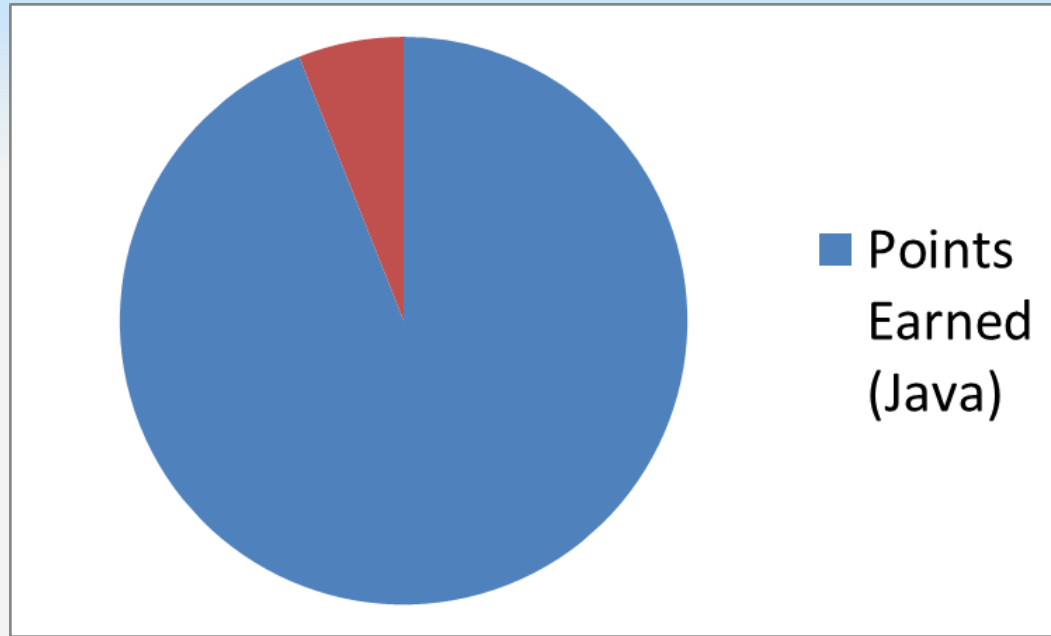
# Decision Matrix

	Universality (10)	Accessibility and Cost (20)	Ease of Use for programming (50)	Graphics (20)	Total
MATLAB	4	10	38	14	66
C++	6	12	40	19	77
Java	8	20	47	19	94

# Decision Matrix



# Decision Matrix Totals



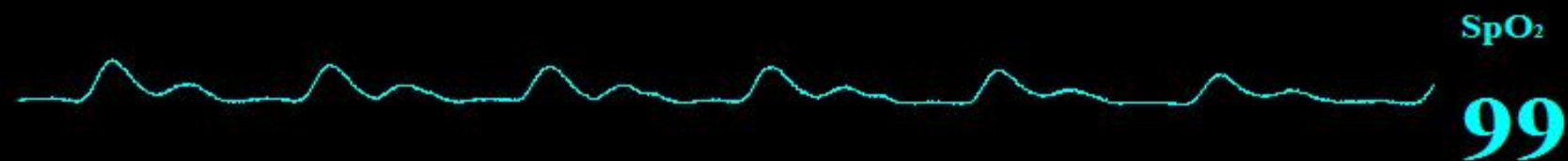
# Current Work

- Vital Signals and Data
  - Real data
  - Simulation
  - Monitor programming
- Research on Tension Pneumothorax
  - Vitals
  - Symptoms
  - ER Procedures
- Flowchart and Pseudocode

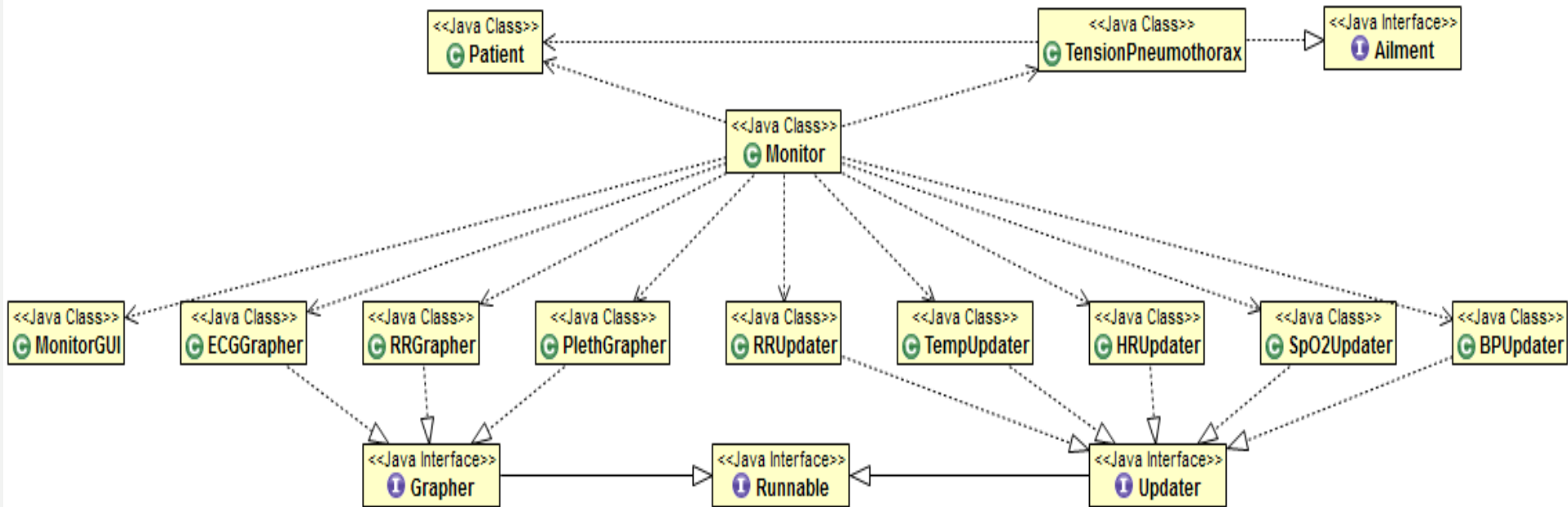


# Future Work

- Simulating respiration waves and pulse oximeter plethysmograph
- Research on threading in Java
- Programming for Tension Pneumothorax scenario
- Research and programming for other trauma scenarios



# Class Diagram



# Acknowledgements

- Professor John Webster
- Dr. Benjamin Mandel
- Professor Robert Radwin
- Amit Nimunkar, Ph.D
- First Hospital of Jilin, China

# References

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Questions?