




Virtual Yoga Coach Final Presentation

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Solution Approach

**Python
&
OpenCV**

**Open
Pose**

**Optical
Flow**

**Standard
Pose
Library**

**Pose
Compare**

**Verbal
Instruction
Generator**

Implementation Plan

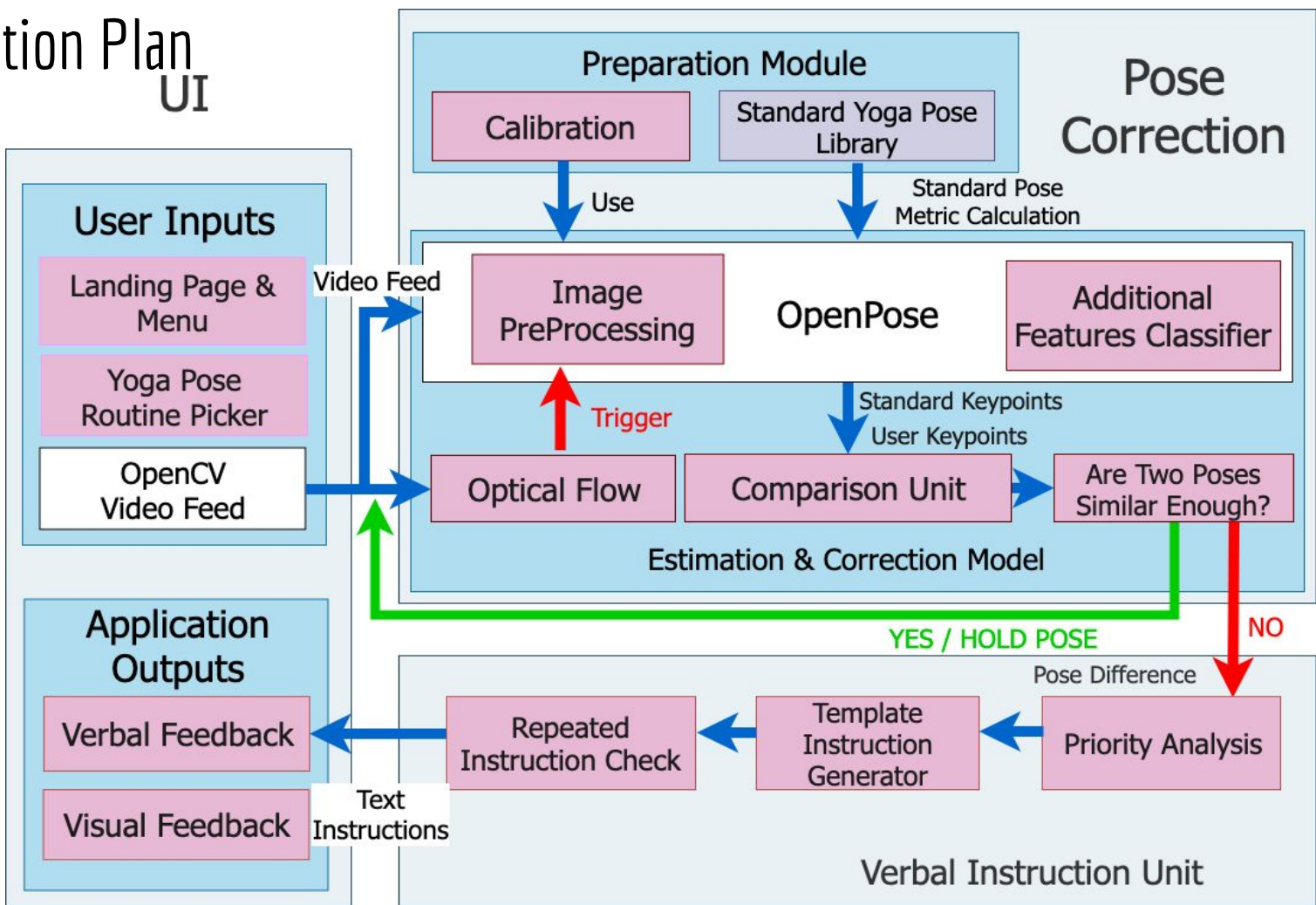
UI

Legend

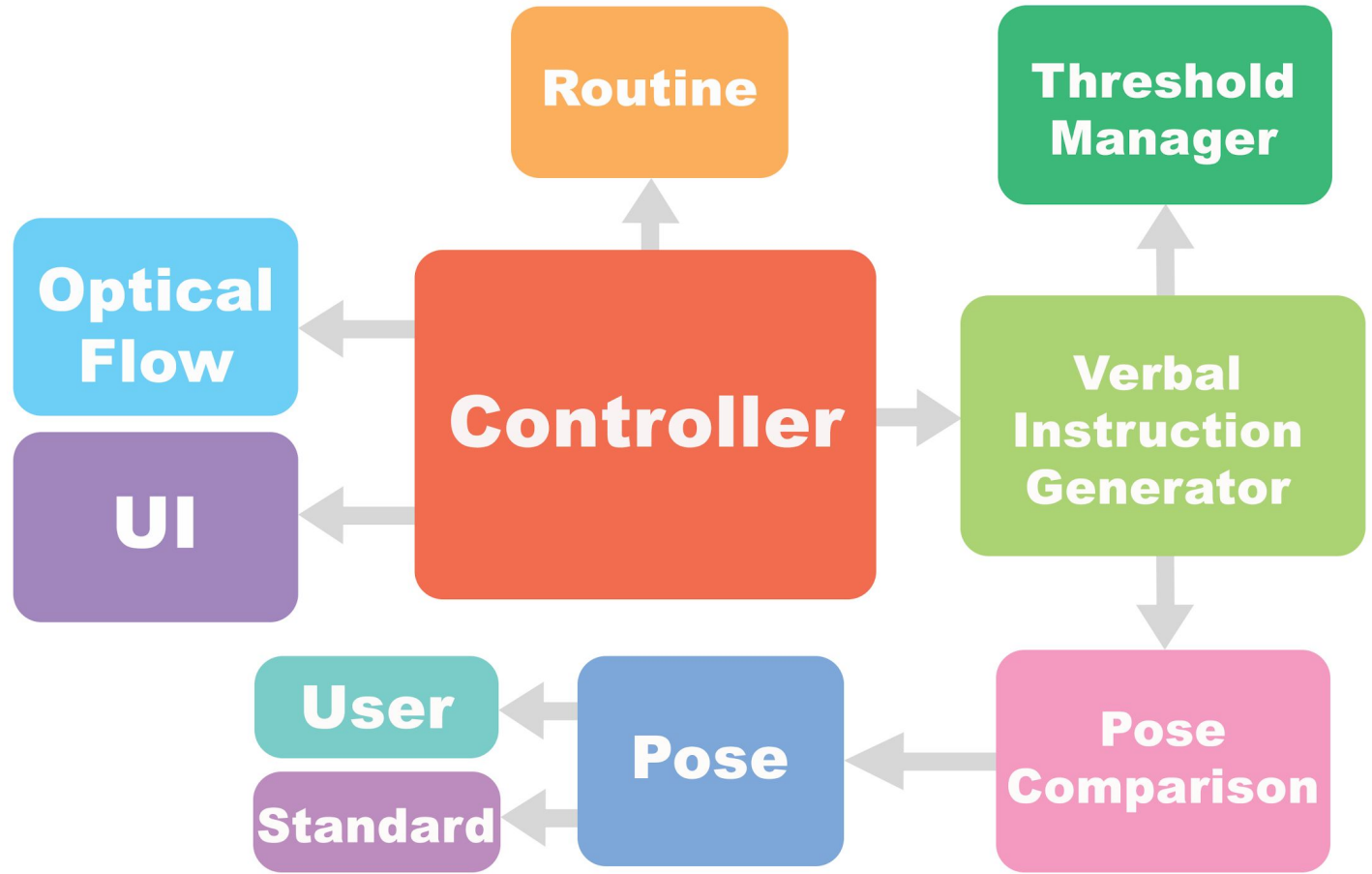
Off The Shelf

New Design

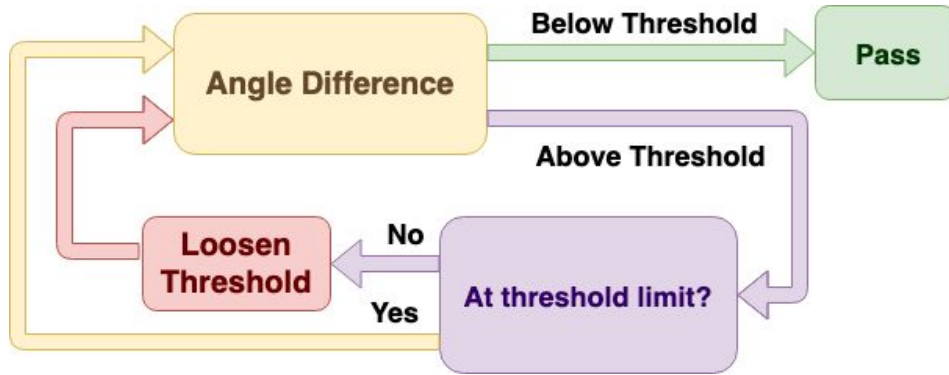
Custom Library



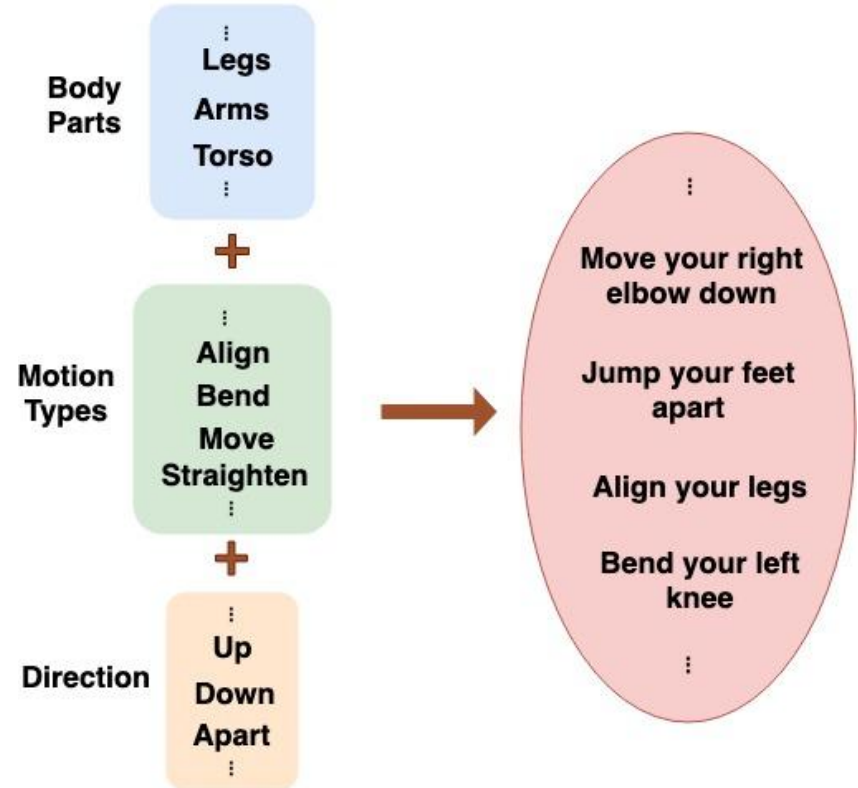
Software Design



Threshold Manager



Verbal Instruction Generator

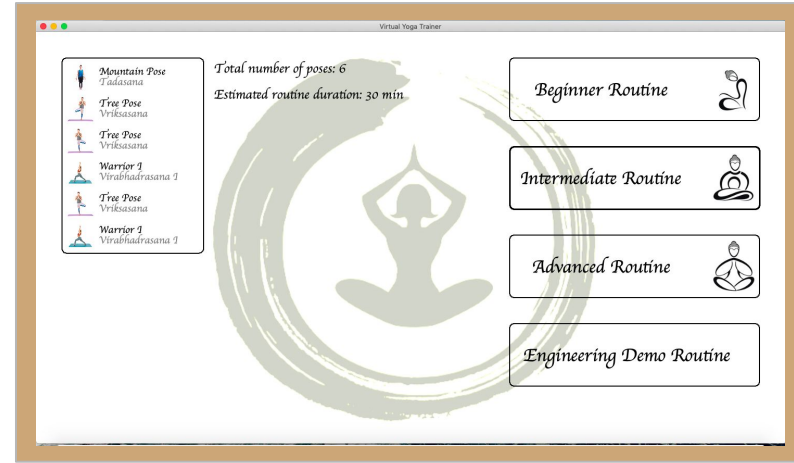


UI + Features

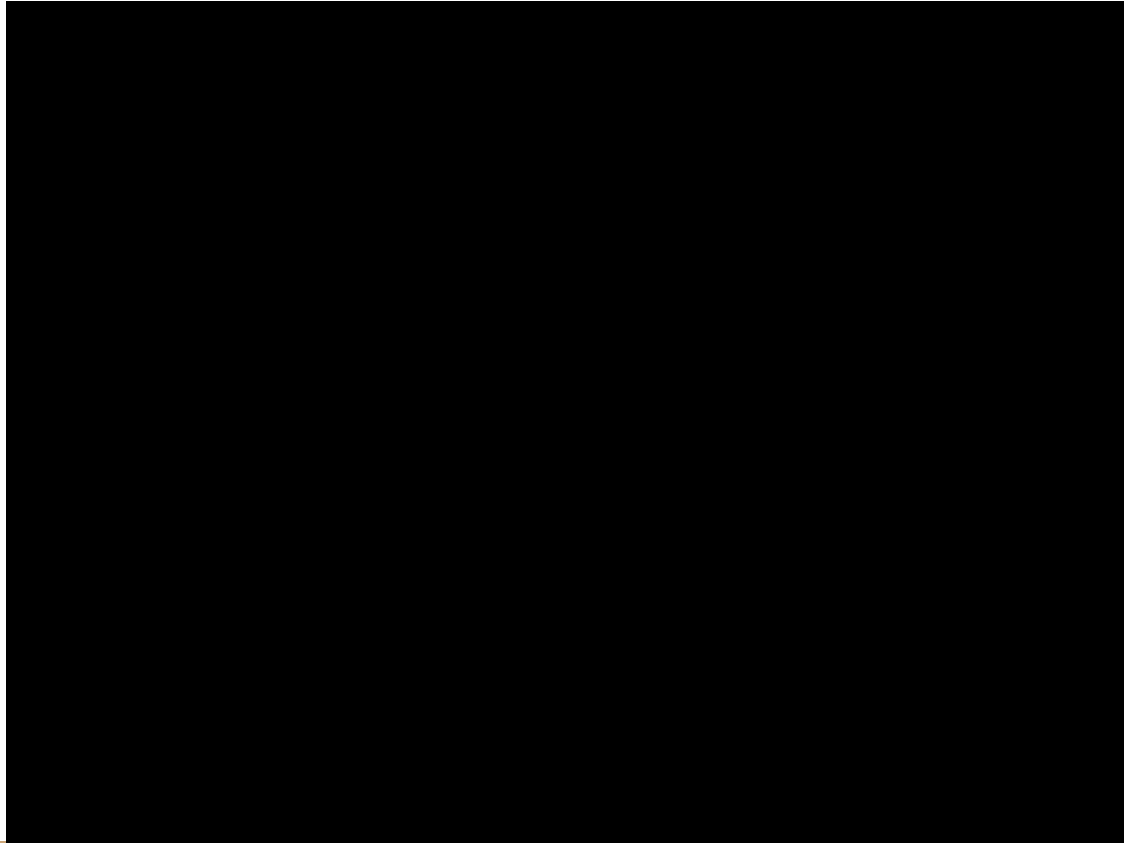


Features

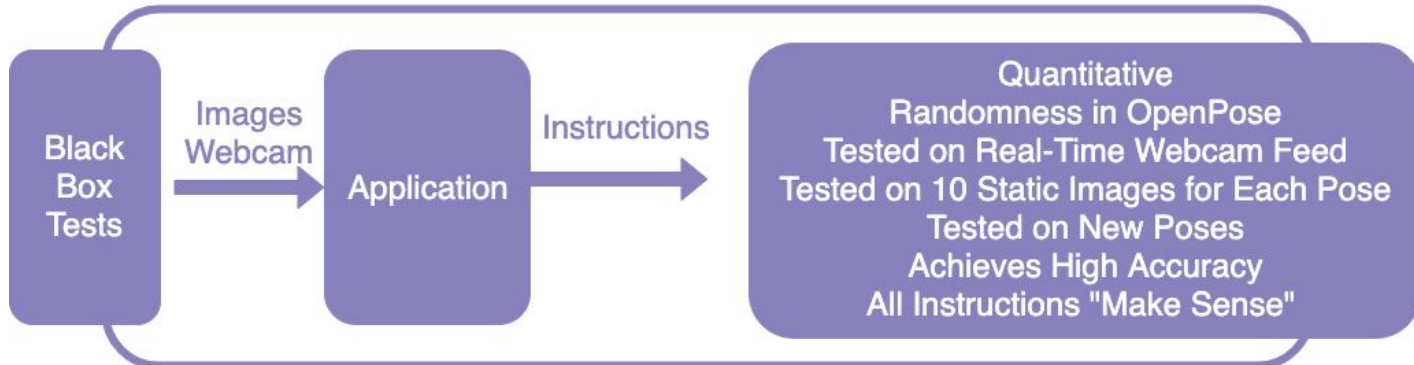
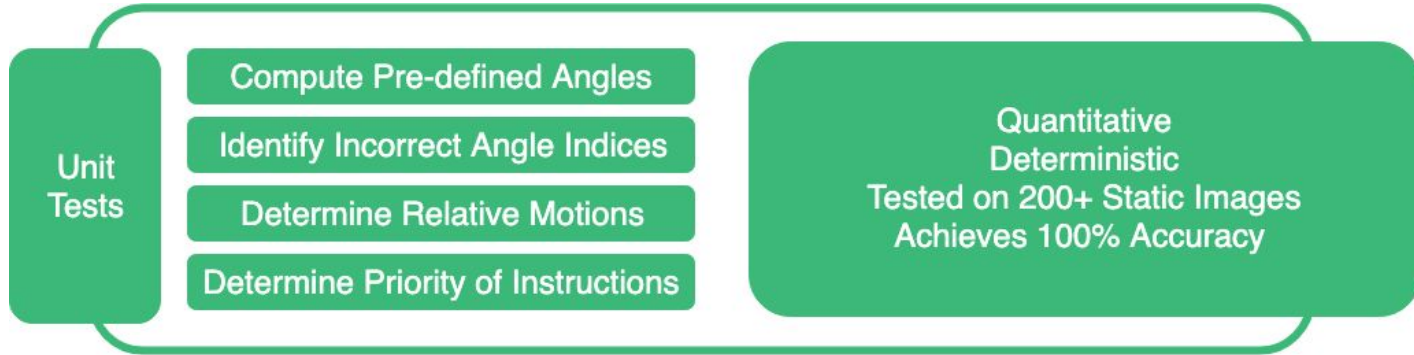
- Live Feedback (Within 5 seconds)
- Dynamic Adjustment to User Level
- Three Different Routines
- Dashboard to Track Progress
- 11 Unique Poses



Complete Solution: Demo Video



Metrics & Validation: Functional Testing



Metrics & Validation: User Testing



Do Instructions Make Sense for Current Situation? 24 / 26 Instructions

Are Instructions Expressive Enough for the Corrections? 25 / 26 Instructions

Are Instructions Useful in Actual Practice? 20 / 26 Instructions

Do Routines Have Appropriate Length and Pace? 3 / 3 Routines

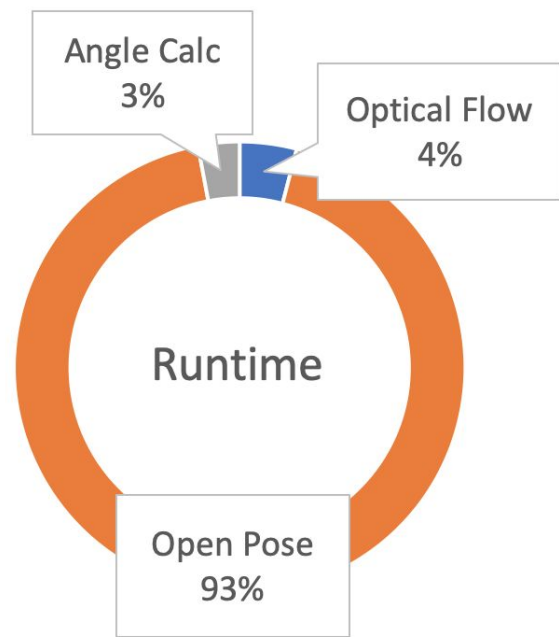
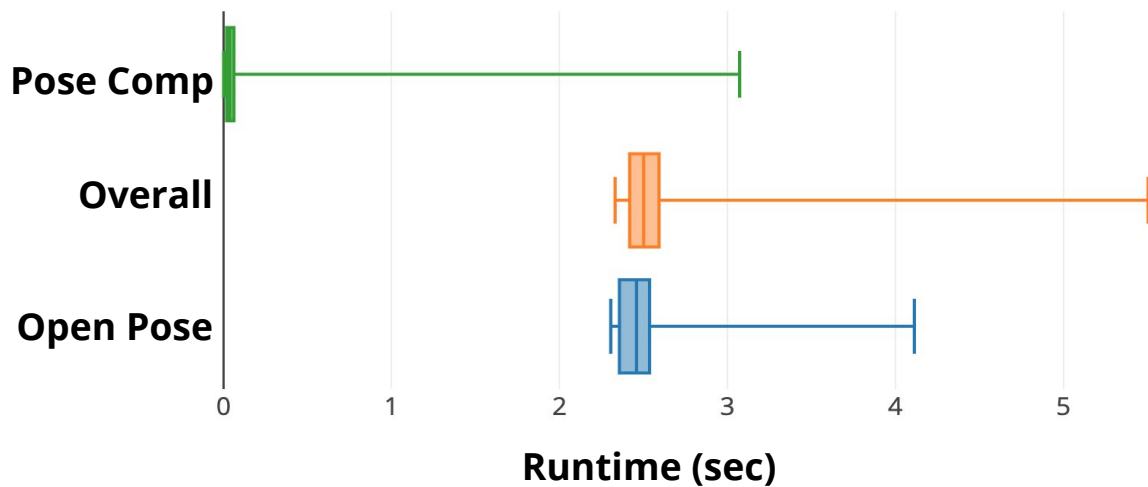
Are Poses of Appropriate Difficulty? 9 / 11 Poses

Is the Application Helpful Overall? 2 / 2 Participants

Limit Repeated Instructions
Add Directions for "Align"

Loosen Initial Thresholds
Adjust Thresholds Dynamically

Metrics & Validation: Runtime



Process	Target (sec)	Avg Runtime (sec)	Std Dev (sec)
Optical Flow (20 frames)	N/A	0.11	0.028
Open Pose Pose Estimation	1.8-4.0	2.51	0.30
Pose Comp + Verbal Instruction	0.5	0.08	0.33
Total	5	2.60	0.44

Project Management

Task	Design Phase Jan 16 - Feb 24		Phase 1 Feb 25 - Mar 8	Phase 2 Mar 17 - April 1	Phase 3 April 2 - May 6		
	Verbal Instruction Design						
Angle Definition + Pose Image Collection							
Optical Flow Testing							
Open Pose Testing							
Construct Verbal Instruction Library							
Generalize Verbal Instruction Basic							
Refine of Standard Yoga Pose Library							
Integration of Angle Metrics and Verbal Instruction							
UI Design + Implementation							
Calibration							
WebCam Testing							
Threading							
Basic User Testing							
Refactor Verbal Instruction							
Integration of Additional Poses							
Routine Class							
Threshold Manager							
Logging + Repeated Pose							
Engineering Routine							
User Testing							
Poster + Report							

Chelsea	
Tian	
Sandra	
Together	

Lessons Learned

Plans Will Change

**Open Pose Not
Light Invariant**

**Future Work Involves
Retraining Open Pose**

Challenges

**Tradeoffs between
Speed and Accuracy**

**Webcam Testing
Increased Variables**

**Balance Correctness
and Usability**

**No Standard Yoga
Instruction Library**