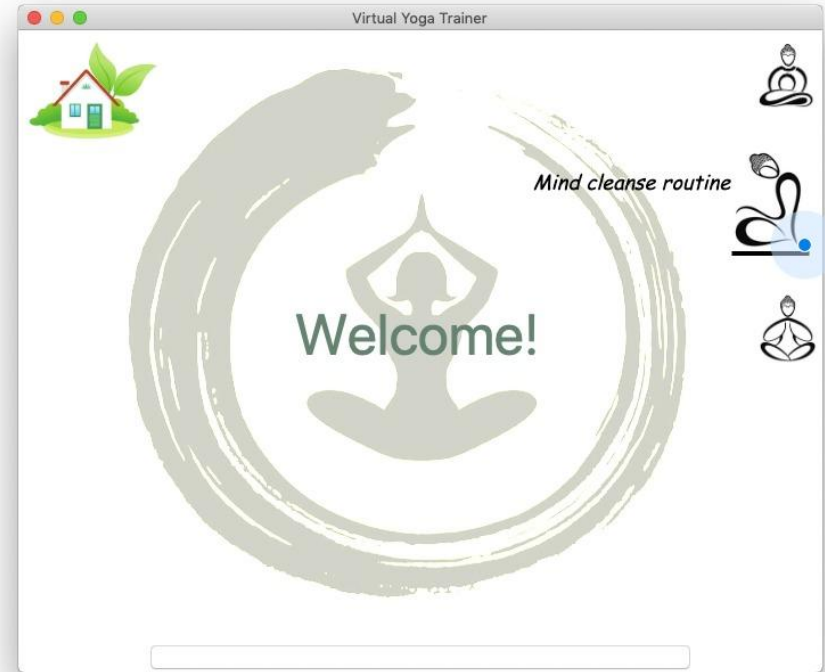


Virtual Yoga Coach Design Review

Team B7
Chelsea Chen
Sandra Sajeev
Tian Zhao



Solution Approach

**Python
OpenCV**

**Open
Pose**

**Optical
Flow**

**Standard
Pose
Library**

**Angle
Difference**

**Yoga
Instruction
Library**

Verbal Instruction Method Comparison

Verb

Body Part

Direction



Naive

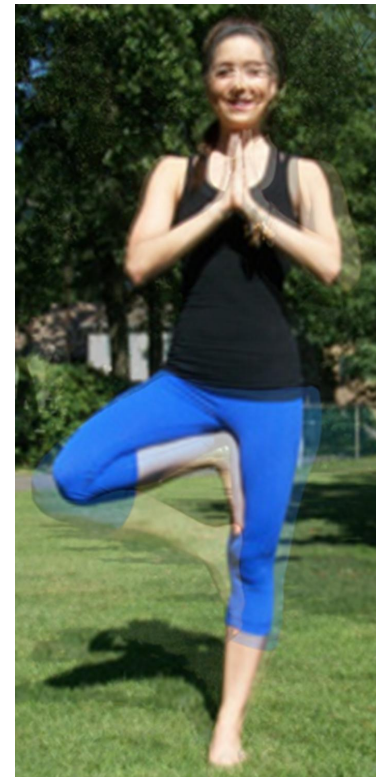
Move Right Foot Up

Template

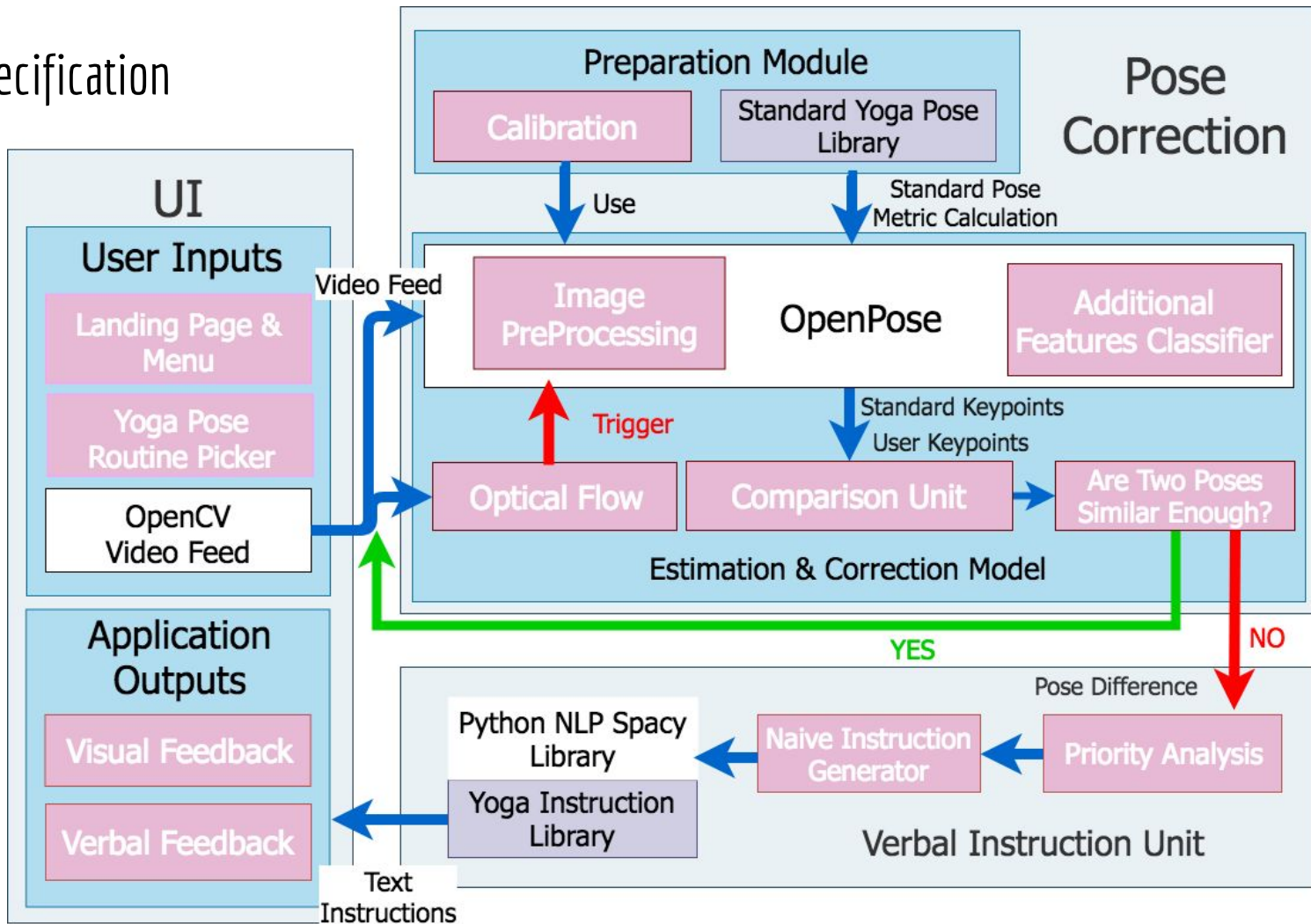
Draw your right foot up

Similarity

Draw your right foot up and place the sole against the inner left thigh



System Specification



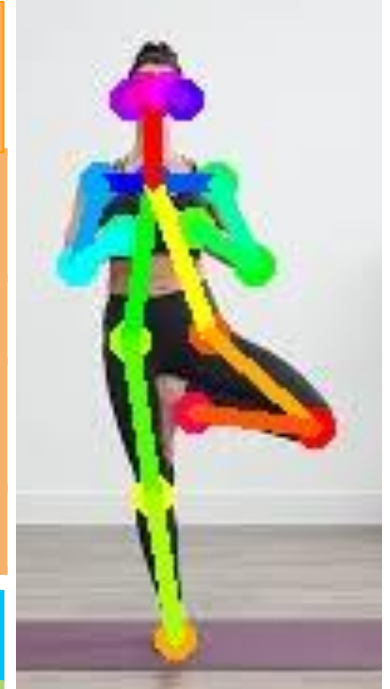
System Specification

Accuracy and Runtime: First-round experiments with ~80 yoga images on OpenPose, 8G RAM Macbook Pro

Pose Name	Warrior 1	Tree Pose	Mountain Pose	Down Dog (rotated)
Accuracy	100%	100%	100%	70%
Runtime (OpenPose)	1.6755s	1.6408s	1.5773s	1.7386s
Runtime (Overall)	2.2s	2.2s	2.1s	4.0s

Image Size 3KB ~ 10KB , Captured 25 frames / sec

Libraries: OpenCV, Tensorflow-OpenPose, Spacy



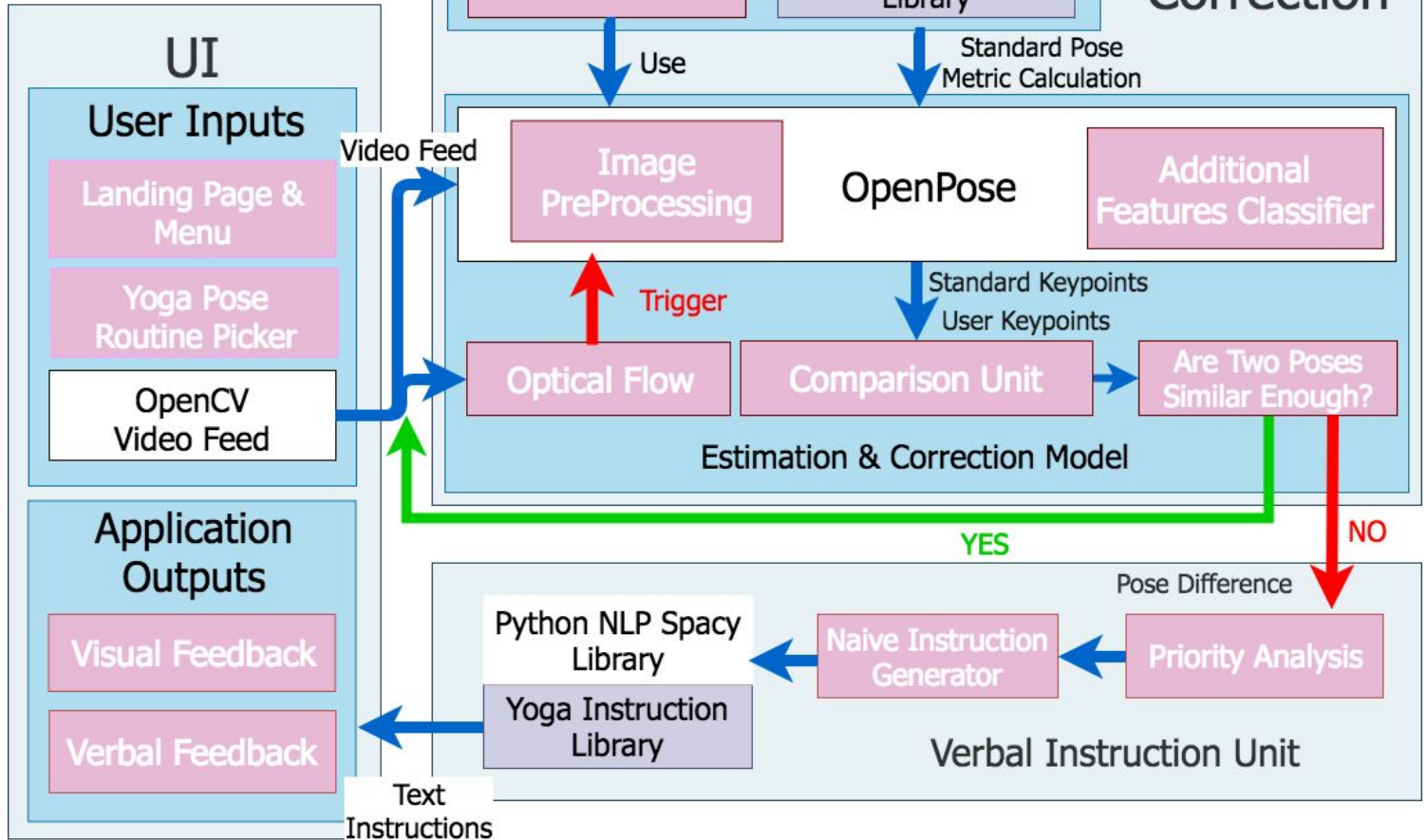
Implementation Plan

Legend

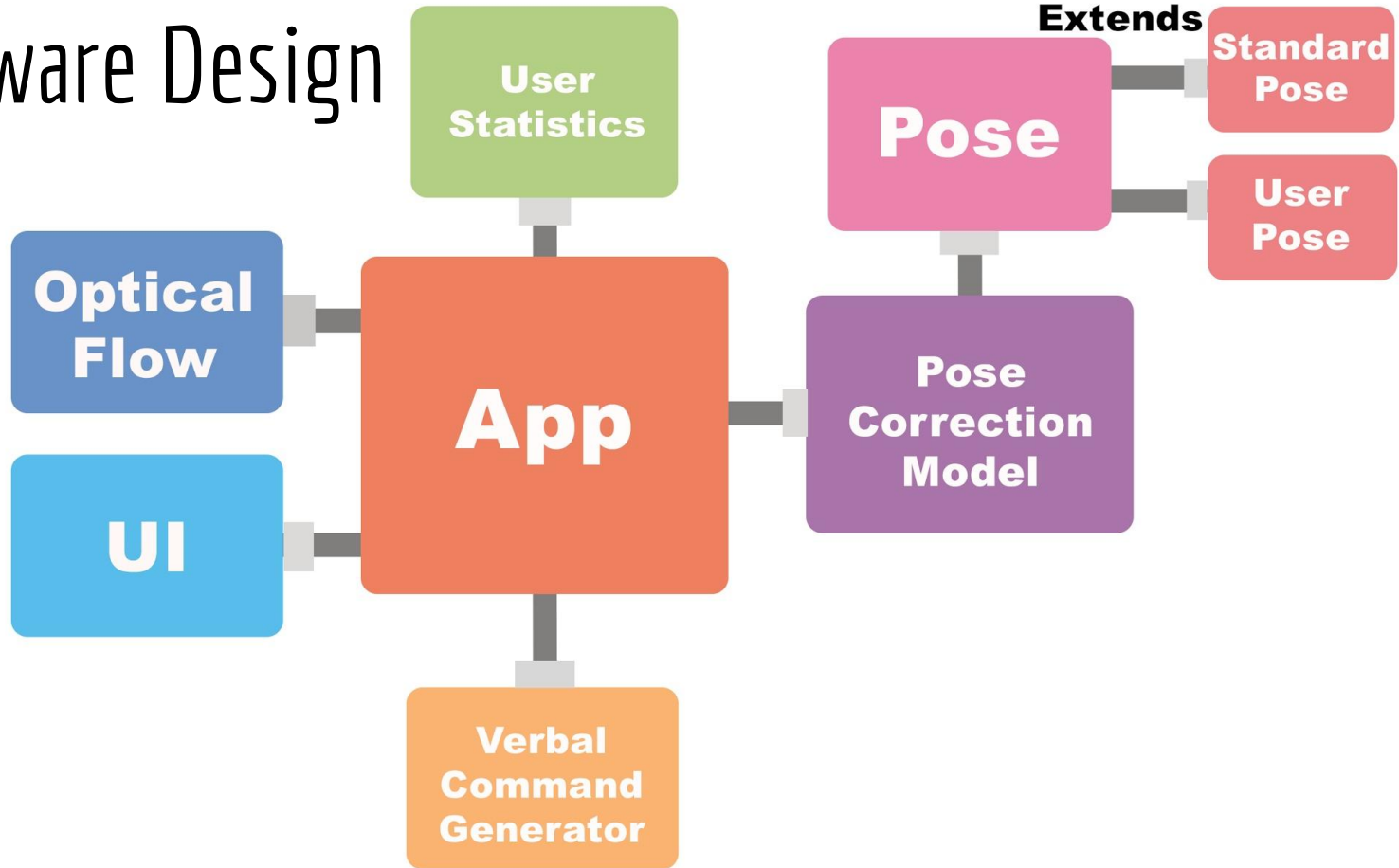
Off The Shelf

New Design

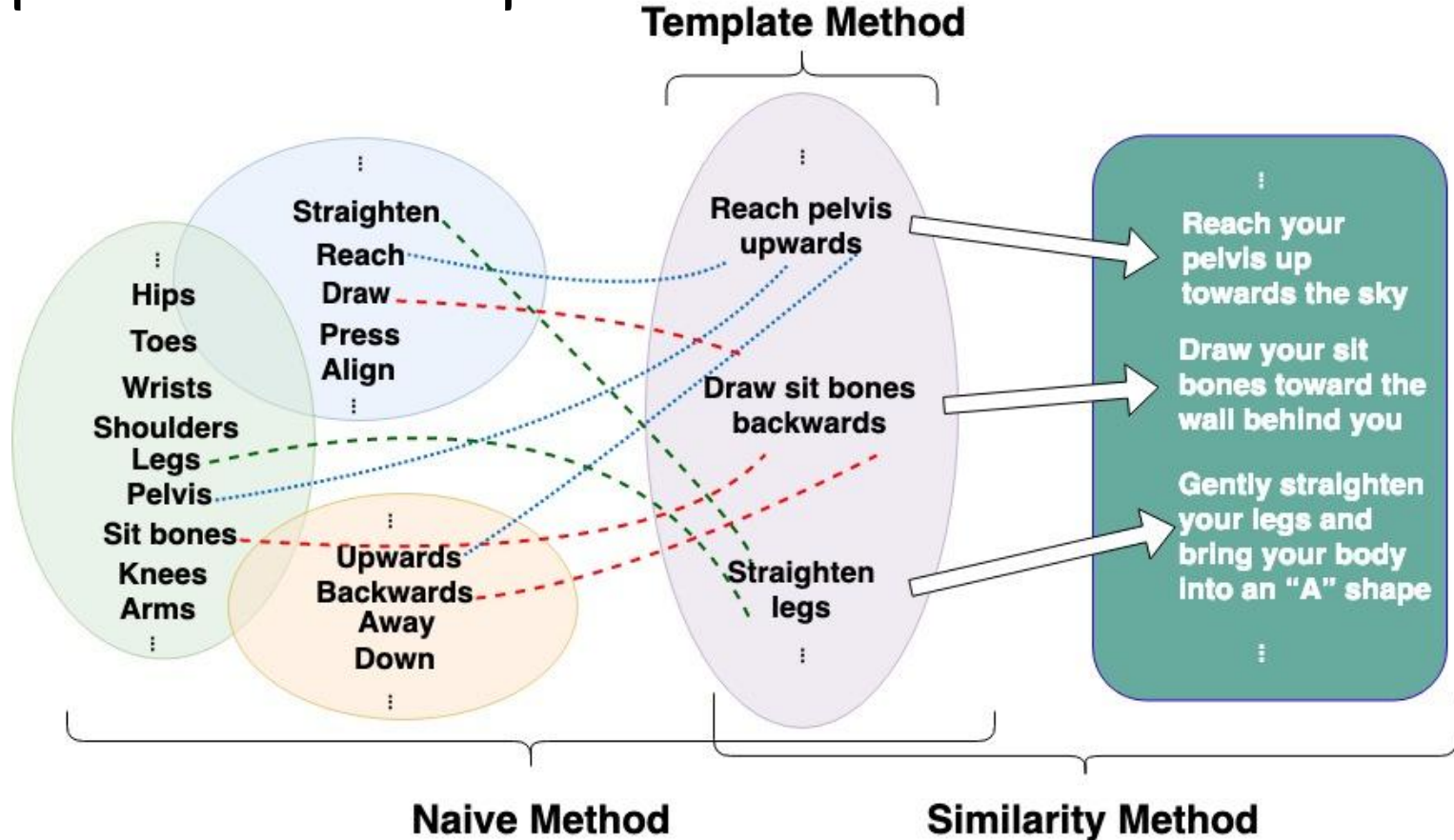
Custom Library



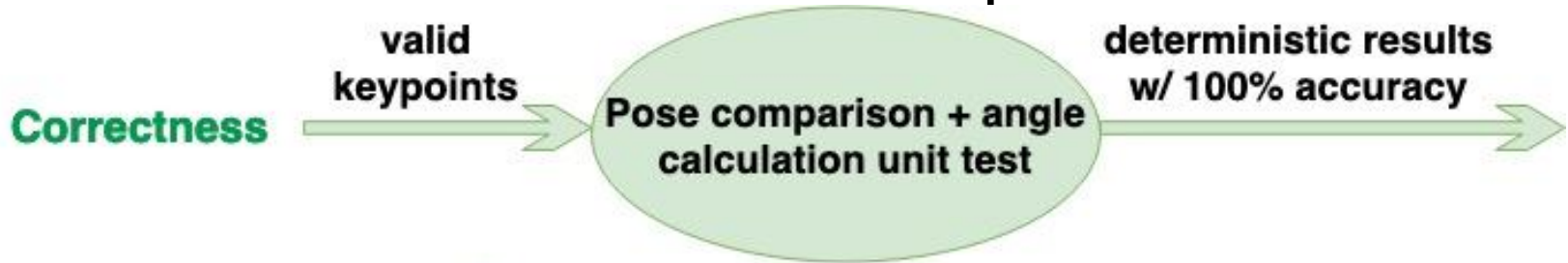
Software Design



Implementation of Verbal Instruction



Metrics & Validation: Pose Comparison



Expressiveness



Common yoga mistakes



Enough information for verbal instruction generation?

Risk: some poses might not work with OpenPose

Solution A

Capture 2 frames.
Trade off runtime.

Solution B

Flip / rotate frames.
Trade off runtime.
Potential randomness.

Solution C

Opt for OpenPose
friendly poses.

Metrics & Validation: Verbal Instructions

User Testing With Picture Comparison



Incorrect
To
Correct Pose



Sample
Text
Command



Qualitative	Quantitative
How realistic the yoga instructions are?	% of Nonsensical Instructions
Are instructions too verbose or too concise?	% of instructions that don't match corrections

Risk Factors:

- No method works significantly better than the other two
- Solution: use more refined combinations of the methods

Metrics & Validation: Runtime

Target Metric	Risk	Testing Strategy
Optical Flow Accuracy > 90%	False Positives or Negatives	Average multiple frames difference and unit test on Yoga videos
Open Pose Time < 1.8 sec	Rare Pose Performance Decrease	Stress test all poses and average runtime on Open Pose
Instruction Length Time < 4 sec	Complex Yoga Commands are longer	Test each Yoga instruction on speech synthesis tool

Project Management

Chelsea	Yellow
Tian	Red
Sandra	Blue
Together	Grey

Task	Phase 1		Phase 2		Phase 3			
	Now - Mar 8		Mar 17 - April 1		April 2 - May 6			
Construct Verbal Instruction Library	Chelsea							
Generalize Verbal Instruction Methods	Sandra	Sandra						
Refine of Standard Yoga Pose Library	Tian	Tian						
Integration of Angle Metrics and Verbal Instruction		Together						
UI Design + Implementation			Chelsea	Chelsea				
Calibration			Sandra	Sandra				
WebCam Testing			Tian	Tian				
Basic User Testing			Together					
Integrate Remaining Components				Together				
Integration of Additional Poses					Together	Together	Together	
User Testing								Together