Team B7

Virtual Yoga Coach

Areas: Software Systems and Signals & Systems

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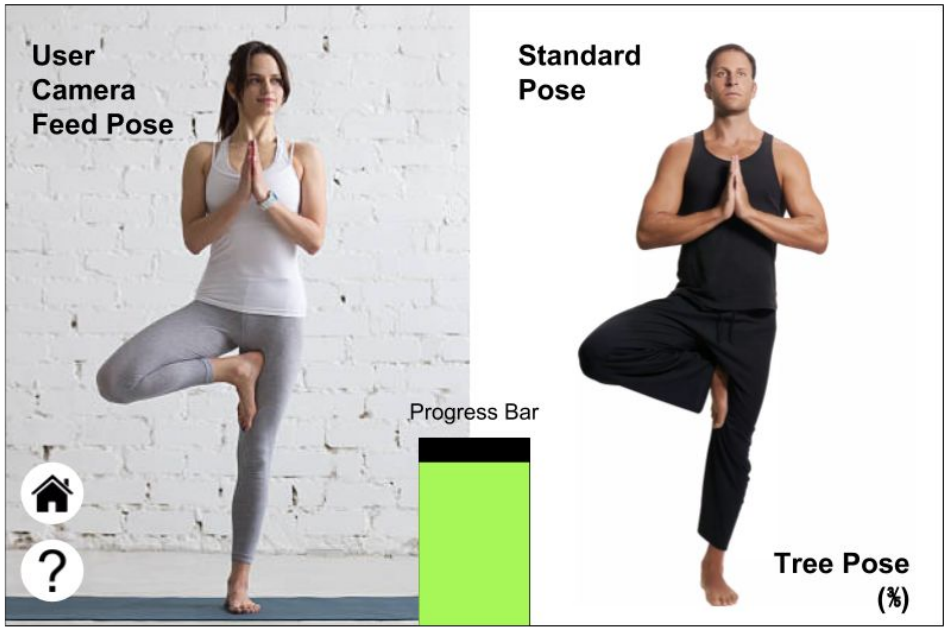
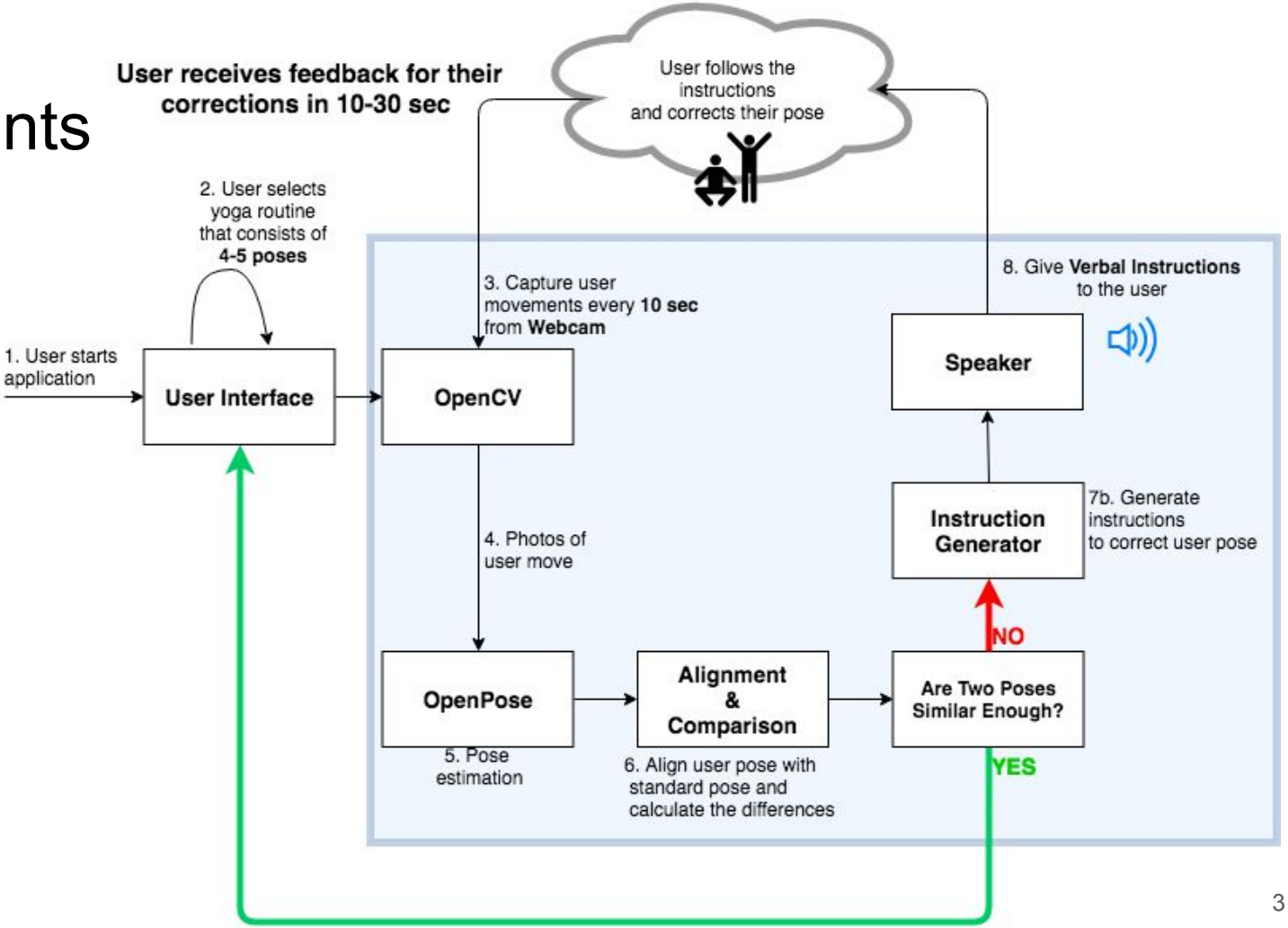
Use case

- Virtual Yoga Coach to minimize injuries during an at-home yoga practice for a single user
- Walk users through 4-5 yoga routines
- Allows users to set the pace at beginning of practice
- Give real-time feedback (verbal and visual cues) to improve the user's practice based on webcam images, user height, arm span, and gender

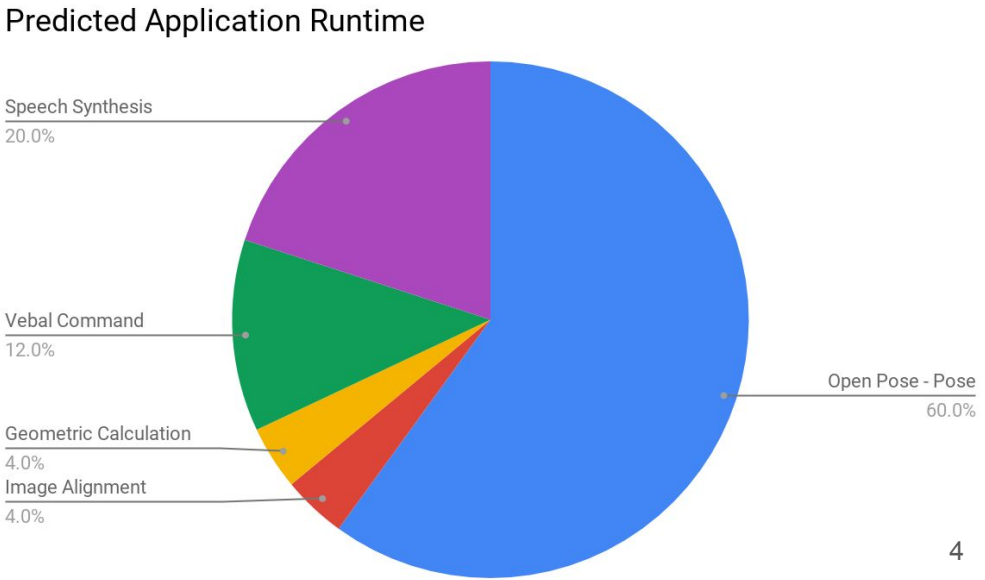


Requirements

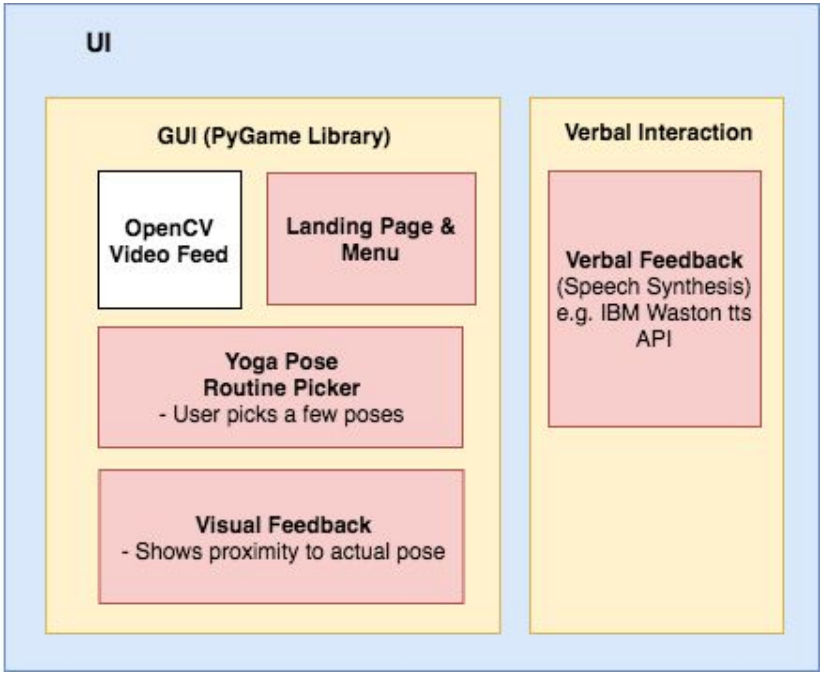


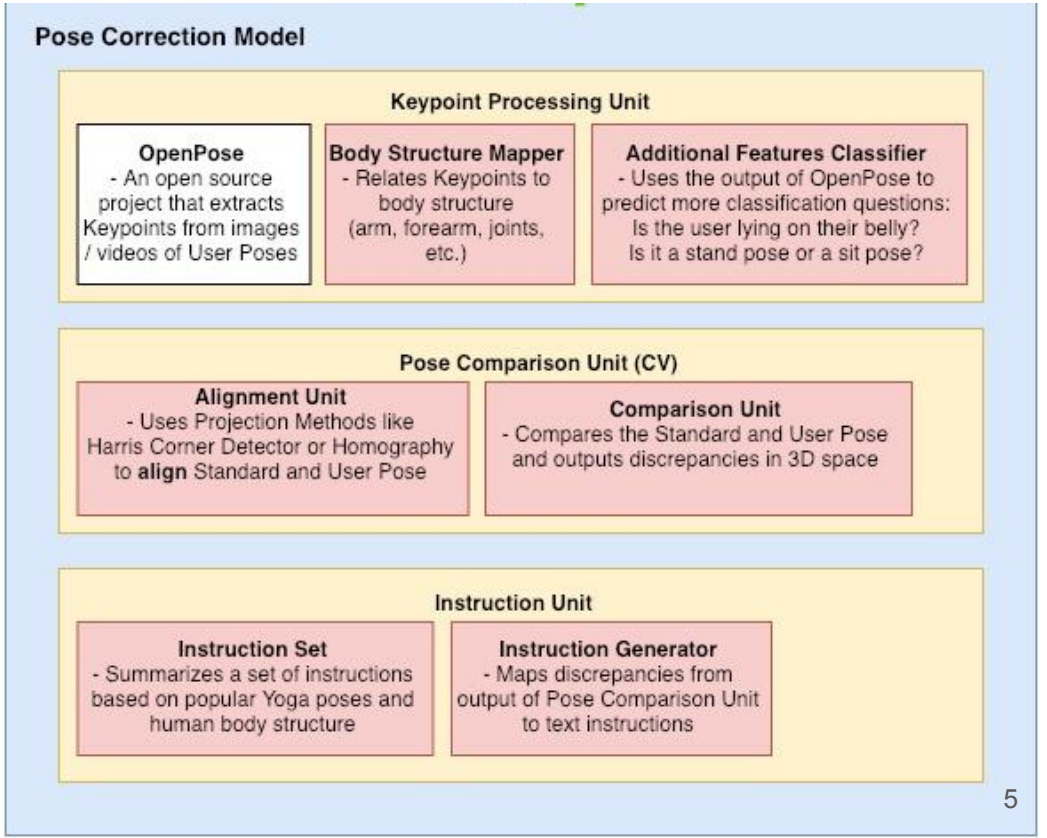
Requirements (Key Challenge)

- Pose Correction Model:
  - Be generic enough to be applicable to a variety of different yoga poses.
  - Controls for size differences in the images and low camera quality.
- Verbal Instruction Generation
  - Describes motion in a way that a variety of people understand.
  - Converts mathematical data such as angles into easy-to-follow instructions.
  - Gives instructions in appropriate order when multiple limbs are out of place.
- Runtime



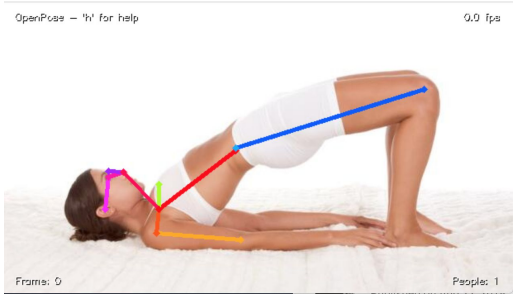
Solution Approach - Architecture

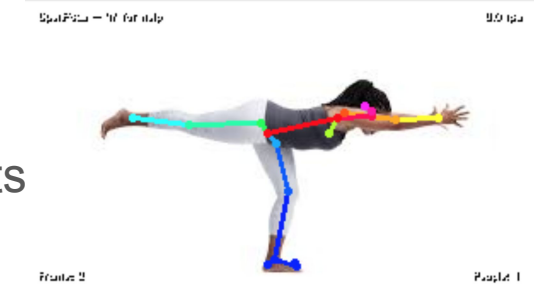


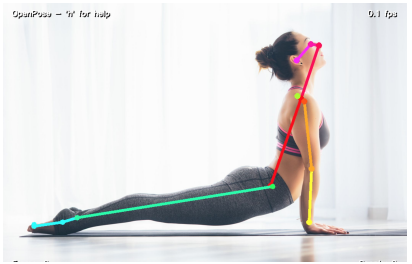


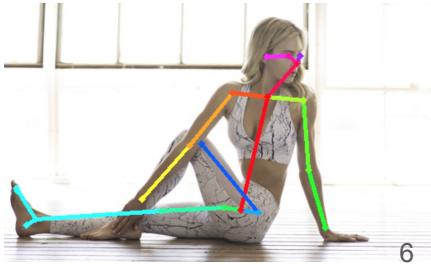
Solution Approach (Pose Correction)

- Existing Features and Functionality (OpenPose)
  - Compute key points of human poses from images/videos/gifs
  - Estimate face / body / hands / feet from a pose
- Pose Alignment for Standard Affine Transformations/Homography to alight the poses
- Computing Geometric Differences for Multiple Body Parts
- Our Generated Pose Estimation on Yoga Poses



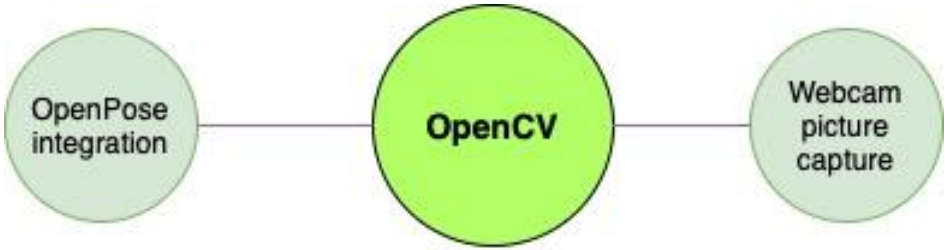






Solution Approach - Frontend

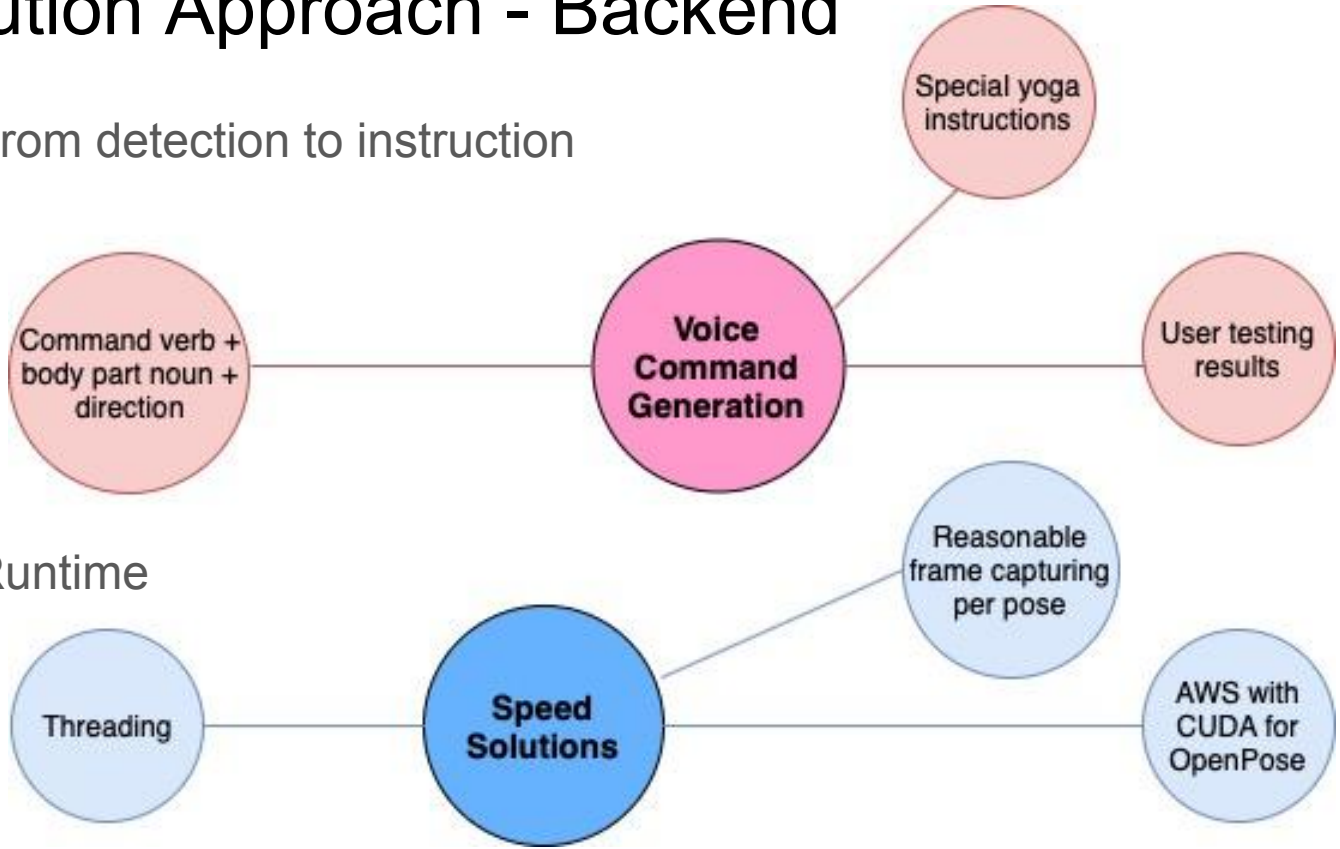
- Camera feed



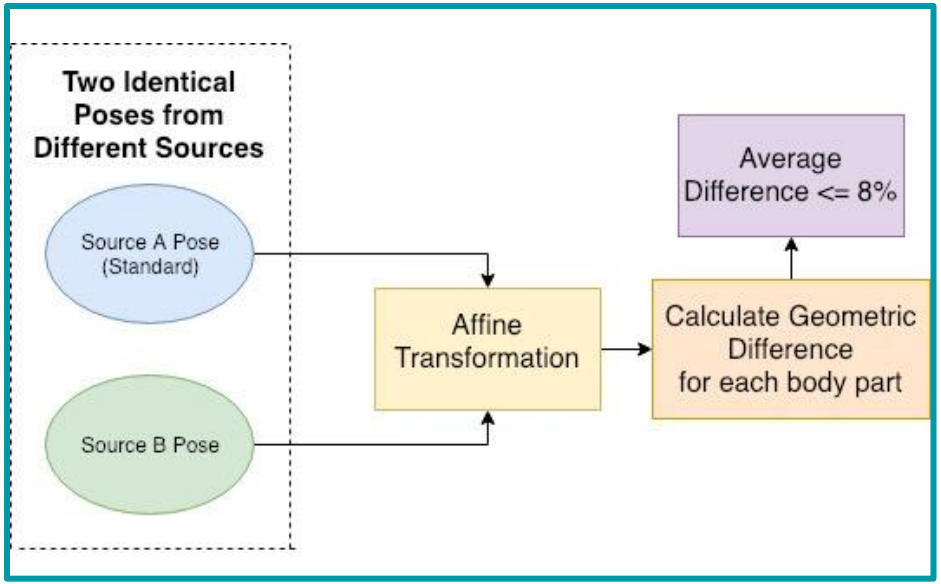
- Instructions to users

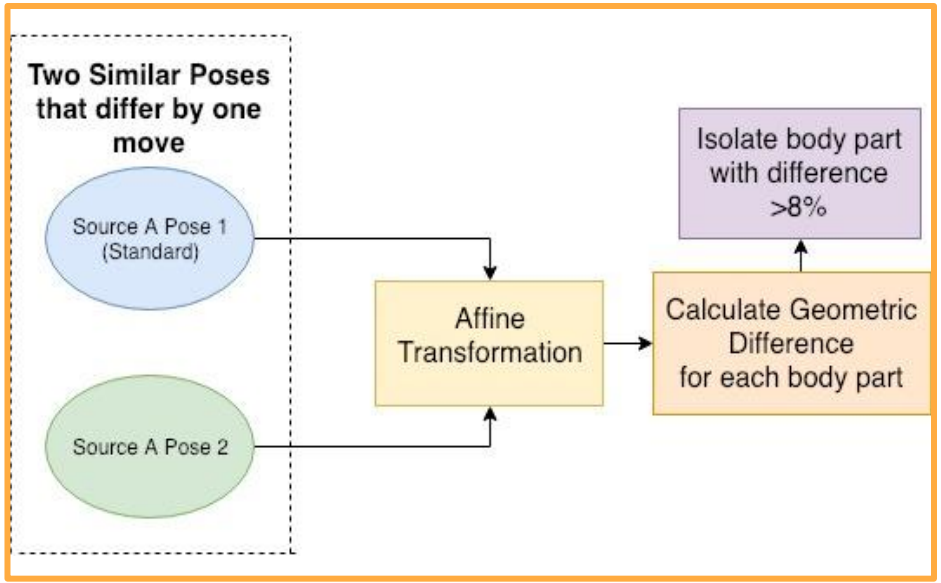
Solution Approach - Backend

- From detection to instruction
- Runtime

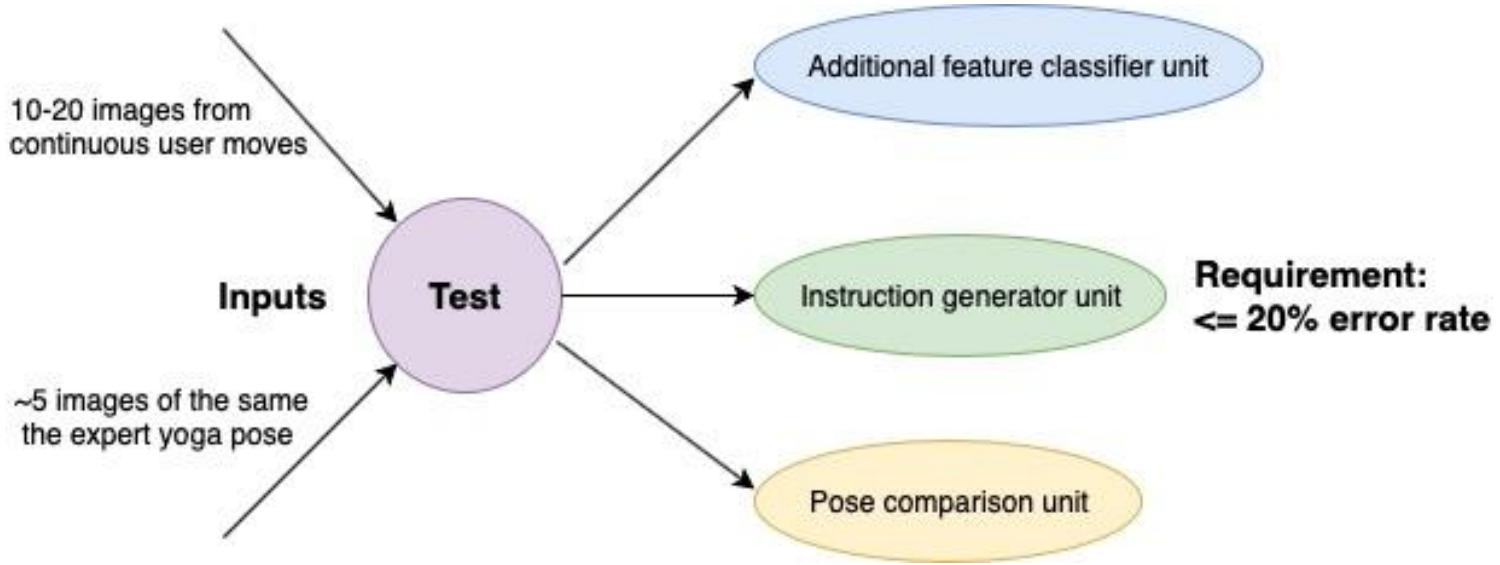


Testing, Verification and Metrics - Pose Alignment





Testing, Verification and Metrics - Pose Correction



Testing, Verification and Metrics - Overall Application

User Studies

20 - 30 Participants do same Sun Salutation Routine

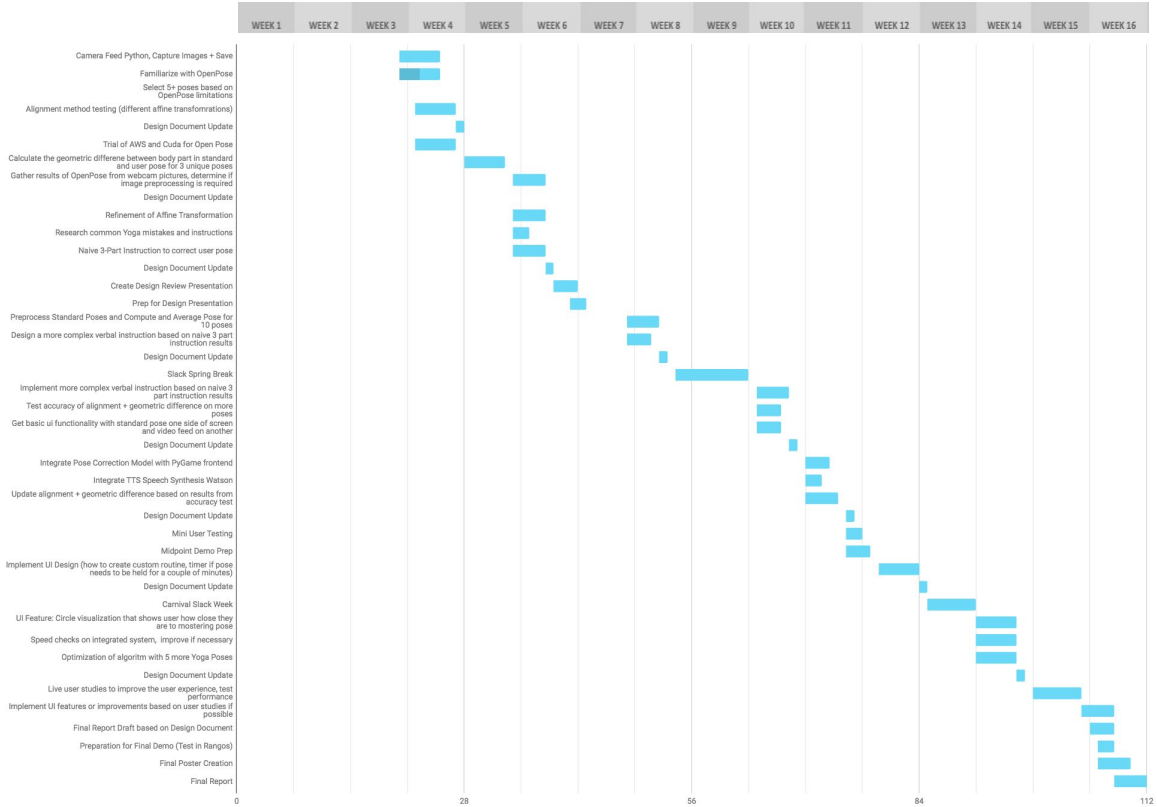
Quantitative Data

- False Positives Count
- Yoga Level
- Height and Arm Span
- Routine Duration

Qualitative Data

- Usability
- Verbal Commad Helpfulness
- Use Again?
- Opinion on Timing

Division of Labor & Schedule



Stakeholder	**Component**
Chelsea	User Interface
Sandra	Pose Alignment
Tian	OpenPose Integration; Verbal Instructions