Smart Mirror: Final Presentation

Team B8

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Application Area

Lulu Lemon’s MIRROR

HiMirror Vanity

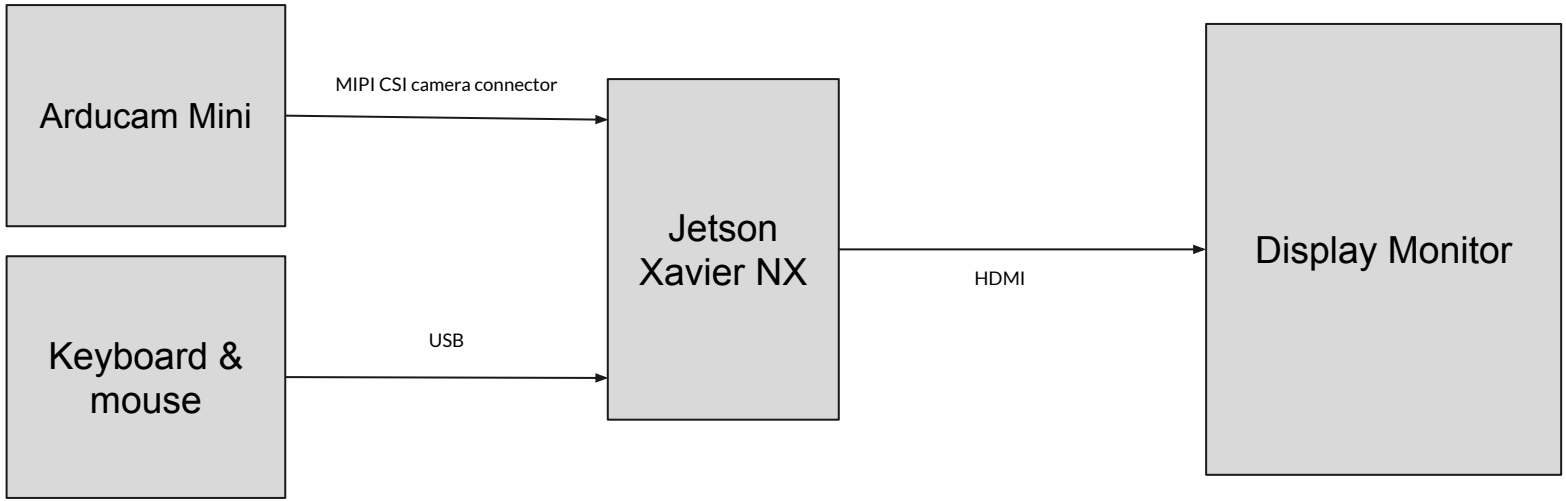
DIY Smart Mirror

Solution Approach (overall)

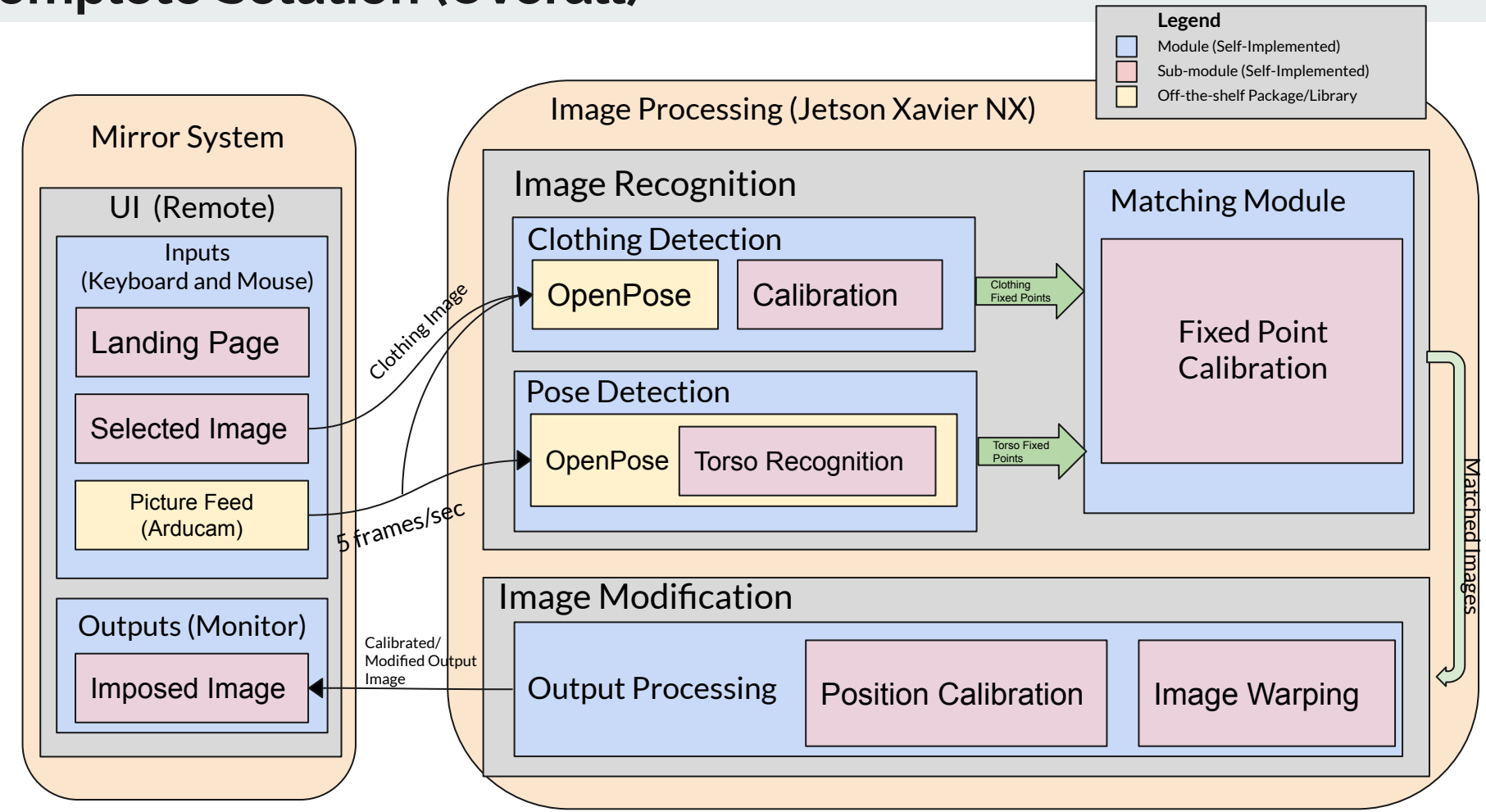
We want to make a simple, inexpensive and accessible smart mirror that utilizes a torso recognition computer vision algorithm to allow users to select and try on tops.*

*Note: to maintain manageable scope, we are limiting our recognition algorithm to tops only.

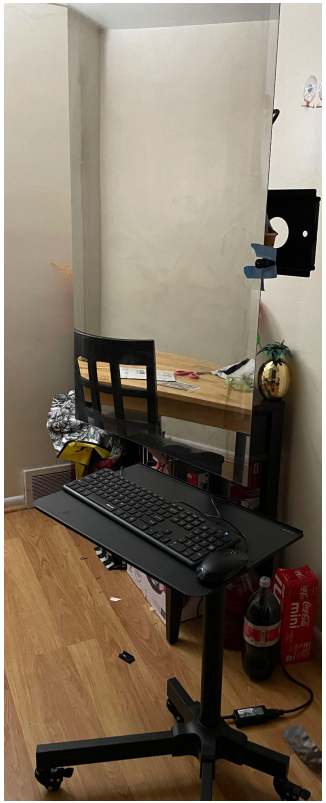
Complete Solution (hardware)



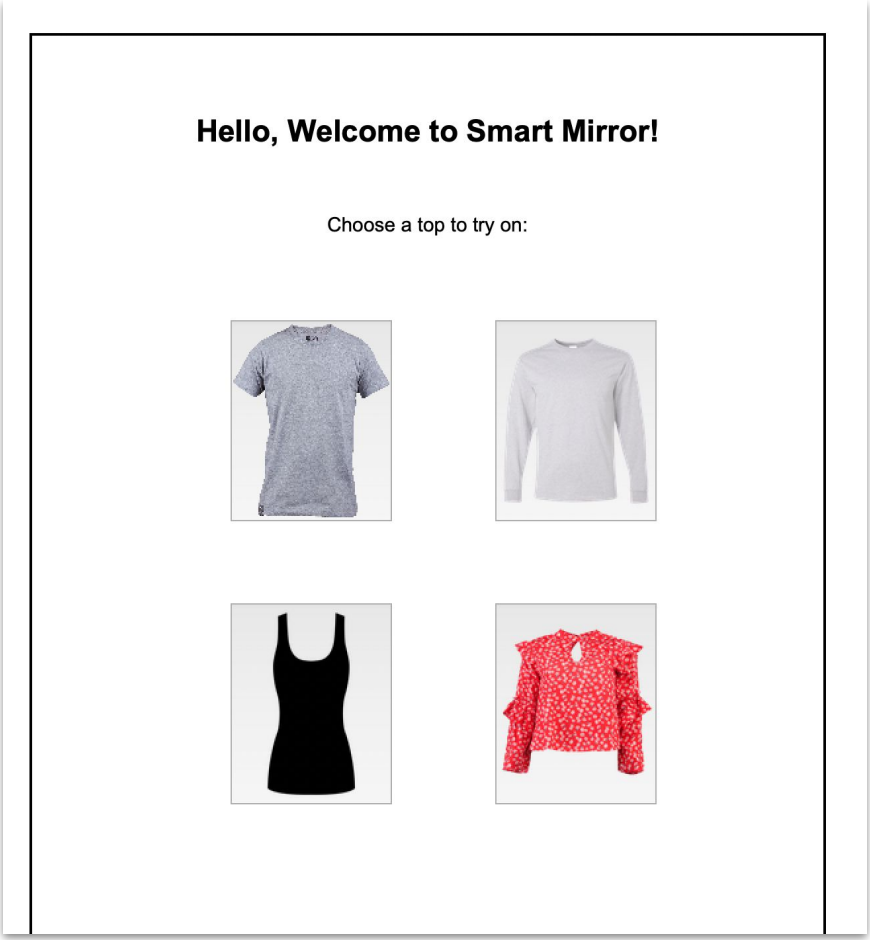
Complete Solution (Overall)



The Mirror



The Interface



Testing, Metrics, Validation

Requirement	Test	Metrics
Clothing Image Processing Speed	Time Decorator/Stopwatch	~5.5 seconds
OpenPose Torso Detection	Analyze fixed points	100% precision
Clothing/Torso Matching	Ran on 2032 model images, manually pick passable images	68% precision
Camera/Mirror Calibration	Display video feed over mirror	30 fps

Testing Results: Clothes Matching

- Tested 2032 images
- From a sample of 100, 68 are passable, better than the 50% goal we originally had previous set
- Criteria:
  - Center alignment
  - Low percentage of body shown
  - Neck alignment is a good indicator
- Observation:
  - Doesn't work well on models that have angled or unconventional poses
  - We assume similar conditions for our mirror (well lit, minimal background)

Testing: Clothes Warping

Tradeoffs

Hardware Tradeoffs

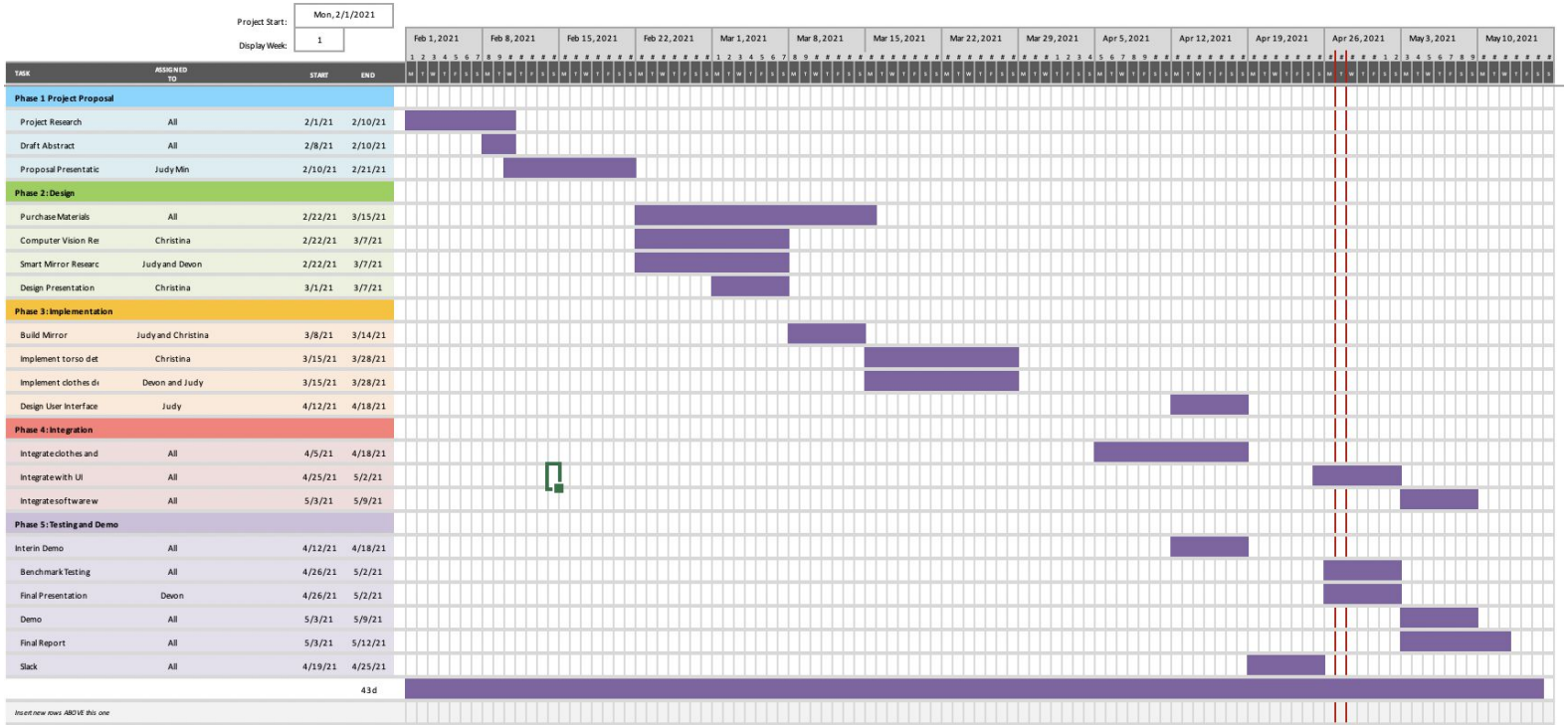
- Acrylic vs glass mirror
- IR touch frame vs keyboard & mouse
- TV stand vs frame
- Xavier NX vs nano

Software Tradeoffs

- OpenPose processing speed on Jetson is an average of 5.5 seconds vs our goal of 3.5 seconds
  - Optimizing speed from 5.5 to 3.5 seconds was not a priority
- Matching
  - Using OpenPose on clothing as opposed to a designated clothing detection algorithm made matching very intuitive

Project Management

Smart Mirror



Project Start: Mon, 2/1/2021
Display Week: 1

TASK	ASSIGNED TO	START	END
Phase 1 Project Proposal			
Project Research	All	2/1/21	2/10/21
Draft Abstract	All	2/8/21	2/10/21
Proposal Presentatic	Judy Min	2/10/21	2/21/21
Phase 2: Design			
Purchase Materials	All	2/22/21	3/15/21
Computer Vision Re	Christina	2/22/21	3/7/21
Smart Mirror Researc	Judy and Devon	2/22/21	3/7/21
Design Presentation	Christina	3/1/21	3/7/21
Phase 3: Implementation			
Build Mirror	Judy and Christina	3/8/21	3/14/21
Implement torso det	Christina	3/15/21	3/28/21
Implement clothes d	Devon and Judy	3/15/21	3/28/21
Design User Interface	Judy	4/12/21	4/18/21
Phase 4: Integration			
Integrate clothes and	All	4/5/21	4/18/21
Integrate with UI	All	4/25/21	5/2/21
Integrate software w	All	5/3/21	5/9/21
Phase 5: Testing and Demo			
Interin Demo	All	4/12/21	4/18/21
Benchmark Testing	All	4/26/21	5/2/21
Final Presentation	Devon	4/26/21	5/2/21
Demo	All	5/3/21	5/9/21
Final Report	All	5/3/21	5/12/21
Slack	All	4/19/21	4/25/21
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