

# Ubiquitous and Mobile Computing

## CS 403x: Perfect Form

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# Problem Statement

- Too many people are working out with incorrect form
- This can lead to...
  - Injury
  - Poor Results
  - Looking Stupid
- Nearly a **MILLION** Americans sustained a weight lifting injury between 1999 and 2007
- Perfect Form can help...



# Related Works

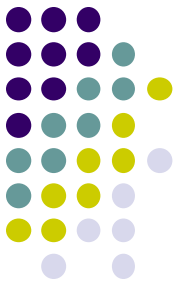
## Atlas Wearables

- Used to track exercise
- Automatically detects reps
- Does not track accuracy of movement

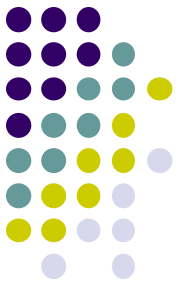


## Exercise Apps

- Google Fit



# Vision

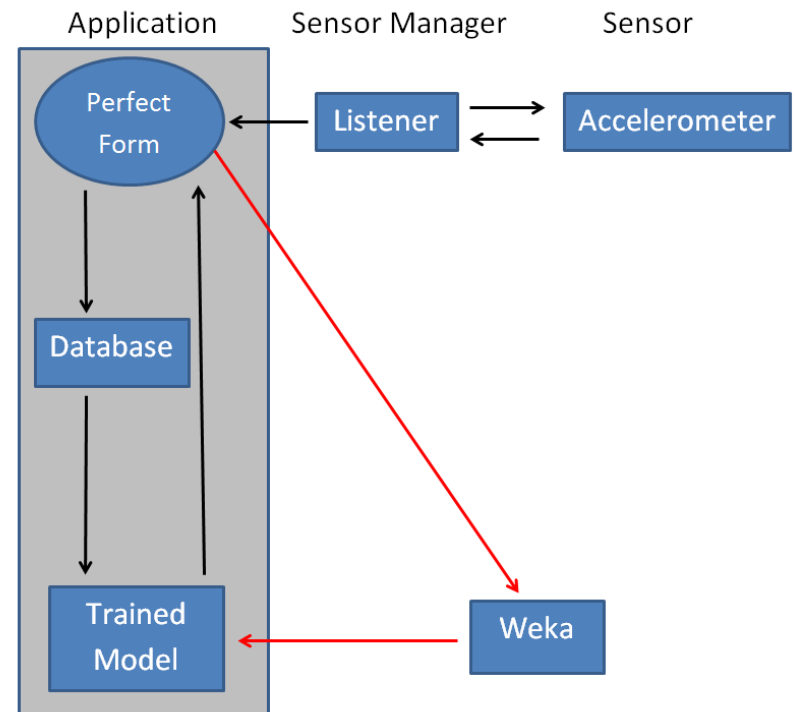


- If time and resources were no issue...
- An app that gives you live feedback about your workout form
  - Particularly with lifting exercises
  - Visual representation of sensor data vs. correct form
- User Accounts
  - Users could post, download, and rate workouts
  - Extensions for athletic trainers and clients

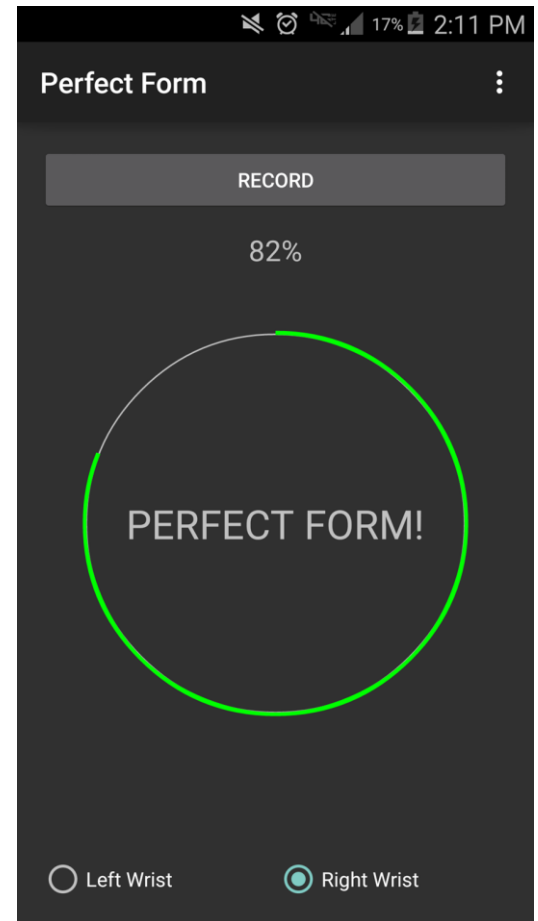
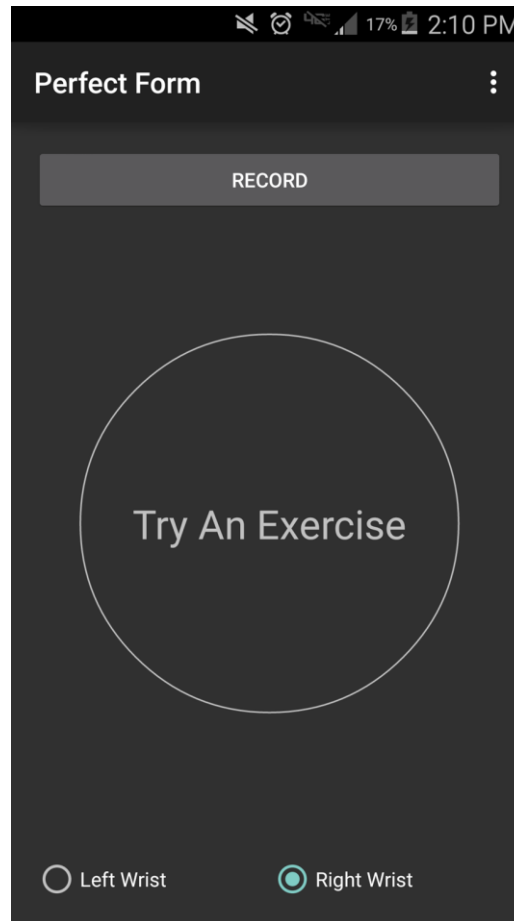
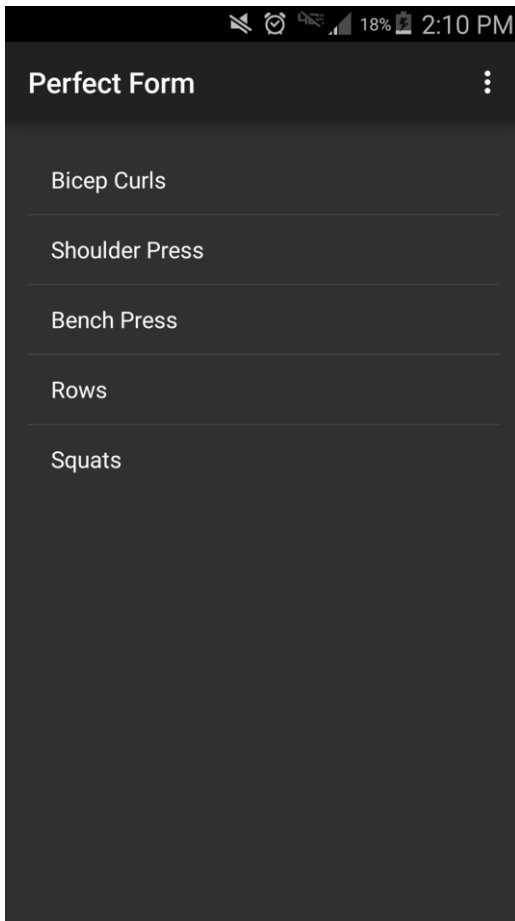
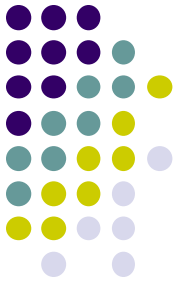
# Methodology/Implementation



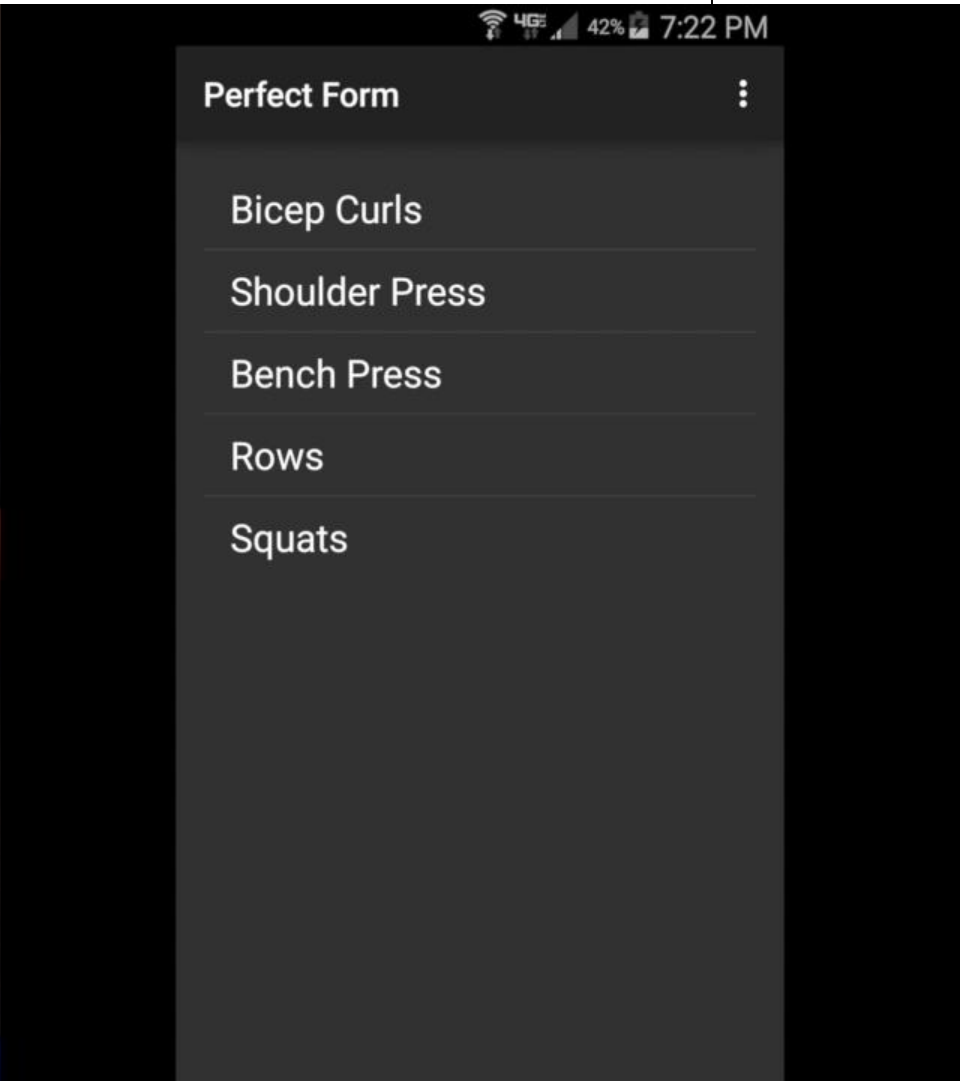
- Find a way to accurately fit recorded data to test data
  - Train the app to function correctly with one workout
    - Bicep Curls
- Give the user a visual representation of progress



# Screenshots



# Demo





# Results

User study performed with 4 students

Left Arm

Test #	True Positive	True Negative	False Positive	False Negative
1	5	4	1	0
2	5	0	0	5
3	4	2	3	1
4	5	5	0	0

Right Arm

Test #	True Positive	True Negative	False Positive	False Negative
1	4	3	2	1
2	0	5	0	5
3	5	4	1	0
4	0	5	0	5

Overall Accuracy: 70%





# Future Work

- Smartwatch integration
- Add more workouts
- Implement a more complex algorithm
  - Recursive Neural Networks
- Implement a cloud database
  - Google Fit
- Social aspects



Samsung Gear

# References



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- 7) Klein, Sarah. "Fix Your Form: How To Do The Perfect Bicep Curl." *The Huffington Post*. TheHuffingtonPost.com, 26 June 2012. Web. 02 May 2016.
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