



Project Management and Software Development

# A Vision Based Anthropometric Scanner

Final Presentation

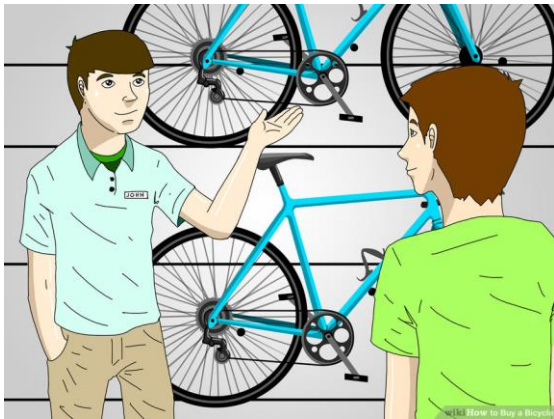
Ahmed El-Gazzar

Supervisor : Benjamin Busam



# Problem Statement

## Buying a bicycle



<http://www.wikihow.com/Buy-a-Bicycle>



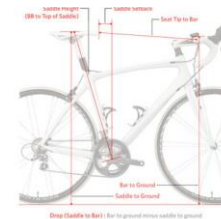
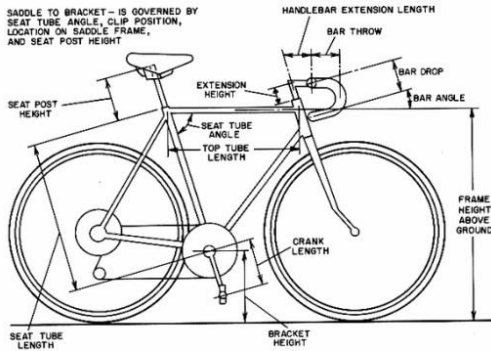
## It's not that simple!



# Problem Statement

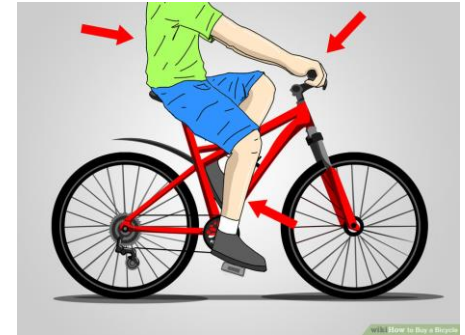
An optimum bicycle provides:

- Comfort
- Safety
- Injury prevention
- Peak performance

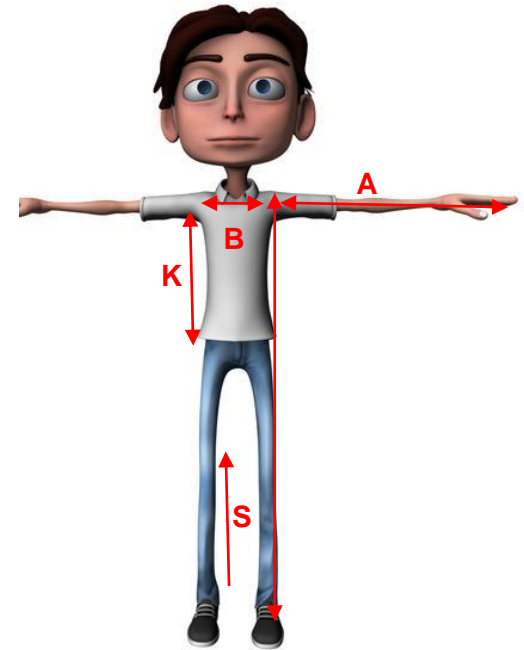
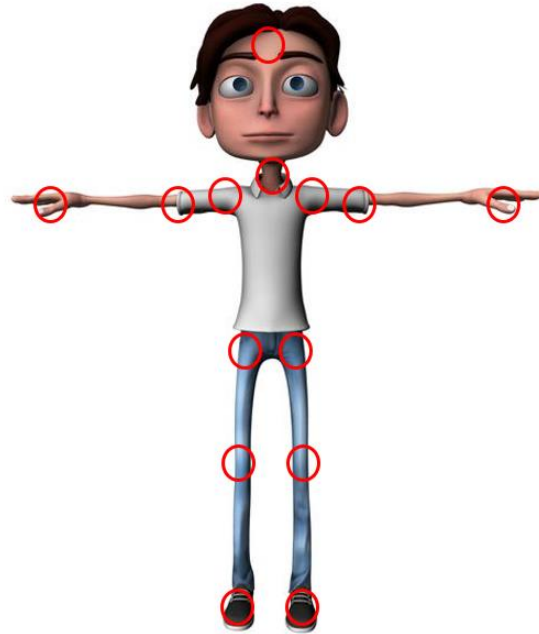


# Our Approach

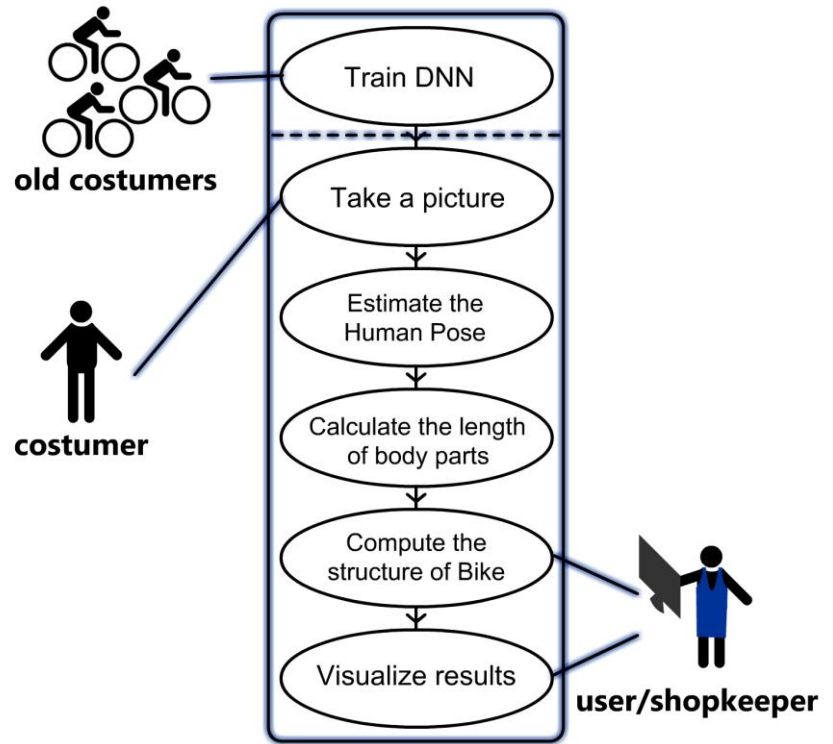
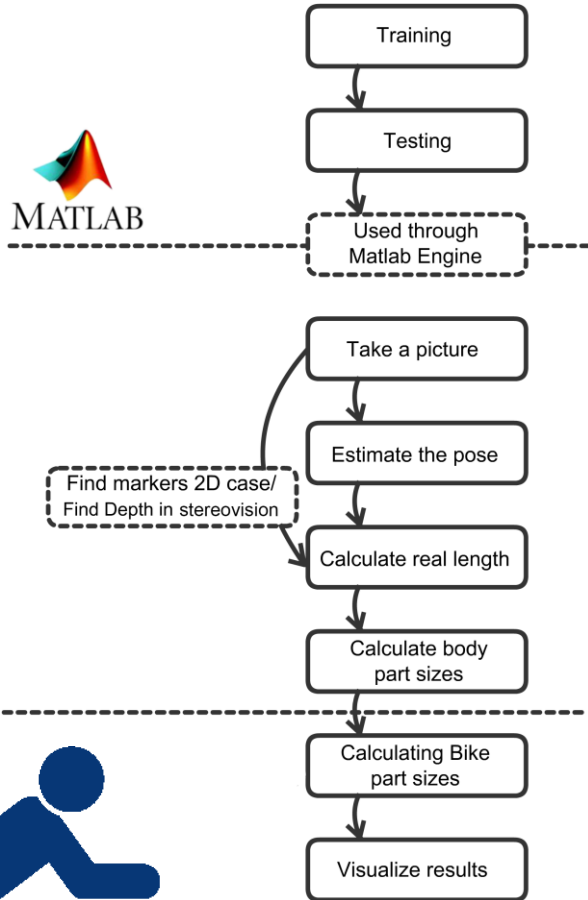
 Fitting a bike to the customer based on pose estimation



# Overview

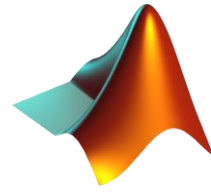


# Procedure breakdown

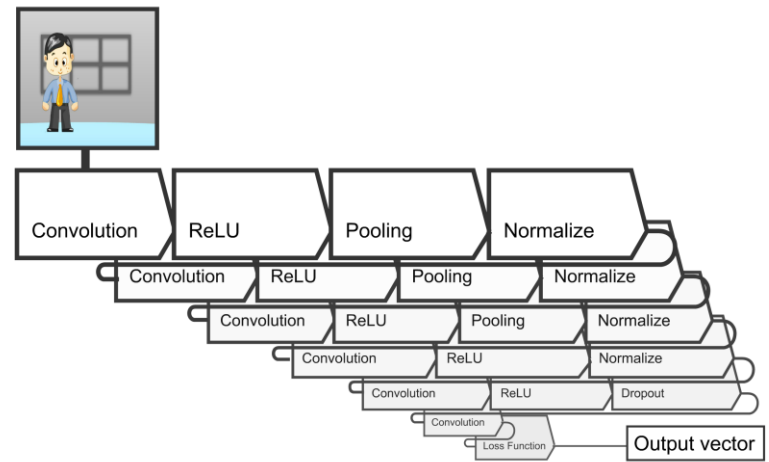


# Network Training

- Implemented in Matlab using MatConvNet.



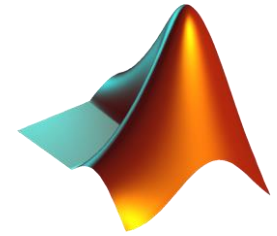
- Convolutional Neural Network.



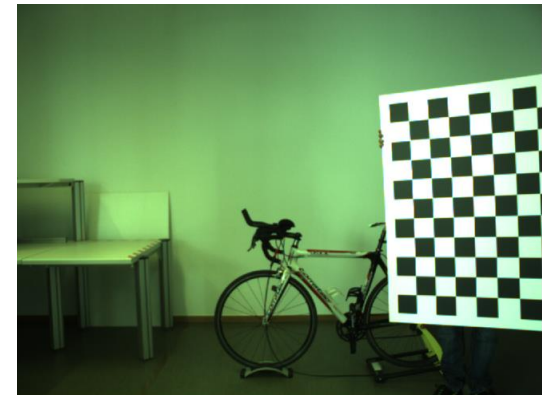
- Trained using the Leeds Sports Pose Dataset.



# Camera Calibration

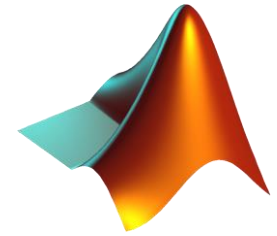


- ⚙️ Tens of images with checkerboard and Bicycle
- ⚙️ Intrinsic Camera Parameters calculated and stored






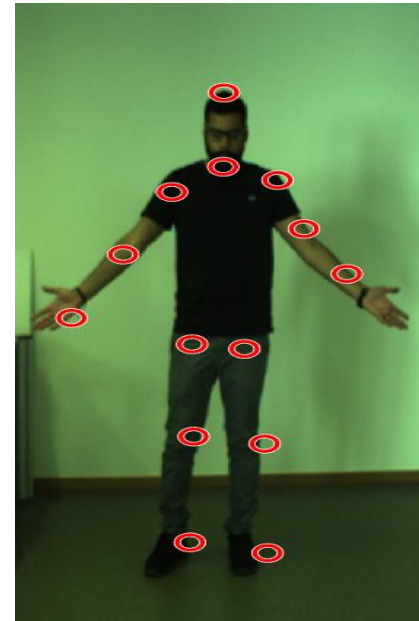
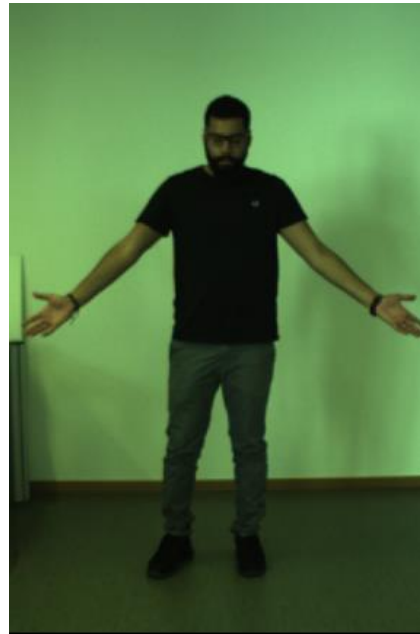


# Pose Estimation

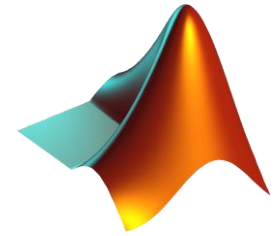


## Pose estimation




-  Human region is cropped
-  CNN validation
-  14\*2 outputs extracted and drawn

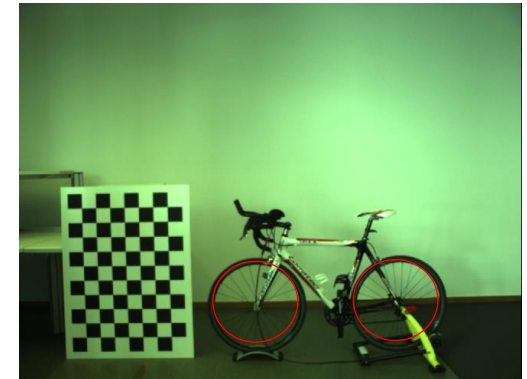


# Image to World



## Real pose estimation

-  Bicycle images collected
-  Tires detected.
-  Tires radiuses and centers distance calculated



# Bicycle parameters

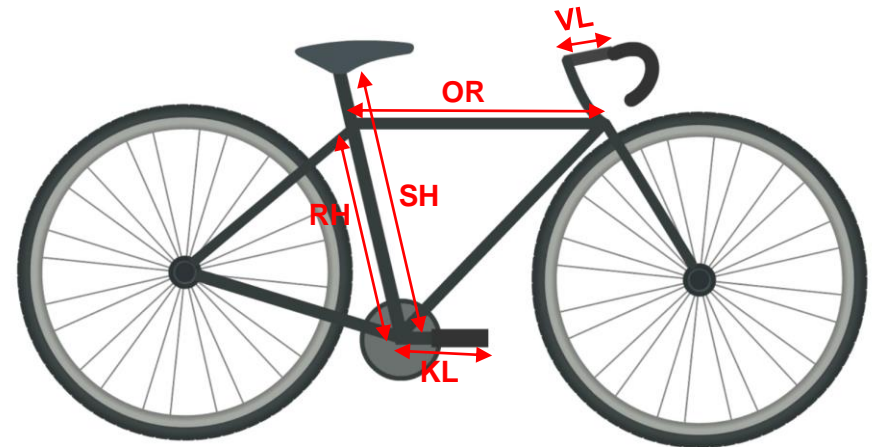
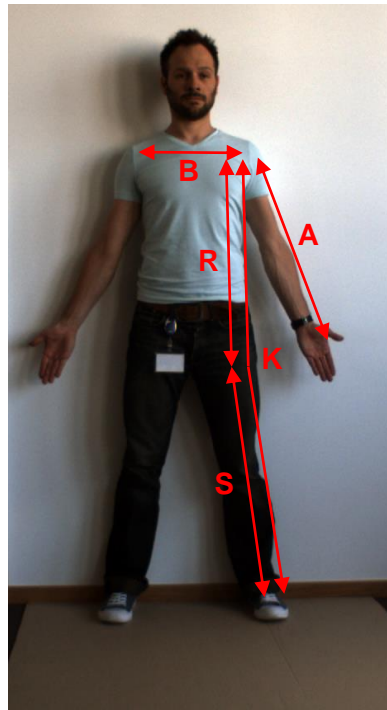


 Human body parameters extracted

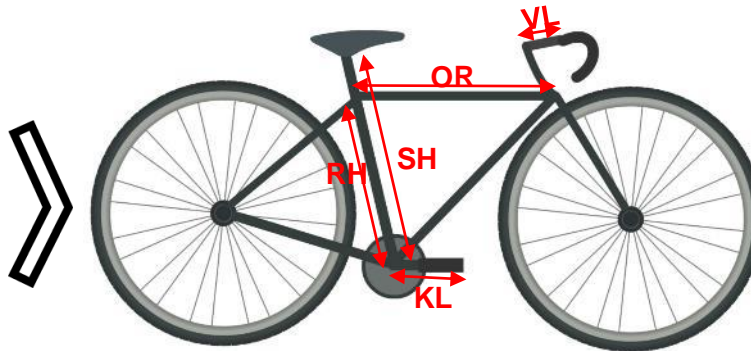
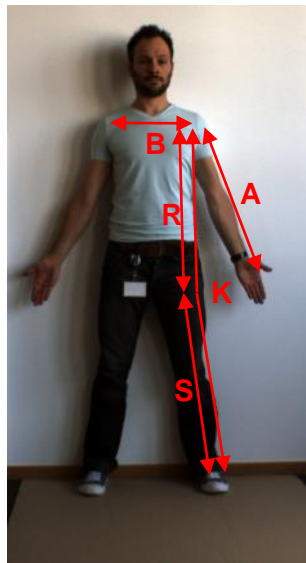
 Bicycle parameters calculated

 Formulas

 Tables



# Bicycle parameters



$$SH = R * 0.885$$

$$OR = (R + A) * H - A$$

Type	H
Touring	0,52
Sport	0,53
Racing	0,54

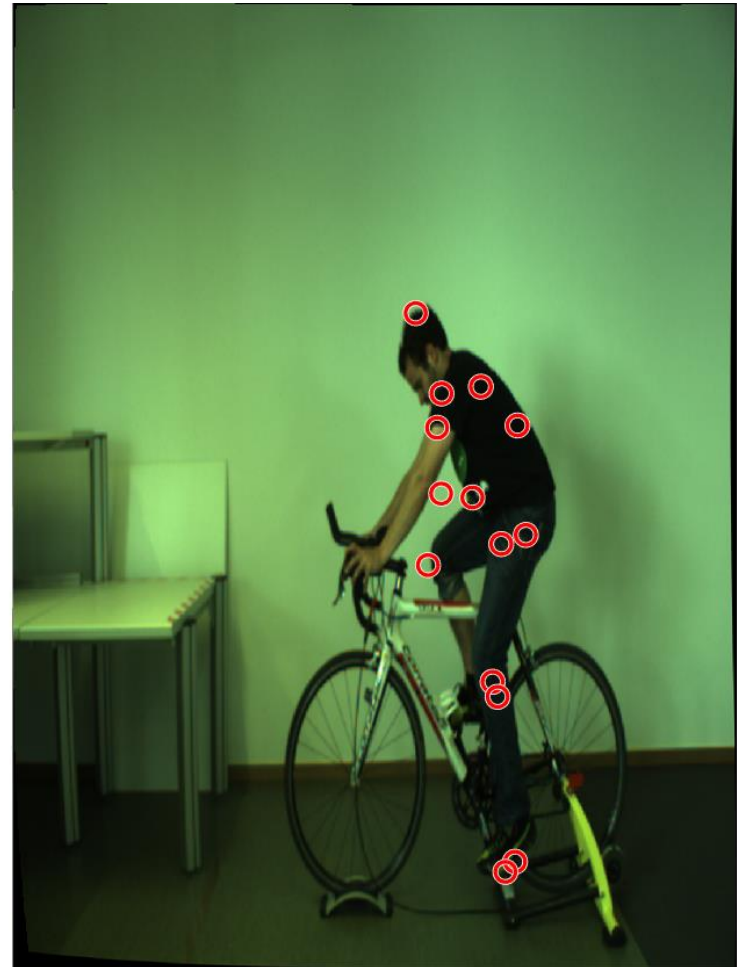
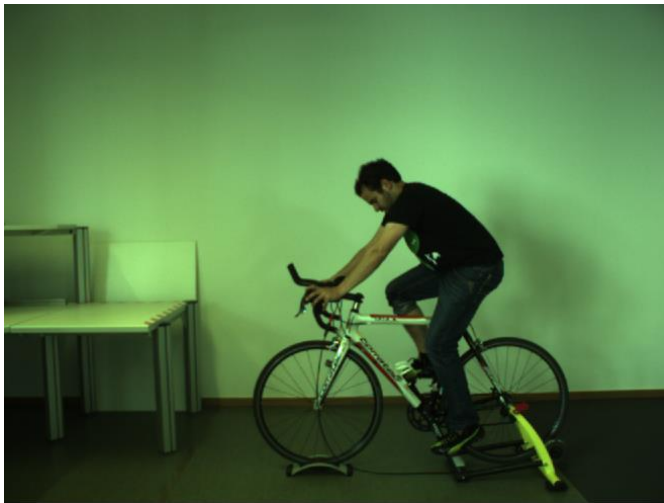
S (mm)	KL (mm)
≥ 700	165,0
≥ 730	167,5
≥ 760	170,0
≥ 790	172,5
≥ 820	175,0
≥ 860	177,5
≥ 900	180,0

Roadbike.de magazine, 10, 2012

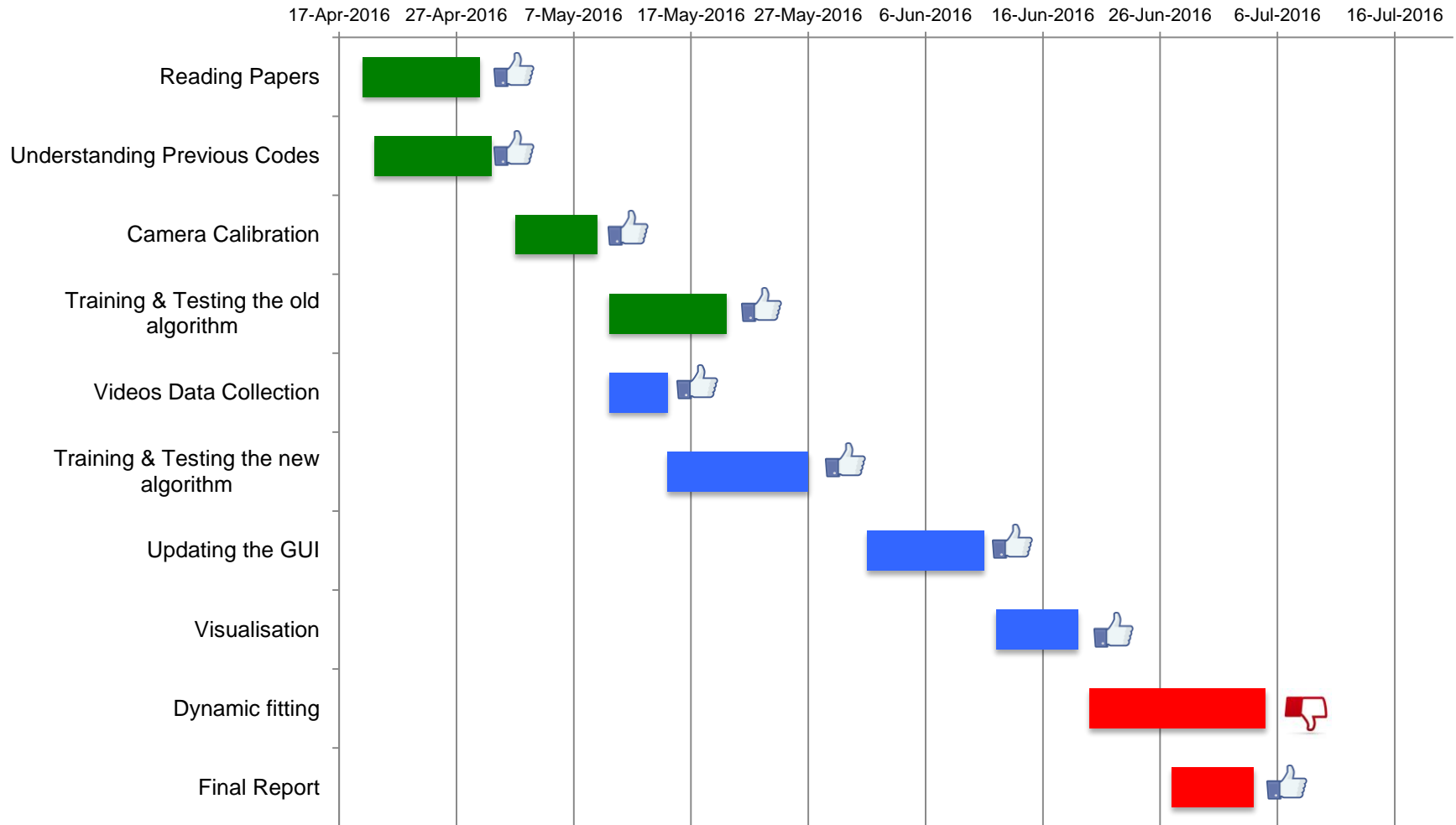


# Dynamic fitting

- ⌘ Pose on the bicycle
- ⌘ Video Capturing
- ⌘ Results were not satisfactory



# Gantt Chart




Created with Microsoft Excel

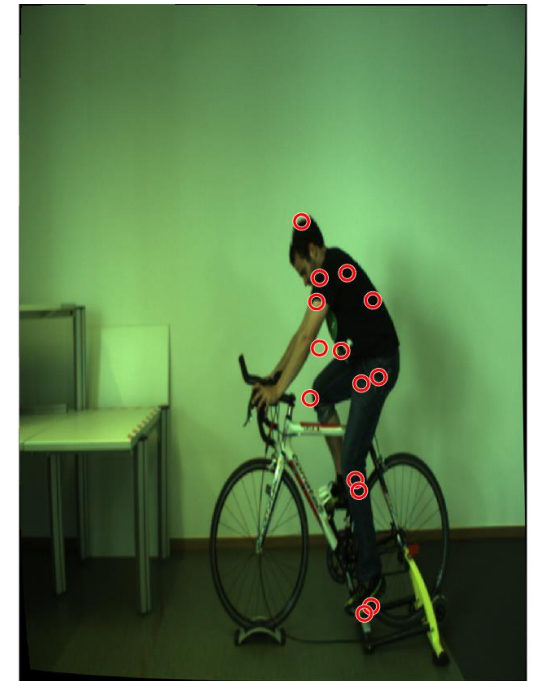
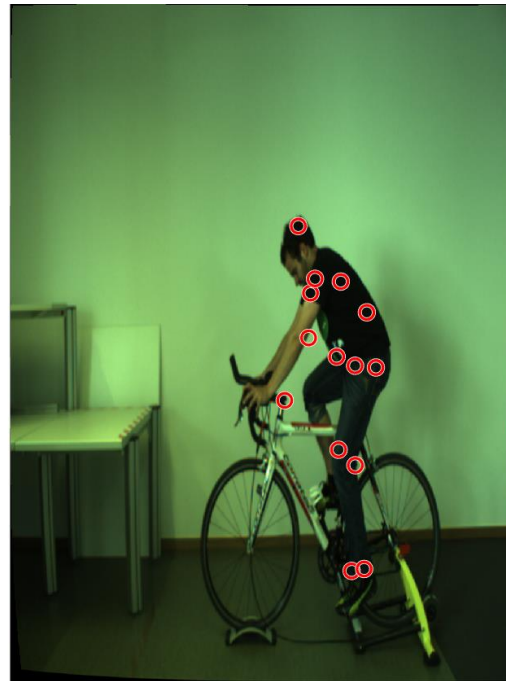
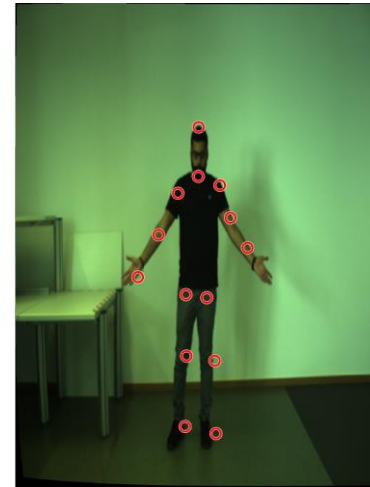


# Project Outlook

 Create a customized dataset

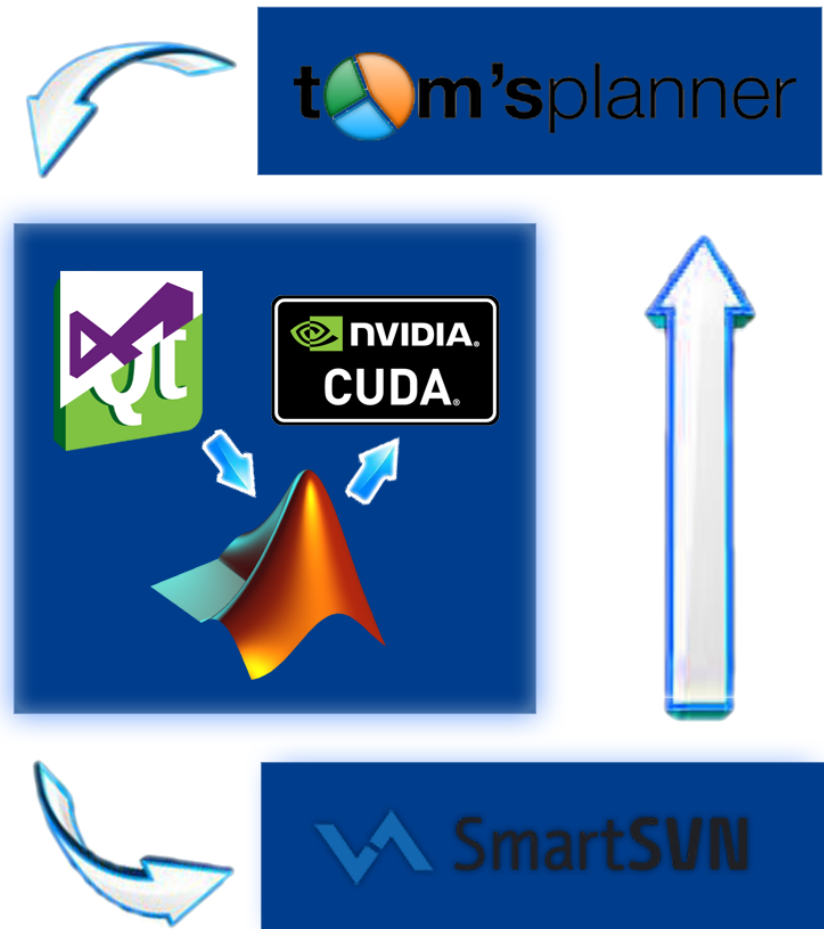
 Retrain network

 Optical flow



# Lessons Learned

- ⚙ Deep Learning in action
- ⚙ Connecting different parts
- ⚙ Time management
- ⚙ Work presentation





 **Thank you for your attention!** 

