

# Person Following Robots



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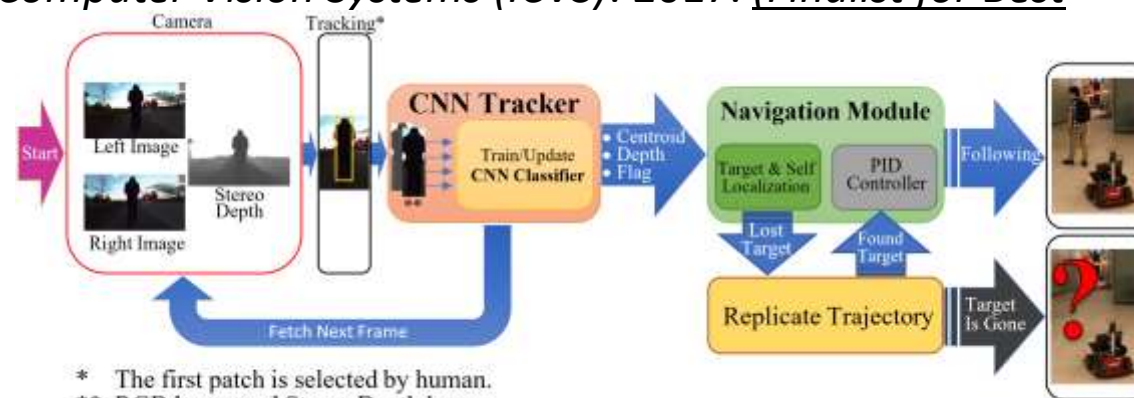


# Person Following Robots: 2 approaches

## • Using Selected Online Ada-Boosting

- Chen, Bao Xin, Raghavender Sahdev, and John K. Tsotsos. “Integrating Stereo Vision with a CNN Tracker for a Person-Following Robot.” *International Conference on Computer Vision Systems (ICVS)*. 2017. (Finalist for Best Paper Award)

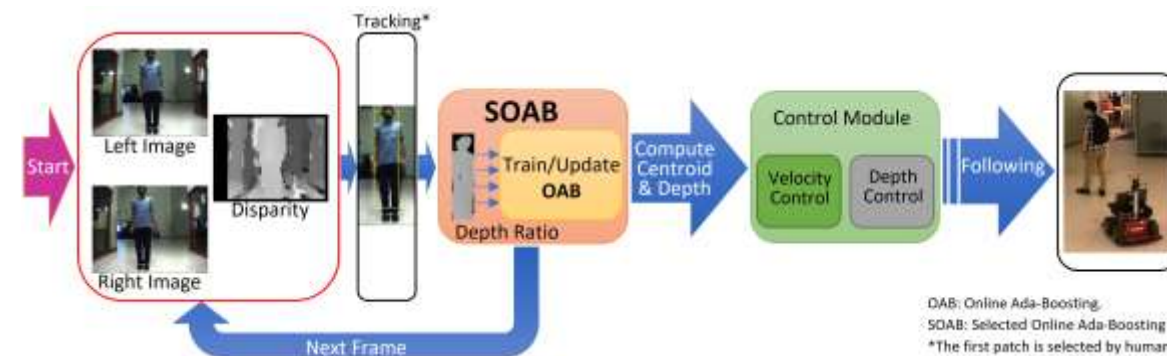
- Uses Depth information on top of Ada-Boosting
- Tested with 2 stereo cameras (ZED and Bumblebee 2)
- Works at 15fps on 2<sup>nd</sup> Gen i7 CPU



## • Using CNNs

- Chen, Bao Xin, Raghavender Sahdev, and John K. Tsotsos. “Person following robot using selected online ada-boosting with stereo camera.” In *Computer and Robot Vision (CRV)*, 2017 14th Conference on, pp. 48-55. 2017. (Best Robotics Paper Award)

- CNN Trained Online
- Tested with 2 stereo cameras (ZED and Bumblebee 2)
- Works at 20fps on 7<sup>th</sup> Gen i7 with GTX 1060 GPU.



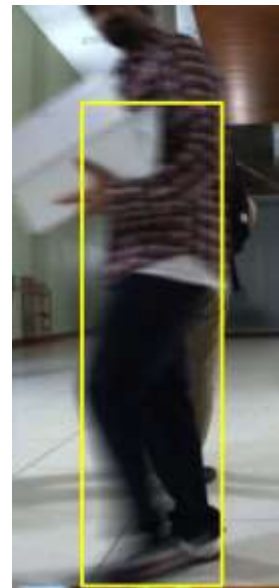
# Different cases our approach can handle



People Wearing Similar Clothes under occlusions


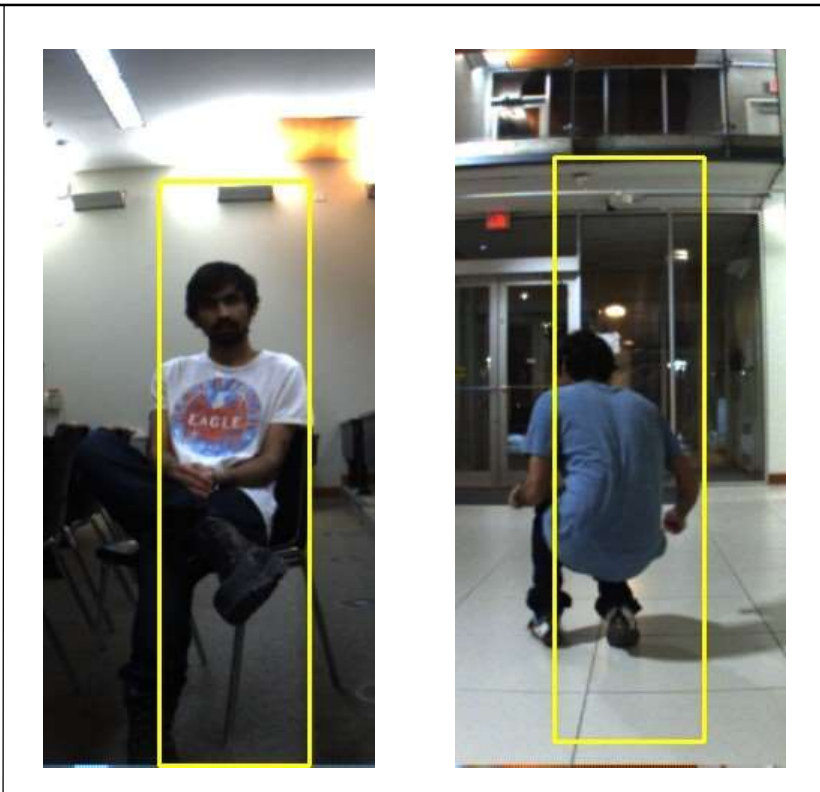

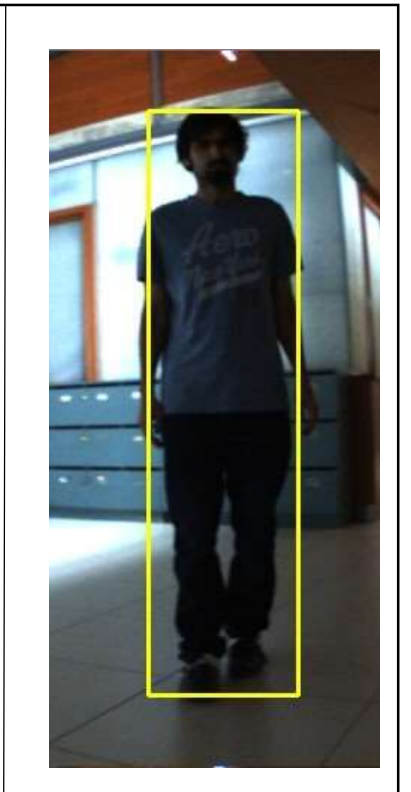


Appearance changes  
Person removes his jacket



Partial and complete Occlusions

# Different cases our approach can handle

			
<p>Picking up and bag</p>	<p>Sitting and crouching</p>	<p>Facing side to the robot</p>	<p>Illumination changes</p>

# Integrating Stereo Vision with a CNN Tracker for a Person-Following Robot



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& International Computer Vision Summer School (ICVSS 2017), Sicily, Italy, July 9-15, 2017



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## Selected Online Ada-Boosting (SOAB) Based Approach

- Built on top of Ada-boosting approach, runs at 15fps at 2<sup>nd</sup> Gen i7
- Tested in 4 different places, dataset publicly available
- Can follow any object not just human

# Videos



## CNN Based Approach

- CNN trained online in real time, tracking runs at 20fps on a 7<sup>th</sup> Gen i7 with GTX 1060 GPU
- Tested in 11 different places, dataset publicly available
- Can follow any object not just human

## Person Following Robot using Selected Online Ada-Boosting



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# Conclusion

- Project pages links with videos:
  - <http://jtl.lassonde.yorku.ca/2017/05/person-following-cnn/>
  - <http://jtl.lassonde.yorku.ca/2017/02/person-following/>
- Code:
  - We are selling it, looking for buyers
  - Contact me [raghavendersahdev@gmail.com](mailto:raghavendersahdev@gmail.com) or +1-647-518-4406 for more details
- Acknowledgement
  - NSERC Canadian Network on Field Robotics
  - Canada Research Chairs Program
  - All participants in the videos (Amir, Bikram, Omar, Oscar, Toni)
  - Video Credits: Sidharth