Computer Senior Seminar Research Paper Proposal

By Matthew Clark

**Synopsis**: In recent years, due to significant improvements to sensor and processing power and capability, major milestones have been made in the field of autonomous vehicles. As a result, the automotive industry and consumers have developed a deep interest in the substantial socioeconomic impact autonomous vehicles have. (Maybe *just* worthy for introduction and not included in the abstract) To realize full autonomous driving, the vehicle must have reliable object detection systems. Lidar, cameras, and other proximity sensors are used to make this possible. Much of the current research and development is being poured into improving the performance of detecting lanes, signals, road signs, pedestrians, vehicles, and other unexpected objects. Detecting each type of object presents unique challenges and requires unique solutions. The analysis of the different object detection techniques for each type of object will provide an effective picture of the state of the field in its current form. Analyzing each technique will require identifying the problems, defining the reliability and robustness, measuring the performance, and evaluating the cost. For the goal of fully autonomous vehicles to be attained any time soon, finding and developing systems with the right hardware and software systems is vital. (revise for more formal language)

**References:**

1. [An, Jhonghyun; Choi, Baehoon; Sim, Kwee-Bo; Kim, Euntai. 2016. "Novel Intersection Type Recognition for Autonomous Vehicles Using a Multi-Layer Laser Scanner." Sensors 16, no. 7: 1123.](http://www.mdpi.com/1424-8220/16/7/1123)
2. [Bottino, Andrea; Garbo, Alessandro; Loiacono, Carmelo; Quer, Stefano. 2016. "Street Viewer: An Autonomous Vision Based Traffic Tracking System." Sensors 16, no. 6: 813.](http://www.mdpi.com/1424-8220/16/6/813)
3. [Gámez Serna, Citlalli; Ruichek, Yassine. 2017. "Dynamic Speed Adaptation for Path Tracking Based on Curvature Information and Speed Limits." Sensors 17, no. 6: 1383.](http://www.mdpi.com/1424-8220/17/6/1383)
4. [Rudolph, Gert, and Uwe Voelzke. "Three Sensor Types Drive Autonomous Vehicles." *Sensors Online*, November 10, 2017. Accessed January 27, 2018. https://www.sensorsmag.com/components/three-sensor-types-drive-autonomous-vehicles.](https://www.sensorsmag.com/components/three-sensor-types-drive-autonomous-vehicles)
5. Zhou, Yu, Xiang Bai, Wenyu Liu, and Longin Latecki. 2016. "Similarity Fusion for Visual Tracking." *International Journal Of Computer Vision* 118, no. 3: 337-363. *Academic Search Complete*, EBSCO*host* (accessed February 9, 2018).
6. Vondrick, Carl, Aditya Khosla, Hamed Pirsiavash, Tomasz Malisiewicz, and Antonio Torralba. 2016. "Visualizing Object Detection Features." *International Journal Of Computer Vision* 119, no. 2: 145-158. *Academic Search Complete*, EBSCO*host* (accessed February 9, 2018).
7. Ouyang, Wanli, Xingyu Zeng, and Xiaogang Wang. 2016. "Learning Mutual Visibility Relationship for Pedestrian Detection with a Deep Model." *International Journal Of Computer Vision* 120, no. 1: 14-27. *Academic Search Complete*, EBSCO*host* (accessed February 9, 2018).
8. Novak, Matt. "DARPA Tried to Build Skynet in the 1980s." Paleofuture. December 18, 2013. Accessed February 09, 2018. <https://paleofuture.gizmodo.com/darpa-tried-to-build-skynet-in-the-1980s-1451000652>.
9. "8 milestones of the history of self-driving cars." 8 milestones of the history of self-driving cars - Strand. November 2, 2017. Accessed February 09, 2018. ps://www.strandassociates.be/en/insights/ba-ict-and-digital-19-history-of-self-driving-cars.
10. Elbahri, Mohamed. "Parallel algorithm implementation for multi-object tracking and surveillance." *IET Computer Vision.*April 2016 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
11. Nawaf, Mohamad Motasem. "Fusion of dense spatial features and sparse temporal features for three-dimensional structure estimation in urban scenes." *IET Computer Vision.*October 2013 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
12. Lookingbill, A., J. Rogers, D. Lieb, J. Curry, and S. Thrun. 2007. "Reverse Optical Flow for Self-Supervised Adaptive Autonomous Robot Navigation." *International Journal Of Computer Vision* 74, no. 3: 287-302. *Academic Search Complete*, EBSCO*host* (accessed February 9, 2018).
13. [Hoang, Toan Minh; Baek, Na Rae; Cho, Se Woon; Kim, Ki Wan; Park, Kang Ryoung. 2017. "Road Lane Detection Robust to Shadows Based on a Fuzzy System Using a Visible Light Camera Sensor." Sensors 17, no. 11: 2475.](http://www.mdpi.com/1424-8220/17/11/2475)
14. [Meng, Xiaoli; Wang, Heng; Liu, Bingbing. 2017. "A Robust Vehicle Localization Approach Based on GNSS/IMU/DMI/LiDAR Sensor Fusion for Autonomous Vehicles." Sensors 17, no. 9: 2140.](http://www.mdpi.com/1424-8220/17/9/2140)
15. Bilal, Muhammad. "Algorithmic optimisation of histogram intersection kernel support vector machine-based pedestrian detection using low complexity features." *IET Computer Vision.*August 2017 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
16. Camplani, Massimo. "Multiple human tracking in RGB-depth data: a survey." *IET Computer Vision.*June 2017 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
17. Ding, Weili. "Efficient vanishing point detection method in unstructured road environments based on dark channel prior." *IET Computer Vision.*December 2016 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
18. Yu, Chong. "Text detection and recognition in natural scene with edge analysis." *IET Computer Vision.*August 2015 . Date Accessed: 2018/02/09. [www.lexisnexis.com/hottopics/lnacademic](http://www.lexisnexis.com/hottopics/lnacademic).
19. Law, Marc, Nicolas Thome, and Matthieu Cord. 2017. "Learning a Distance Metric from Relative Comparisons between Quadruplets of Images." *International Journal Of Computer Vision* 121, no. 1: 65-94. *Academic Search Complete*, EBSCO*host* (accessed February 9, 2018).
20. Schroeder , Tom S., Dr. "Suggested Dissertation Outline - Teachers College." Ball State University. July 2001. Accessed February 09, 2018. <https://cms.bsu.edu/academics/collegesanddepartments/teachers/academicprog/gradprograms/resources/doctoralguide/suggdissoutline>.

Helpful tips for writing and publishing a dissertation

* For presentation: identify the known problems
* This article may a good starting point for further research in the field described and reviewed above.
* **Going to conferences** is a wonderful resource for research and networking
  + Builds business connections that could lead to a deepening of resources
* Graduate Journals *“Harvard Graduate Journal”* may be a significant option instead of a top research journals for publication
* The type of journal is different. It is aimed at graduate students to earn credibility for gaining a PHD. There is a way to look up the ranking or journals: scimago – pick a field of research and rate by impact
* Why is my research needed? Why does it matter? What has been done, and what needs to be done?
* Dissertation - Need to prove that what I am presenting is original and/or what has been done is deficient in the field
* Feedback is **KEY and get to know the journals in my field**
* Journals sometimes do not always involve proving worth but instead focus on the research and advancements made with the research done. Journals do not need as much of a ligature review.