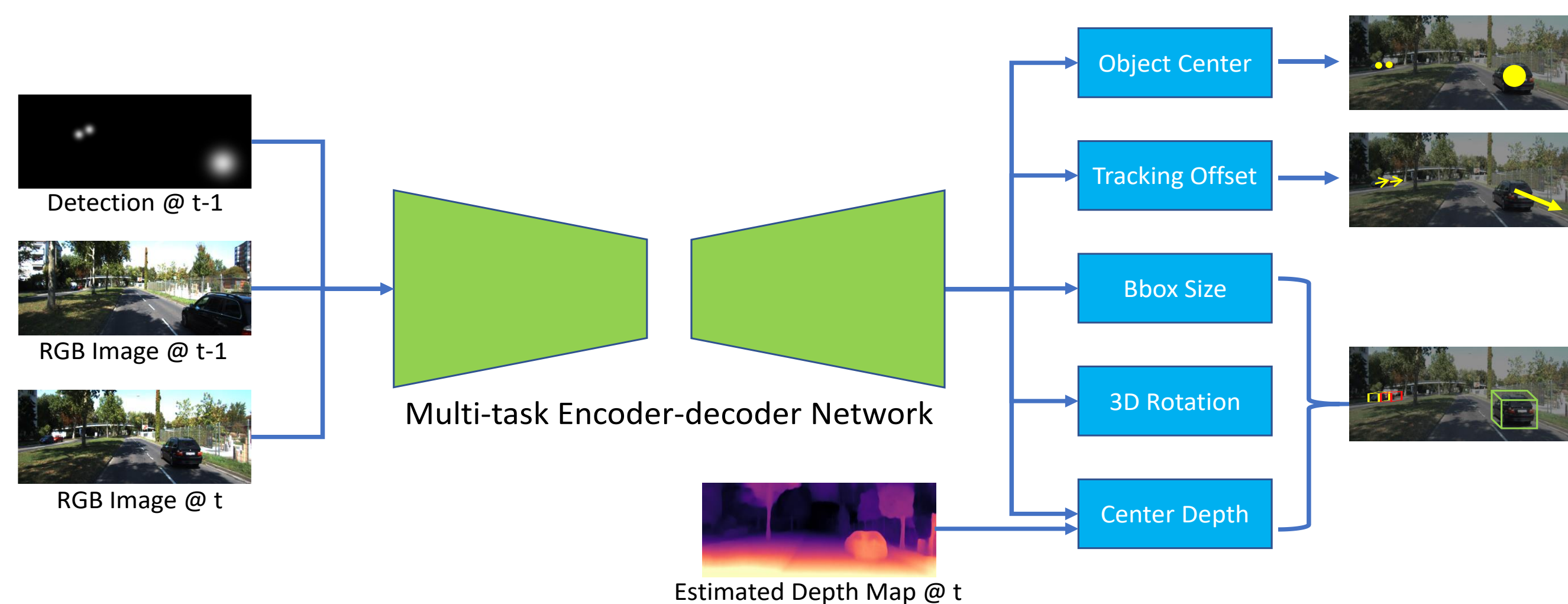


NSF CPS: Samll: Robust and Efficient Perception System for Autonomous Vehicles (REPAVE)

Mooi Choo Chua, Lehigh University

<http://www.cse.lehigh.edu/~chuah/repave.html>

Goal: Advancing the science of designing efficient and robust perception systems for complex cyber physical systems such as autonomous vehicles.



Challenges:

- Focus on using only RGB cameras to develop an efficient perception system.
 - Hard to estimate depth from monocular images
 - Needs to be efficient and robust
- Might consider using light curtains device developed by CMU

Broader Impact (Society)

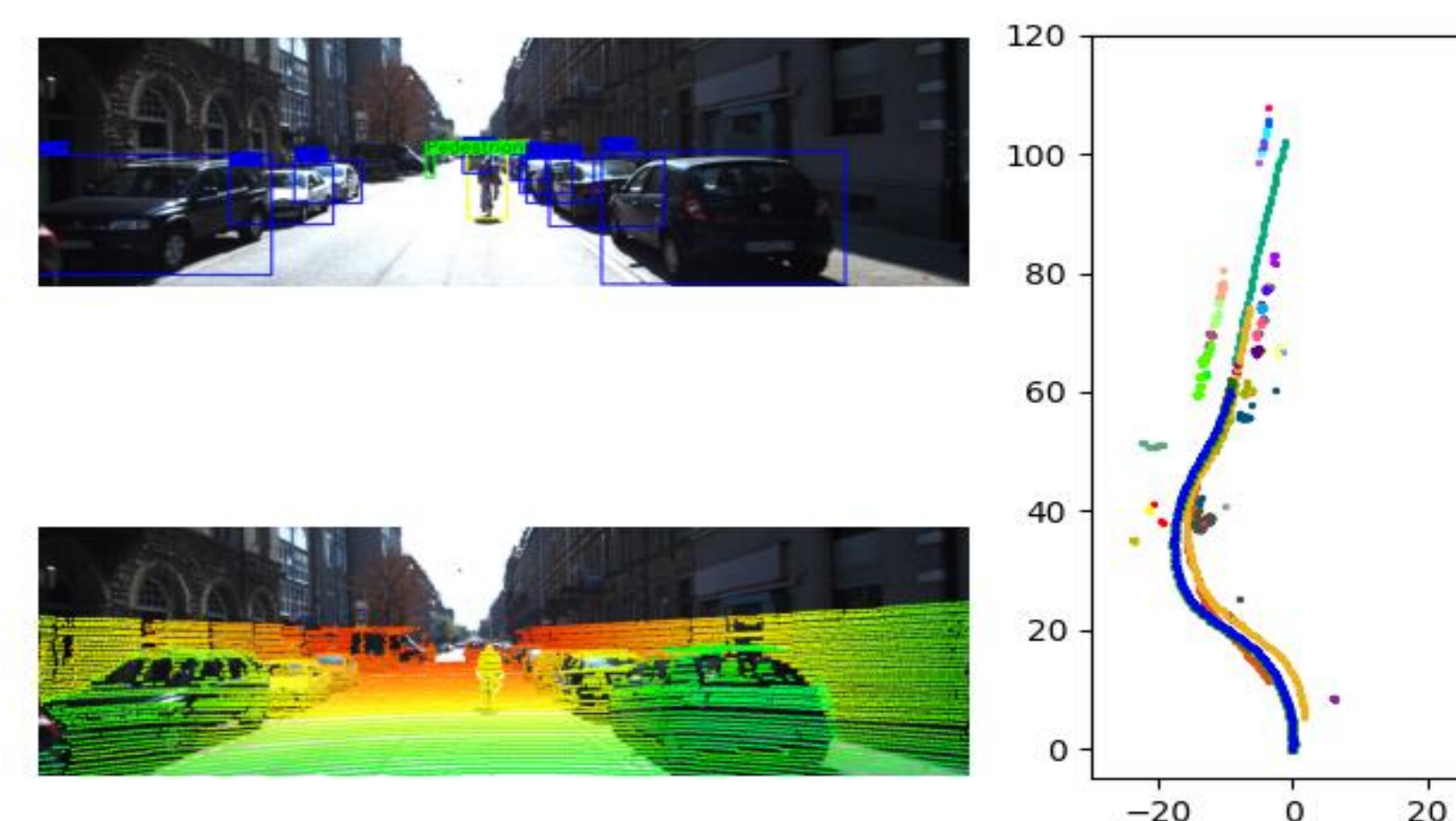
- Advance the algorithmic development of computer vision;
- Safer operations of autonomous vehicles under adverse conditions;
- Potential technology transfer to AV related industries

Broader Impact (Education & Outreach)

- Train future CPS scientists & engineers
- Increase number of minority students in CS programs at Lehigh via REUsite projects
- Summer “Introduction to Modern Robotics” class and Capstone projects to get undergraduates involved

Solutions

- Design an efficient RGB-based e2e perception system that does object detection, tracking and distance estimation
- Design and develop affordable robotic cars for our testbed
- Exploring robustness of our perception has just started.



Potential Impact to Other CPS systems

- Our approach is applicable to other autonomous systems e.g. mobile robots used in warehouse, delivery drones
- Our robust design for deep learning models can be applied to other fields e.g. deep fake video detection

Broader Impact

- Sensor data models for stress testing perception system under adverse weather conditions
- Framework for evaluating robustness of DL-based perception systems for AVs
- Open-source low cost AV testbed