

Environment Representation

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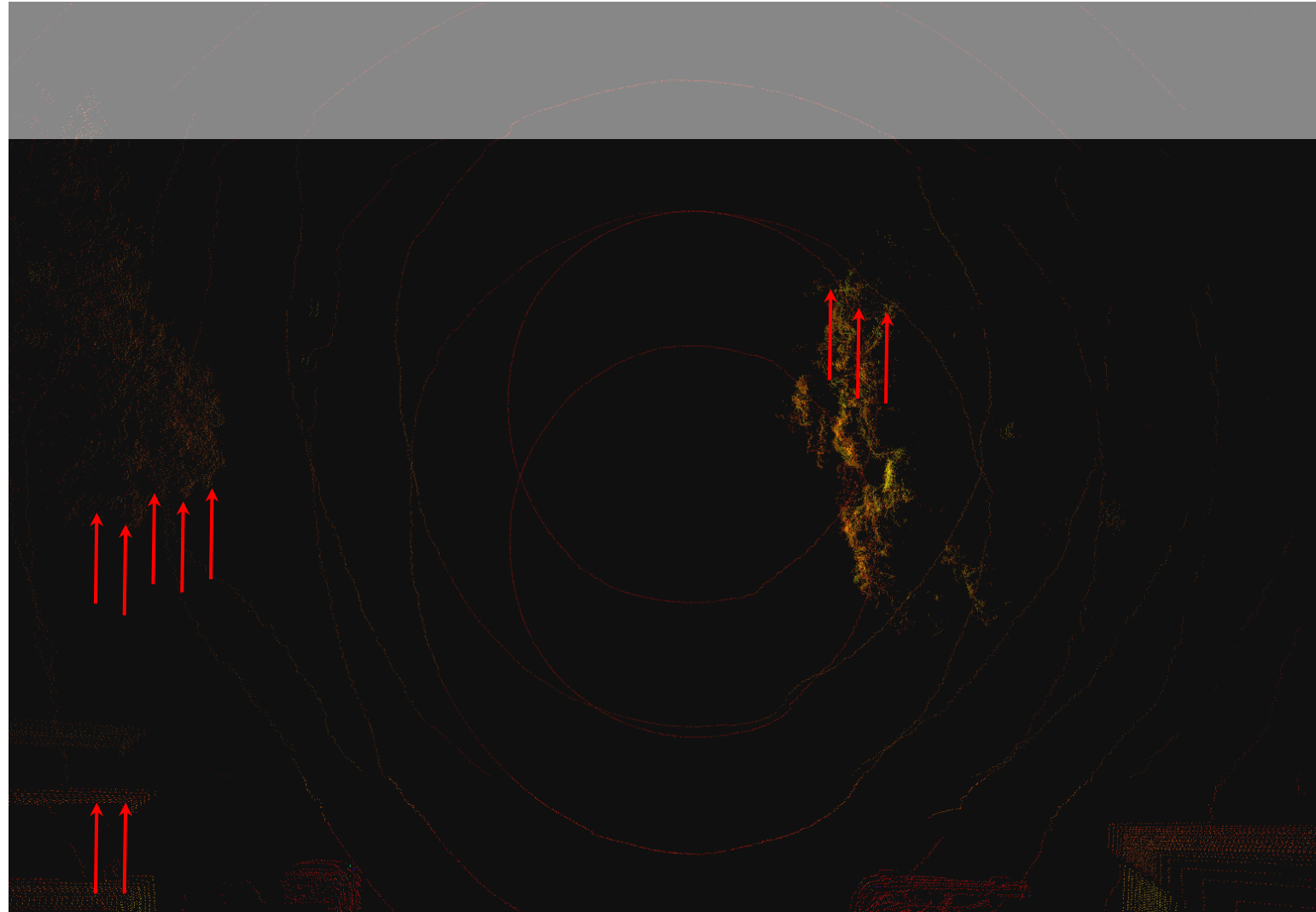
UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING

Environmental Map Types

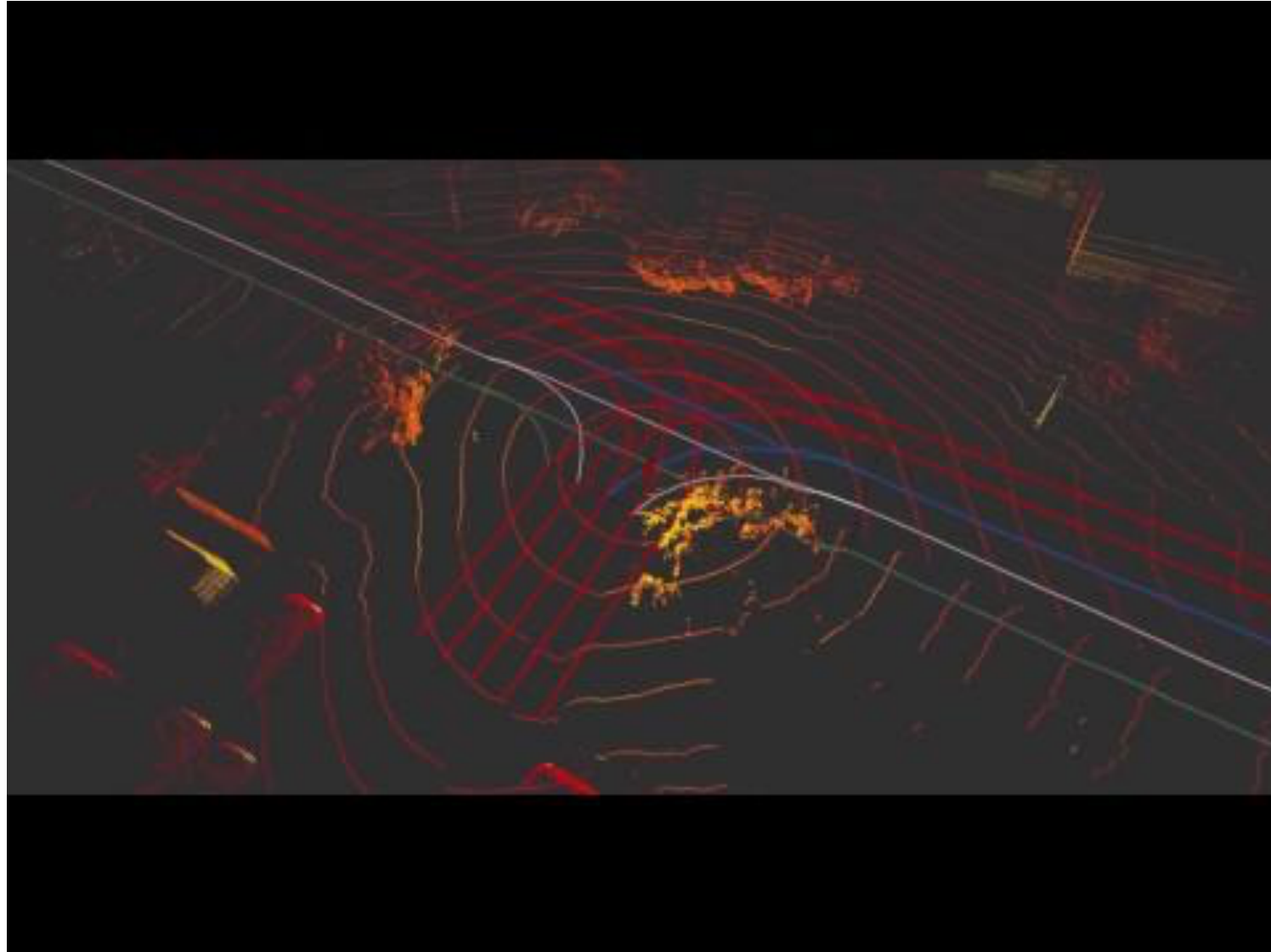
- Localization of vehicle in the environment.
 - Localization point cloud or feature map.
- Collision avoidance with static objects.
 - Occupancy grid map.
- Path planning.
 - Detailed road map.

Point cloud or Feature Map (Localization Map)

- Collects continuous sets if LIDAR
- The difference between LIDAR maps is used to calculate the movement of the autonomous vehicle

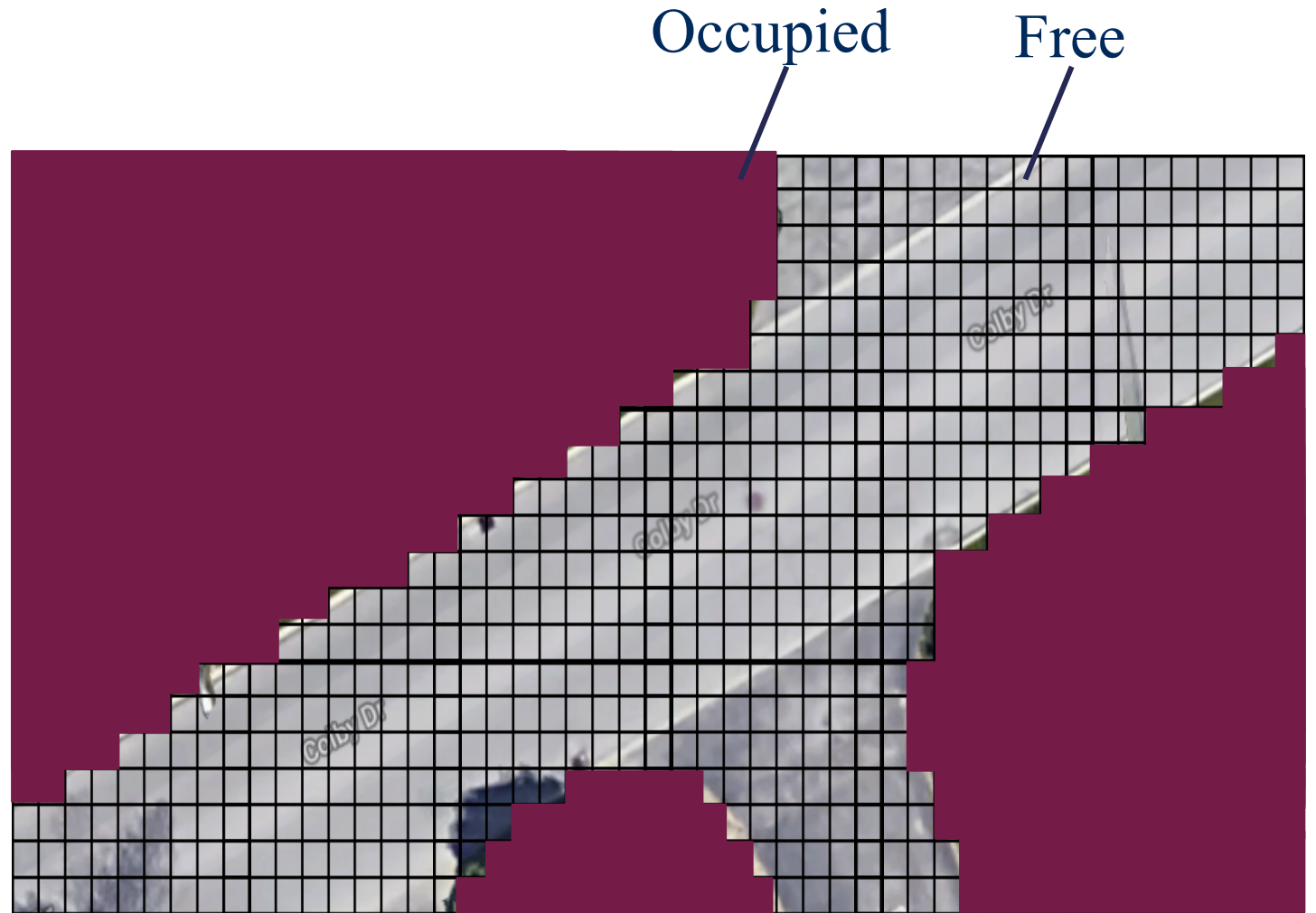


Point cloud or Feature Map (Localization Map)

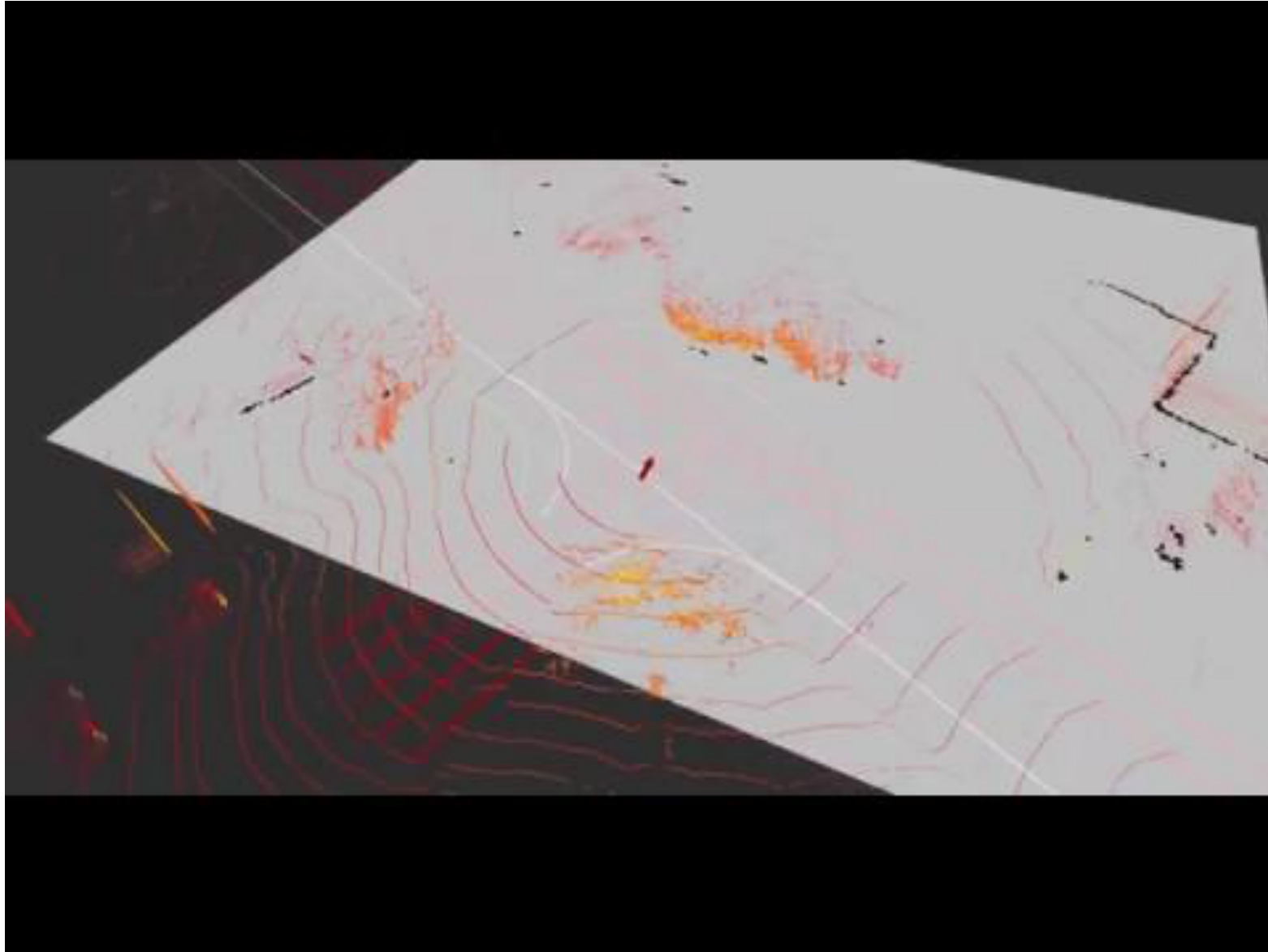


Occupancy Grid

- Discretized fine grain grid map
 - Can be 2D or 3D
- Occupancy by a static object
 - Trees and buildings
- Curbs and other non drivable surfaces
 - Dynamic objects are removed



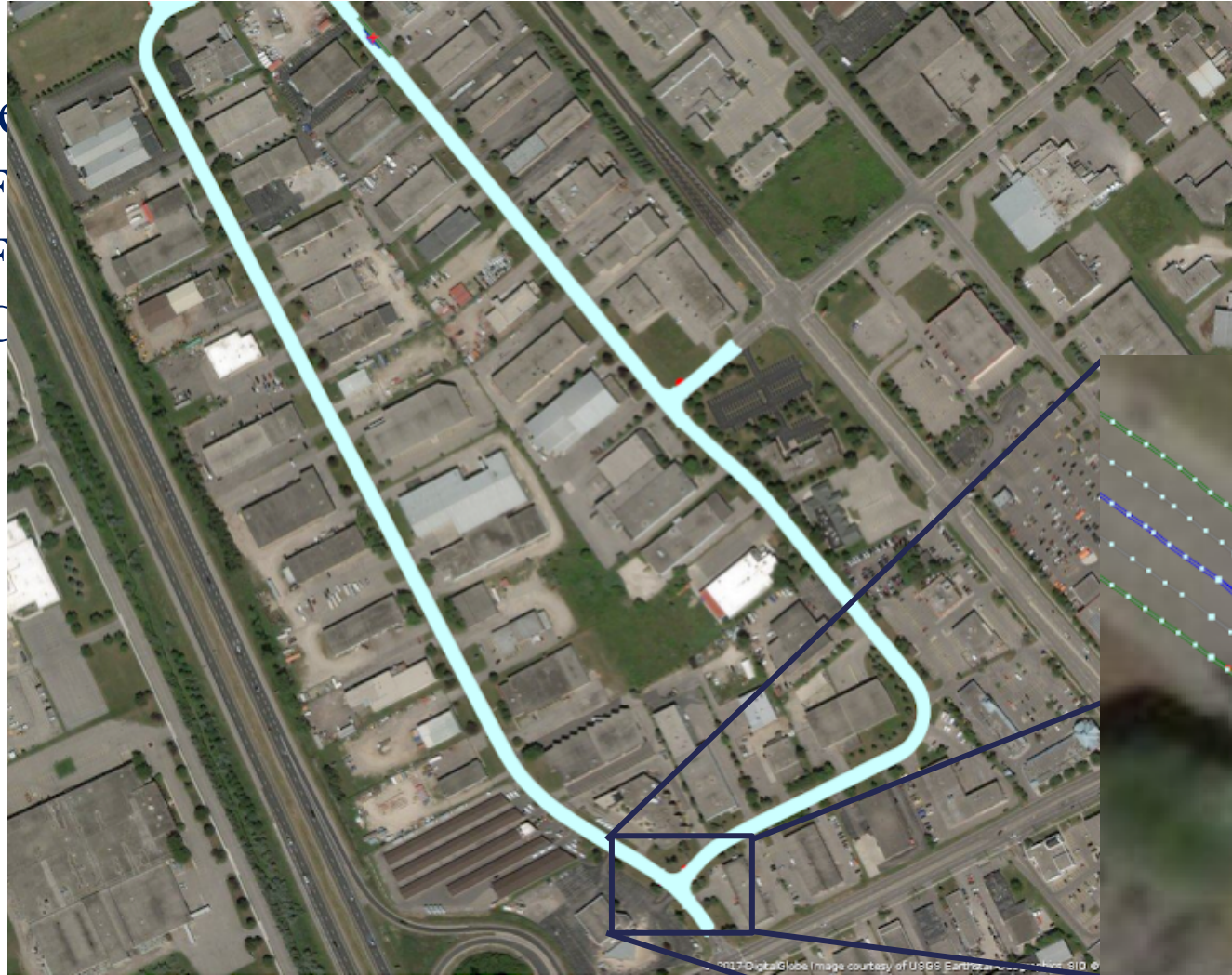
Occupancy Grid Map



Detailed Roadmap

- 3 Me

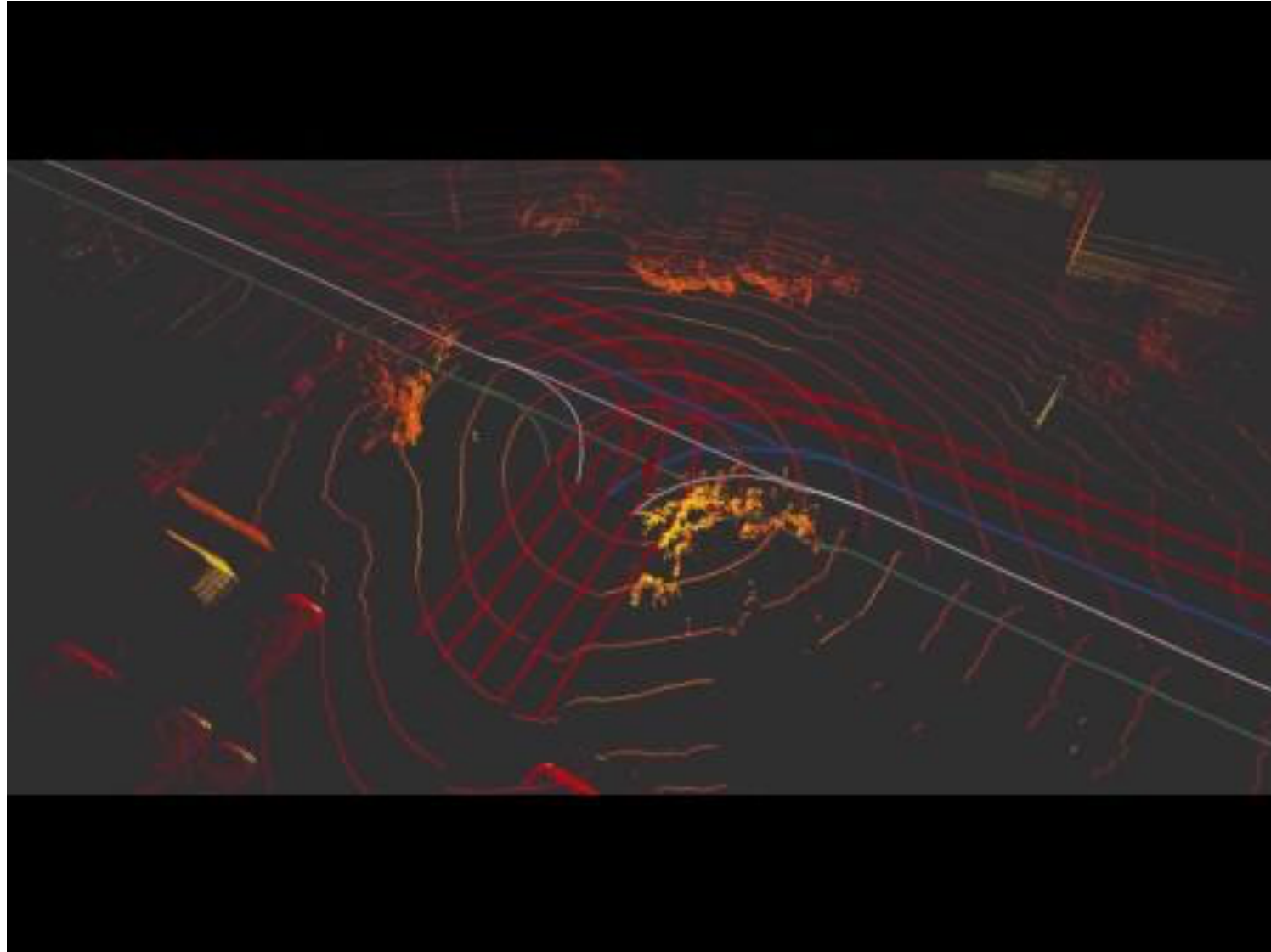
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Traffic regulation Lane Boundaries



Detailed Roadmap



Summary

- Environmental maps used by self driving cars
- Localization point cloud or feature map
- Occupancy grid map
- Detailed roadmap

Module Summary

- Understand various sensor and computing hardware used for autonomous driving
 - The relative strengths and weaknesses
- Understand the design of hardware sensor configurations for autonomous driving
- Describe the basic architecture of a typical self-driving software system
 - Understand the standard decomposition for each software module
- Define the different types of maps used in autonomous driving
- **Next Module:** Vehicle modeling