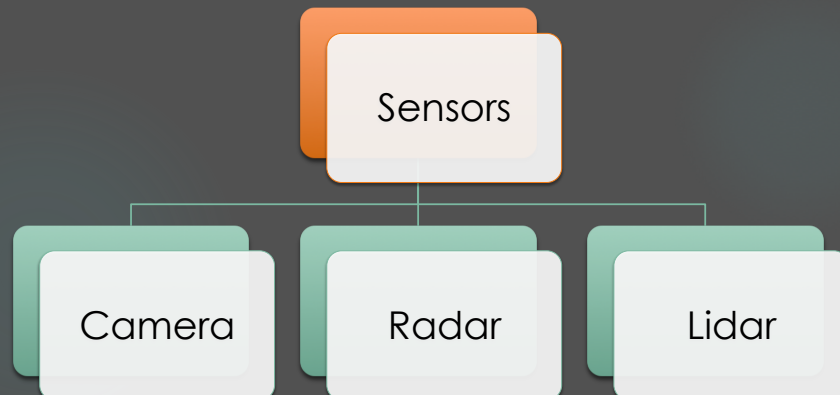


# Digital Image Processing in Autonomous Vehicles



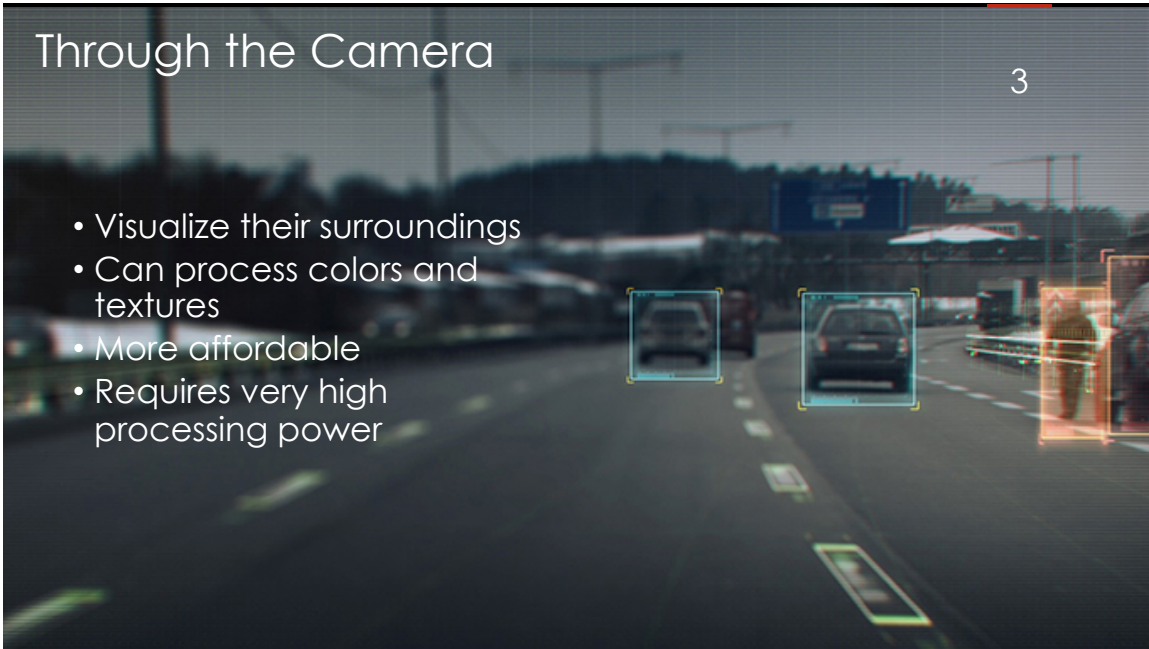
How do Autonomous vehicles see the world?



## Through the Camera

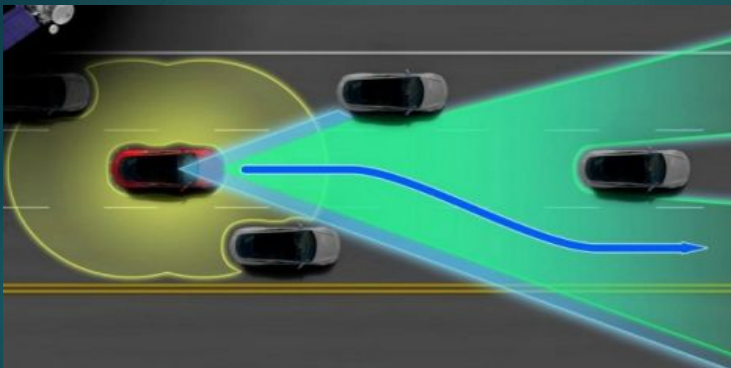
3

- Visualize their surroundings
- Can process colors and textures
- More affordable
- Requires very high processing power



## Through the Radar

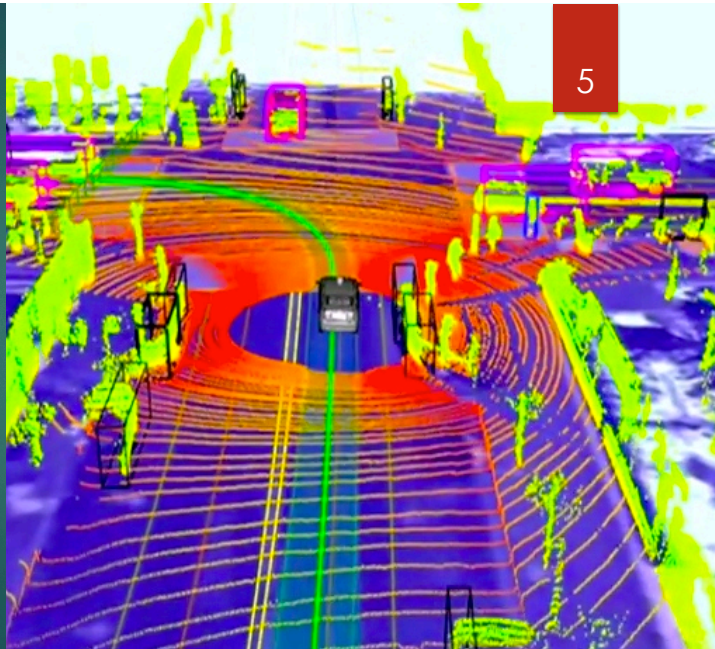
4



- Uses radio waves to map out it's surroundings
- Less Computationally Expensive
- More efficient in bad weather
- Less accurate than Lidar Sensor

## Through the Lidar

- ▶ Lidar sensors use lasers and light
- ▶ Very fast and more aware
- ▶ Can scan over 100m in every direction
- ▶ Requires high processing power



## How much data is processed?

### THE COMING FLOOD OF DATA IN AUTONOMOUS VEHICLES

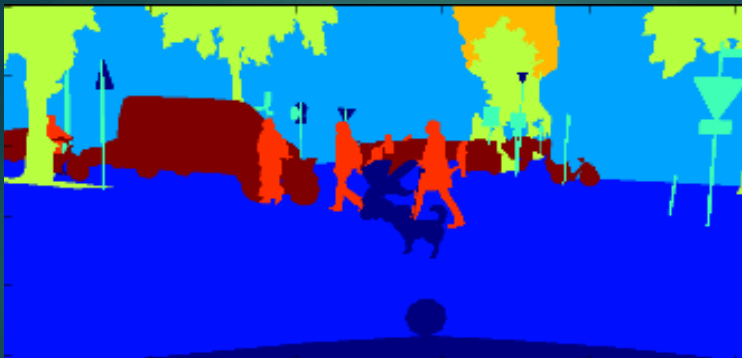




# How do autonomous vehicles understand what they're seeing?

- SEMANTIC SEGMENTATION
- OBJECT DETECTION

## What is Semantic Segmentation?

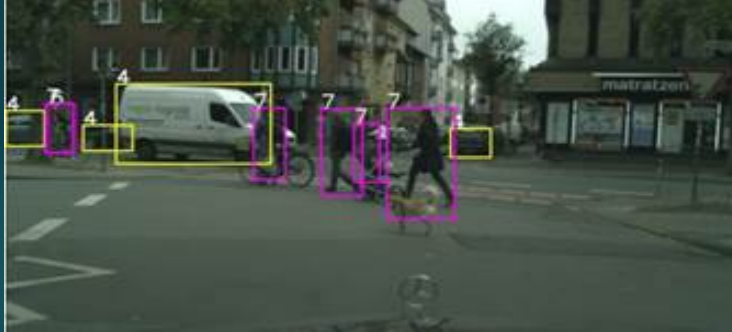


- Semantic Segmentation is the ability to label pixels that belong to a particular class of object



## What is Object Detection?

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- Object Detection is the ability to bound the location of an object with a box
- Simpler than segmentation and recognizes multiple classes of objects at once

## How can Autonomous Vehicles recognize so many objects?

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- ▶ Deep-learning networks
- ▶ Networks are fed with video from real-world driving
- ▶ The more data the network processes the smarter it gets

## Bad Driver? No Worries.

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- ▶ Reversing Cameras
- ▶ Aerial View Cameras

## Reversing Camera

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## Aerial View Camera

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## References

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