Stereo cameras with applications to traffic scenarios, traffic light detection

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MOTIVATION

SAFE DRIVING WITHOUT ACCIDENTS

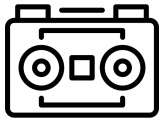
The disregard of traffic lights by drivers is one of the major causes of traffic accidents

SELF DRIVING CAR BECAME THE PART OF HUMAN ROAD TRAFFIC

Report forecasted that roughly 33 million autonomous cars will hit the road by 2040

Nearly 43% of people in the US don't feel safe in a driverless car. But with a save robust algorithms providing non-crash driving, people are expected to get used to driverless cars.

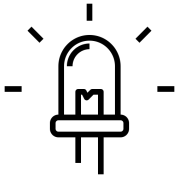
Why traffic detection is challenging?



Traffic lights have to be detected before passing the stop line. Camera needs to cover a high field of view.

The colours of traffic lights easily over-saturated and appears to be white. Thus it's hard to distinguish red and green.

False detection of color (like green light in shining sun through trees) can lead to an incorrect action and humans' death.



New LED lights blink at a high frequency and can appear all turned off on camera frames.

3D position and orientation estimation is not enough to make a decision.

Additional information such as shape or position is required for correct detection.

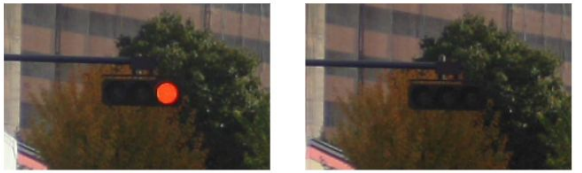
Report Structure

- Introduction
  - About a Stereo Camera
  - Camera Setup

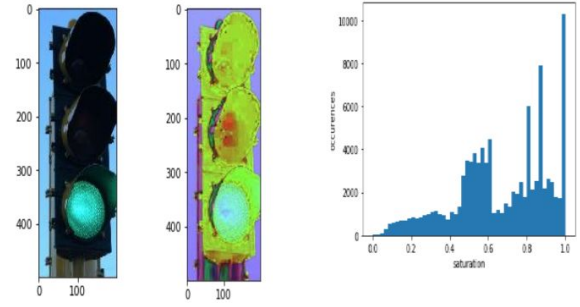
- **Traffic lights as a special perception problem**
- **CNN for object detection**
- **Traffic light mapping**
- **Color pixels detection**
- **Shape, texture and color detection**
- **Color saturation approach**
- **High frequency detection**

- Conclusion

(a) Over-saturated pixels



(b) Blinking light



(a) Original (b) Saturation (c) Saturation Plotting

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Thank you for your attention!

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Do you have any questions?

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