**Inter-distance vehicle estimation using displaced stereoscopic vision**

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### Problem Description

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### Proposed Methodology

Unless specific properties of the observed object are known, or estimated it is impossible to determine its distance [1]**.** To determine distance from the object to observer, stereoscopic vision can be used. This entails using 2 cameras of known positions to observe an object to determine its distance. The position of the object in 3D space is at the intersection of two lines; a line from camera 1 to the object, and a line from camera 2 to the object. Since the positions of the cameras are known, it is sufficient to only know the directions of the lines to determine the position of the object **[ref].**

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, , , are known values from sensors on the cameras. and are calculated from imagery data.

Object Detection: Object is observed and detected on both cameras. Camera 1 is on a mobile robot. Camera 2 is an overhead camera. Camera 2 sees both the mobile robot and the object while being able to differentiate them.

Relative direction estimation: The relative position of the object on the image plane of both cameras are calculated from the imagery. Combining this information with and , there is sufficient information to calculate and . **[ref]**

Object position calculation: is at the intersection of 2 lines, and

and

is a line parallel to and is a line parallel to .

Distance calculation: If camera 1 is mounted on the mobile robot, then the distance between the robot and the object is the difference between and .

### References

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