**Research Paper Summary**

**Title:** Vision-Based Path Coordination for Multiple Mobile Robots with Four Steering Wheels Using an Overhead Camera

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**Link to paper:** <https://github.com/albud187/ELG5163_project/blob/main/literature%20review/finished_reading/Vision-based_path_coordination_for_multiple_mobile_robots_with_four_steering_wheels_using_an_overhead_camera.pdf>

Section 1 - Overall Idea

* Vision path coordination of multiple robots using overhead camera
* Generate synchronized trajectories to avoid collision, ensure paths are always in visibility of overhead camera and avoid intersection boundaries.
* Nonholonomic robot (has kinematic constraints but does not have holonomic constraints)

Section 2 - Methodology

Diagram

Description automatically generated

* Images in initial and desired state are input data.
* CAD based method for pose estmation, hue saturation value color filter to specify boundaries of obstacle in image space
* Attractive potential field to pull robot’s desired points towards goal configuration.
* Repulsive potential field to push robot’s desired points away from constraints such as obstacles. Total force is linear combination of attractive and repulsive forces, and are 6 x 1 vector representing paramaterization of robot’s workspace.
* Discrete time trajectory to generate midoints from initial to robot’s goal.
* Simplified kinematic model, instaneous center of rotation
* Robots with lower priority will move to avoid stationary and higher priority robots, or will halt to wait for higher priority robots to pass.

Section 3 - Applications

* work in which main source of information for operator is through a camera / monocular vision system. For example work in confined / out of reach spaces such as tunnels.
* Work in a “controlled” environment such as warehouse

Section 4 - Future Development

1. Can the overhead camera be a drone, or multiple drones for redundancy?

Section 5 - Questions

1. What is “CAD based method” for pose estimation?
2. What is “hue saturation value color filter”

Section 6 - Anything Else

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