**Research Paper Summary**

**Citation:** Hee-Chang Moon, Jae-Hwan Kim and Jung-Ha Kim, "Obstacle detecting system for unmanned ground vehicle using laser scanner and vision," 2007 International Conference on Control, Automation and Systems, 2007, pp. 1758-1761, doi: 10.1109/ICCAS.2007.4406629

**Title:** Obstacle Detecting System for Unmanned Ground Vehicle using Laser Scanner and Vision

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**Link to paper:** [**https://github.com/albud187/ELG5163\_project/blob/main/literature%20review/finished\_reading/Obstacle%20detecting%20system%20for%20unmanned%20ground%20vehicle%20using%20laser%20scanner%20and%20vision.pdf**](https://github.com/albud187/ELG5163_project/blob/main/literature%20review/finished_reading/Obstacle%20detecting%20system%20for%20unmanned%20ground%20vehicle%20using%20laser%20scanner%20and%20vision.pdf)

Section 1 - Overall Idea

* Describes obstacle detecting system of unmanned ground vehicle. Obstacle detecting system of UGV is important system for driving safety and stability.
* The detecting system consists of 2 components. One is laser system component using laser scanner and the other is vision system components using a camera.

Section 2 – Methodology

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* Obstacle detecting system is consists of two components. Laser system component used two Laser scanners and Vision system component used one camera for detecting obstacles and recognition.
* This Laser scanner offers two interface methods. One is RS232C and the other is RS422.
* Coordination system of laser scanner is polar coordination system. Generally, UGV use rectangular coordination system. So, the Laser scanner component use an equation of coordinate conversion.
* Laser component gets the position of obstacle in compliance with the following processing:



* Vision system of UGV is a KUL-1’s vision system used for detecting obstacles and recognition on a dirt road.
* Vision system component is got the position data from Laser scanner system component. Then the system set region of interest using obstacles positions. Then the system set region of interest using obstacles positions. And then the system analyzes the region for classifying the obstacles. Using this system, KUL-1 can know kinds of obstacles on the ground.



* Classification algorithm is K-Nearest Neighbor.

Section 3 - Applications

* The Laser scanner cannot figure out accurate features of obstacle. It is difficult to detect a kind of obstacles. However, it can get an accurate position of obstacle.
* Vision system gets numerous data. So, it is difficult to process data. Therefore, it gets the position of obstacle from the Laser scanner system component, and vision system

component can know what kind of obstacles is on the ground.

Section 4 - Future Development

1. Using both systems reduce the processing time of single monocular vision.
2. The system could be modified from fixed obstacle to moving obstacle.

Section 5 - Questions

1. Is it possible to use both camera and laser for simulation?

Section 6 - Anything Else

* Possible use of K-Nearest Neighbor as classification algorithm?