“Drive Me”: a Interaction System Between Human and Robot

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**Introduction:**

“Drive Me” is a new interaction system between **human and robot**, it allows users to “drive” a electric robot using natural and dynamic gestures. The user stands in front of the depth camera and performs the gestures that practically move and “drive” the electric robot. The naturalness and the facility of performing the gestures let us know that “Drive Me” is a robust and easy to use interaction system between human and robot. Gesture recognition has a high accuracy rate and that makes of “Drive Me” a system easy to use by different users, system that does not depend of the ambient light conditions.

B**ackground/Need /Relevance of the Topic:**

Objective of the field of study Human-Robot Interaction (HRI) is the “understanding, design and evaluation of the robotic systems for use by/ with humans”. HRI is one of the most challenging areas regarding gesture interaction. The most application areas of HRI are: search and rescue, entertainment, military and police, assistive and educational robotics, space exploration, medical and health care, etc.

Interaction with robots will play an important role also in the future space missions. The astronauts during their exploring activities , or those at the Earth Control Station, will may communicate with the robot through speech or gesture interfaces in a as natural as possible manner. “ Drive me” is a new way to manipulate a electric robot, using dynamic gestures made with hands, not static positions.

**Literature Review:**

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O. M. Vultur, Ş. G. Pentiuc and A. Ciupu, "Navigation system in a virtual environment by gestures," 2012 9th International Conference on Communications (COMM), Bucharest, 2012, pp. 111-114. doi: 10.1109/ICComm.2012.6262541

**Details of the topic:**

A first step in recognizing gestures is to find a set of features with a great discriminatory power. In most cases, these features are calculated by the computer, and are very difficult to be understood by humans. In the paper [10] it is proposed a set of 17 measures to describe gestures by their spatial characteristics of the body movement, their kinematic performance, and the body posture. The paper also presents a body gesture analysis tool that automatically calculates these measures from a video stream.

In the control of a robot the arm movements and hand postures play an important role. In this system it is presented robust recognition system of hand gestures that uses a RGB Depth sensor. To avoid noises and occlusions, Haar-like Steric features are used to represent the complex spatial relations concerning the hand. A new approach based on a measure of class separability is used in the feature selection. The paper shows that the Spare Steric Haar (SSH) features are effective for tracking the hands.

We also made a performance evaluation of the “Drive Me” interaction system and we calculated the accuracy rate, the error rate, the precision, the recall, the sensitivity and the specificity of gesture recognition.

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