Foreign object detection (FOD) using multi-class classifier with single camera vs. distance map with stereo configuration

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The reliable detection of foreign objects is a key requirement for the safe operation of autonomous machines. A foreign object is defined as an object that can be hurt by the machine or can damage the machine during its operation.

In this paper we describe two fundamentally different approaches to detecting foreign objects. The first technique is to use video from a single camera and detect each object type individually using object shape information and integrate the results from each object type classifier. This also requires training the classifier for all possible shapes. The second technique is to use video from two cameras in a stereo configuration and utilize range and size information to detect foreign objects.

The test results for both of these techniques using real imagery are described in this paper. Both techniques perform satisfactorily. However, the techniques based on stereo imagery is computationally efficient and more robust.