Foreign Object Debris Detection Robot

Overview

One of the greatest safety problems in the aircraft industry is foreign object debris on runways and landing areas. This debris, if not properly taken care of can cause severe problems. Boeing is interested in solving this problem in order to dramatically reduce the risk on runways of plane crashes due to this debris and also to be able to detect when planes are in need of repair.

Objectives

The primary objectives of this project are to provide an autonomous robot able to scan a runway and detect FOD in a timely and efficient manner.

Approach

- We met with the sponsor to discuss the various requirements for the project.
- From these requirements, we chose several possible solutions- multiple robots, separating the robot and sensors, and a robot with multiple sensors onboard
- We then explored relevant patents and existing products to see where the hole for our product existed
- From this hole, we were able to choose the best solution- a single robot with multiple sensors
- We then began to search for off the shelf parts- this would help us keep our costs down and many of these parts had already been interfaced together
- The prototype was then built from these parts and the main work was integrating these systems together and having them work concurrently
- The prototype was then tested, debugged and refactored until we got a sufficient working model
- We validated out results by multiple tests comparing different size objects and distances that the robot would detect
- The robot sends a text message with the GPS coordinates of the location of the FOD, so we were able to successfully check that on Google Maps
- Also, we were able to visibly see when the robot missed objects while testing

Outcomes

- Our robot will greatly reduce the amount of risk that runways face from FOD.
- It is autonomous, so the number of maintenance staff needed to clean the runway regularly is reduced to 0