Using quadrotors for analysis of an environment has been an intriguing subject of study recently. The purpose of this paper is to develop a method for analyzing defects on railroad tracks in a GPS denied environment using a quadrotor. The dynamics of the quadrotor is derived using Euler's and Newton's laws and then linearized around the hover position. A PID controller is designed to control the states of the quadrotor in a manner to effectively follow a vision-based path, using the down facing camera on a Parrot Mambo quadrotor. Using computer vision the distance from the position of the quadrotor to the position of the center of the path was found. Using the yaw controller to minimize this distance was found to be an adequate method of vision-based path following, by keeping the area of interest in the field of view of the camera. The down facing camera is also simultaneously observing the path to detect defects using machine learning. This technique was able to detect simulated defects on the path with around 90% accuracy.

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The public is welcome to attend.