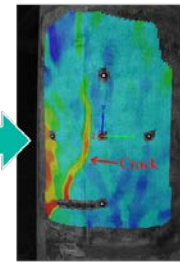
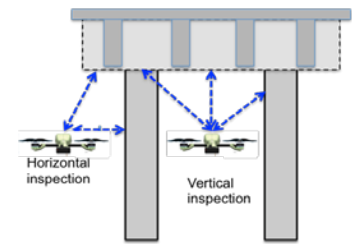




MASTER'S RESEARCH – DANIEL REAGAN

Autonomous UAV Bridge Inspection with 3D Digital Image Correlation



As the average age of the civil infrastructure (i.e. bridges, railways, and tunnels) continues to increase; the frequency and comprehensiveness of inspection must fulfill the modern demand. New structural health monitoring systems must be developed that are quantitative, non-destructive, and cost effective. Three-dimensional (3D) digital image correlation (DIC) has been used to quantify surface strain and crack growth in civil applications. 3D DIC is capable of acquiring high-accuracy large area surface strain, displacement and geometry profiles. These profiles can then be stitched together to generate a complete integrity map of the area of interest. Unmanned Aerial Vehicles (UAVs) have emerged as valuable resources for positioning sensing equipment where a human presence would be hazardous or inefficient. Acquiring the images necessary for DIC from a UAV increases the speed of the measurement process and offers increased accessibility. The implementation of autonomous flight paths enables a simple and consistent measurement process. The combination of autonomous flight with 3D DIC and other mobile measurement systems has the potential to be a highly valuable and effective civil inspection platform.