Task: 02

Date:18.05.2021

Aerial inspection and concepts used in:

In aerial inspection there are 4 steps:

1. Planning:

   Aerial inspection is about to catch the defects in a particular area. For that we need to make a particular path for UAV and design a pattern to fly. This step is a must for determining the parameters to inspect effectively.

2. Inspection:

   After planning we are ready to take off the UAV for the detection. The pattern we decide on the drone it follows and gives us a High resolution image of that particular object. UAV has its sensors and camera to generate complete and reusable data as history of inspection in the future inspection.

3. Analysis:

   In inspection collected the specific raw data it undergoes to data preprocessing. The processing is based on type of data. Also resize, rotate the images for that purpose we use the software “scopito”. Scopito helps to transform the raw data into actionable data insight.

4. Reporting:

   Final step is to report the data which is finely visualised and analysed with detailed information about location, sorted images makes it easy to detect the damage or defects. All this information is mentioned in one user-friendly format for the client is a report of inspection.

Concepts:

Some basic concepts are used in aerial inspections:

1. Focal length:

   Distance from the middle camera lens to focal plane. As focal length increases image distortion decreases.

2. Scale:

   The ratio from actual point on a photo to distance from ground.

3. Large scale :

   A large scale photo simply means that ground features are at a larger, more detailed size. The area of ground coverage that is seen on the photo is less than at smaller scales.

4. Small scale:

A small scale photo simply means that ground features are at a smaller, less detailed size. The area of ground coverage that is seen on the photo is greater than at larger scales.

5. Roll and photo numbers:

   Each aerial photo is assigned a unique index number according to the photo's roll and frame. Identifying numbers allows you to find the photo metadata information such as the date it was taken, the plane's altitude (above sea level), the focal length of the camera, and the weather conditions.

6. Overlap:

   The amount by which one photograph includes the area covered by another photograph, and is expressed as a percentage. The image survey is designed to acquire 60% forward overlap (between photos along the same flight line) and 30% lateral overlap (between photos on adjacent flight lines).

7. Stereoscopic Coverage:

   The three-dimensional view which results when two overlapping photos (called a stereo pair), are viewed using a stereoscope. Each image of the stereo pair provides a slightly different view of the same area, which the brain combines and interprets as a 3-D view.

8. Flight Lines and Index Maps:

   The aerial survey contractor plots the location of the first, last, and every fifth photo centre, along with its roll and frame number, on a National Topographic System (NTS) map. Photo centres are represented by small circles, and straight lines are drawn connecting the circles to show photos on the same flight line.This graphical representation is called an air photo index map, and it allows you to relate the photos to their geographical location.

Tower / Structure inspection using drone:

When it comes to tower surveys, a drone can help identify potential climbing hazards, find structural damage, and help tower inspectors understand the tools they need prior to climbing.

Use cases:

1. Identifying environmental or other hazards before climbing(bee, birds structural damage, etc.)
2. Identifying damages.
3. Pre-work inspection determines the tools and parts needed ahead of a climb.

4. In the case of structural emergency, you can investigate structures integrity before you climb, and find out if it's safe to climb at all.

Types of towers:

1. camouflaged towers:
   They are more expensive compared to other cell tower types. They are required by zoning.

2. Lattice towers:
   These towers are usually seen along the highways. They are three and four sided.

3. Monopole towers :
   It requires one foundation and height does not exceed about 200 feet. In these types, antennas are mounted on the exterior of the tower.

4. Guyed towers:
   These towers are cheap to construct but cover a large area. Radio and tv stations use this type of cell phone tower. This tower uses guy wires connected to the ground to provide the support to the straight tower in the middle. It is about 300 feet and above in height.

5. Powerline pylon towers

Inspections example: Cell tower

Goal :

collect highly detailed visual data regarding the conditions of a cell phone tower.

Mission:

collect the data, accurate visual data on the state of the cell phone tower. Using a camera that allows for high accuracy while zooming. Maintain equal distance from the tower while collecting visual data.

Deliverables:

Visual data that can be used to analyse the condition of the cell towers

Components used in towers:

1. Antenna
2. DSPs
3. Transceivers
4. Control circuitry
5. Gps receiver
6. Power sources
7. Shelter structures

Hazards of towers:

1. Disrupted sleep, Headache, Dizziness, Altered reflexes, Depression, Fatigue, Joint pains, Heart disorders, Alzheimers, DNA damage, cancers are just some of the health hazards of exposure to cell tower radiations.
2. Hazards to bees and birds are also an endangered species.

Terminology:

Stronghold, lookout, fortification, belfry, skyscraper, column, pillar, spire, mast, refuge, steeple, monolith, castle, fortress, fort.

Conclusion :

I've studied briefly about Aerial inspection concepts and telecom towers.