Drone Positioning in Real 3-D Environment with Visual AR Marker Pose Estimation System

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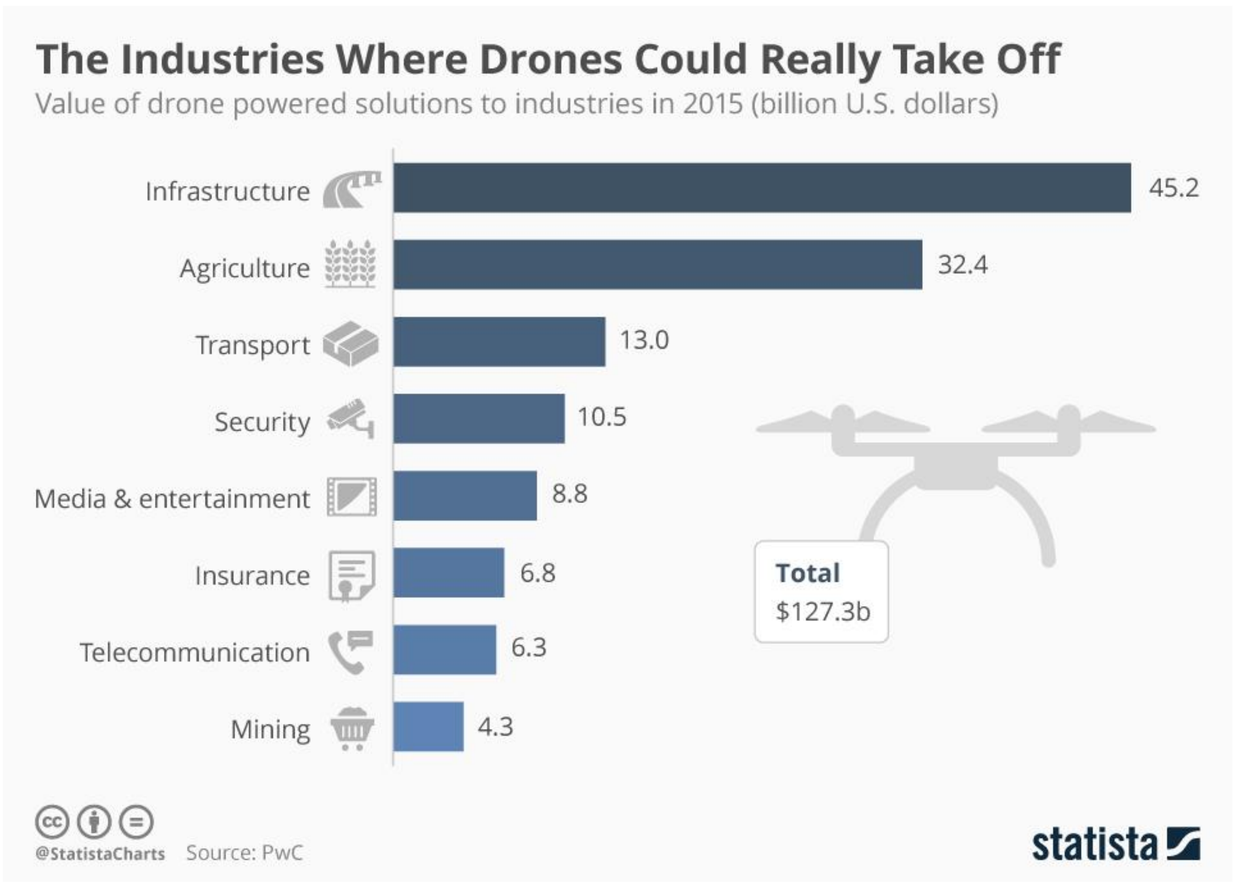
Research Background



Drone powered solutions' value in various industries (Statista)

In recent years, the use of drones has increased significantly. They are used in many fields as described by the graph on the left. Statista shows that drone solutions for the infrastructure industry has the most potential.

Even though manual infrastructure inspection with drones has benefits, there are several additional merits by developing an autonomous infrastructure inspection system.

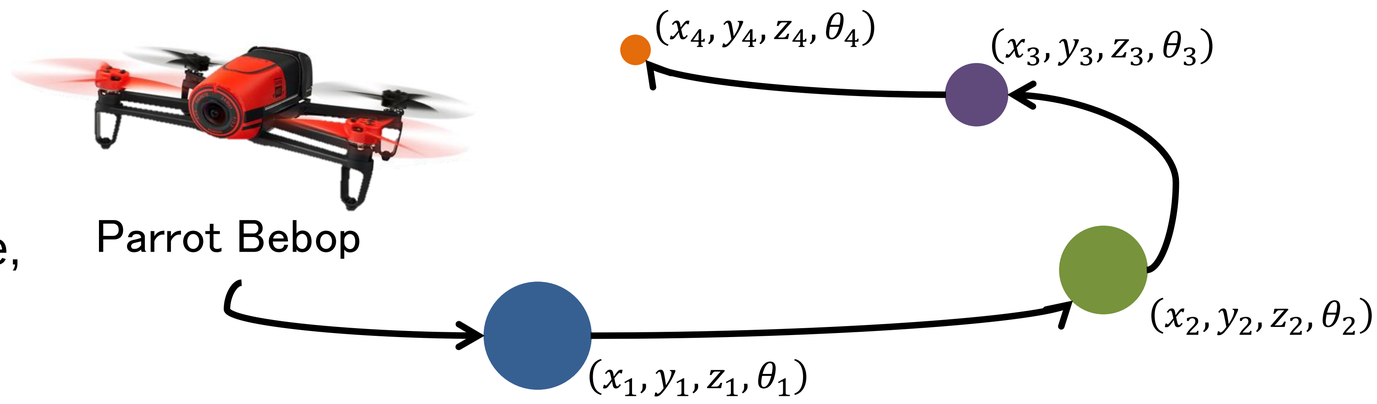
- **Safer**
- **Lower cost**
- **Time efficient**
- **Less training required**
- **Reduce labor**

Using drones for inspecting infrastructure (BUILTR)

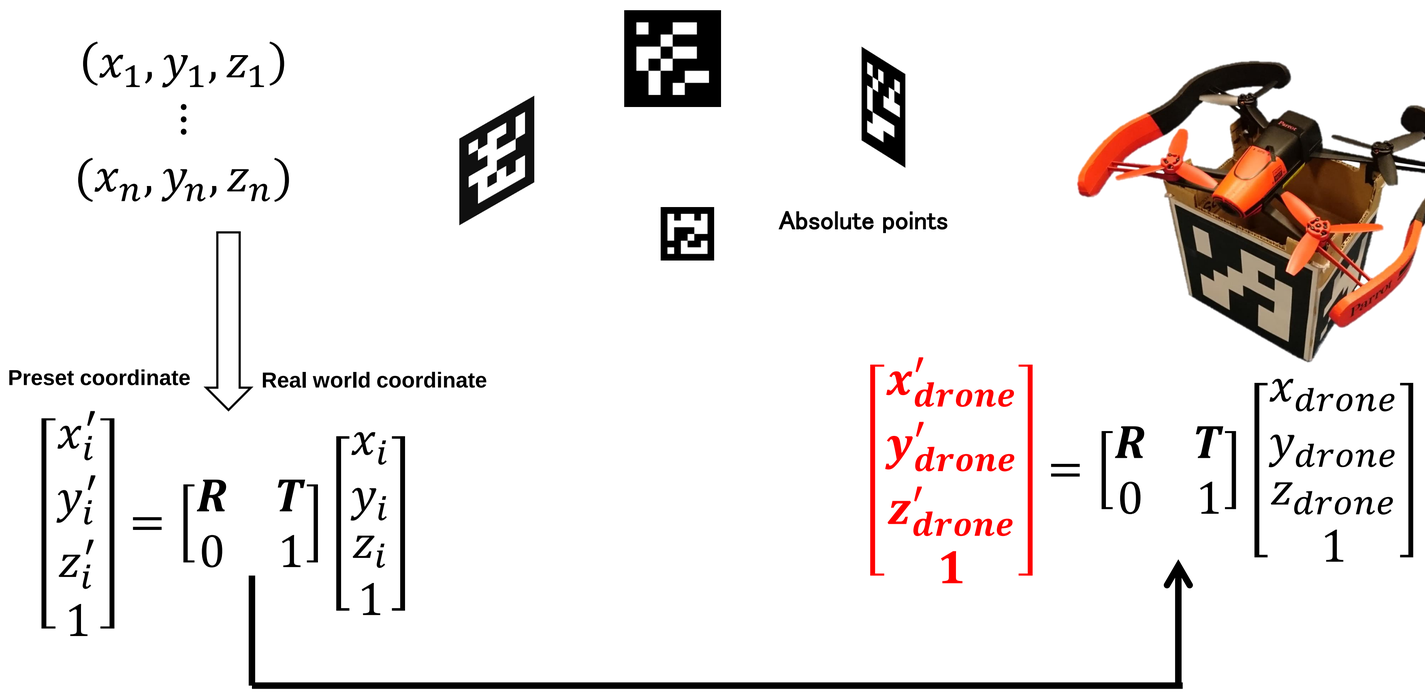
Goal

In an autonomous system, a path for the drone will be planned. However, the drone will need to determine its position to stay on the path.

GPS cannot be used due to its large range of error and multipath error will most likely to occur when conducting infrastructure inspection. Therefore, a positioning system under non-GPS environment is desired.



Method



1. A transformation matrix is found using a set of absolute points that defines the environment.

2. The coordinates of the drone is transformed using the transformation matrix.

Logitech C922 Webcam

Future Development

1. Acquire the yaw of the drone while conducting positioning.

2. Add additional cameras to increase detectable range and accuracy through the distribution of weight vectors.