Validation and performance testing of a laser rangefinder for estimating avian flight in 3D

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Estimating bird collision risk with wind turbines

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Estimating bird collision risk with wind turbines using a laser rangefinder
Estimating bird collision risk with wind turbines using a laser rangefinder
Estimating bird flight height using a laser rangefinder

Fig 1: The variation around Vector altitude measurements of a structure of 64m increase with distance
Estimating bird flight height using a laser rangefinder.
Estimating bird flight height using a laser rangefinder

Fig. 2: Modelled predictions for the deviation in Vector altitude relative to barometer altitude in response to variation in distance between the Vector operator and UAV.
Estimating bird 2D position using a laser rangefinder
Estimating bird 2D position using a laser rangefinder

Fig 3: The variation around Vector latitude and longitude (2D) measurements with increasing distance
Estimating bird 2D position using a laser rangefinder
Estimating bird 2D position using a laser rangefinder

5m-35m

50m-300m
Fig. 4: Modelled predictions for the deviation in Vector latitude and longitude relative measurements taken with an RTK GPS unit.
Estimating bird movement parameters using a laser rangefinder

2m/s-10m/s
Estimating bird movement parameters using a laser rangefinder: 2m/s

Low tort: 0.78

High tort: 0.55
Estimating bird movement parameters using a laser rangefinder: 5m/s

Low tort: 0.69
High tort: 0.59
Estimating bird movement parameters using a laser rangefinder: 5m/s

Low tort: 0.91

High tort: 0.36
Future work: Extraneous factors associated with the ornithodolite
As a tracking system
In Summary:

• The ornithodolite is a useful tool to measure bird flight height under known conditions
• Range influences accuracy and precision
• Measurements are comparable to what is already used but offers samples from a fixed space
• Further validation needed to explore
  - accuracy of 2D positional estimates
  - influence of extraneous factors on measurements