

# 3D building scanning: drone photogrammetry VS ground-based LIDAR

## OBJECTIVE

Determine effectiveness of drone photogrammetry compared to ground LIDAR 3D scans for buildings

## MOTIVATION

- Ground-based LIDAR is time-consuming to set up and difficult to use for taller buildings
- Drone technology offers a quick, inexpensive alternative for 3D scanning

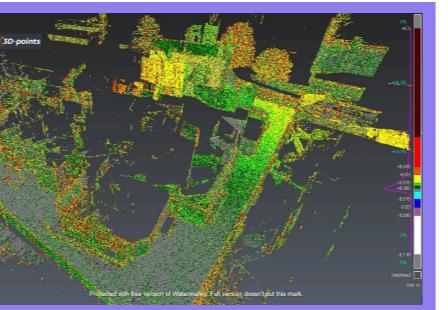
## STRATEGY

- Scans are run at same time of day
- Accuracy of drone compared to LIDAR

## Stationary LIDAR scanning system

### Trimble X7

- Industry standard for accuracy
- Reliable in all lighting conditions
- Fast data integration with workflow
- ~\$40,000



Trimble RealWorks point cloud  
Automatic point cloud generation

## CURRENT TECHNOLOGY

### Skydio X10

- 8K resolution camera
- Automated pathing
- Thermal and RTK expansion Capabilities
- ~\$15,000



## Mobile photogrammetry platforms

### Parrot Anafi AI

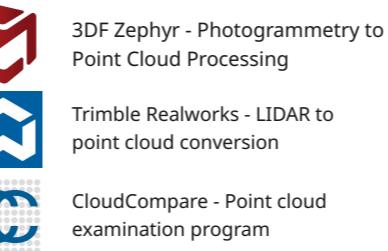
- 8K Resolution Camera
- Automated pathing
- ~\$5000



- More affordable than stationary LIDAR
- Captures data evenly at all elevations
- Quicker operation and ease of use

## SCAN PROCESS - TRIMBLE X7

1. Scan first location
2. Successive scans must be within line-of-sight to a previous scan
3. Upload point cloud data to computer



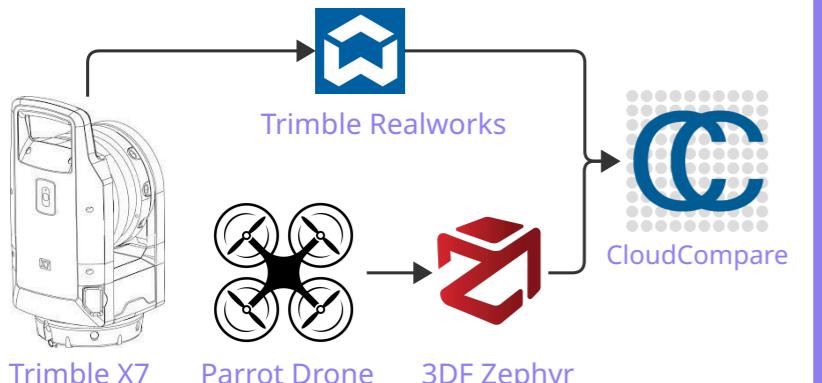
## SCAN PROCESS - DRONE

1. Scan within 10 feet of the facade, moving slowly around the building
2. Pause flight and take multiple pictures at each point
3. Upload photogrammetry data and process to point cloud

## EXPERIMENT PROCESS

### INITIAL TESTING

- FED Building picture data from Skydio X10 drone flight processed in 3DF Zephyr
- Workflow established for processing data



### FINAL EXPERIMENT

- NREL Building picture data from new Anafi AI drone flight processed in 3DF Zephyr
- Trimble X7 used to measure NREL facades
- Cloudcompare used to compare datasets

## RESULTS



## CONCLUSION

- Sub cm accuracy is achievable with drone scan
- Shading has greater effect on photogrammetry
- Drone and LIDAR are useful in conjunction with each other

## FUTURE WORK

- NREL acquiring Skydio X10 drone for scans and additional thermal imaging
- More powerful computer system for faster data processing and point cloud generation