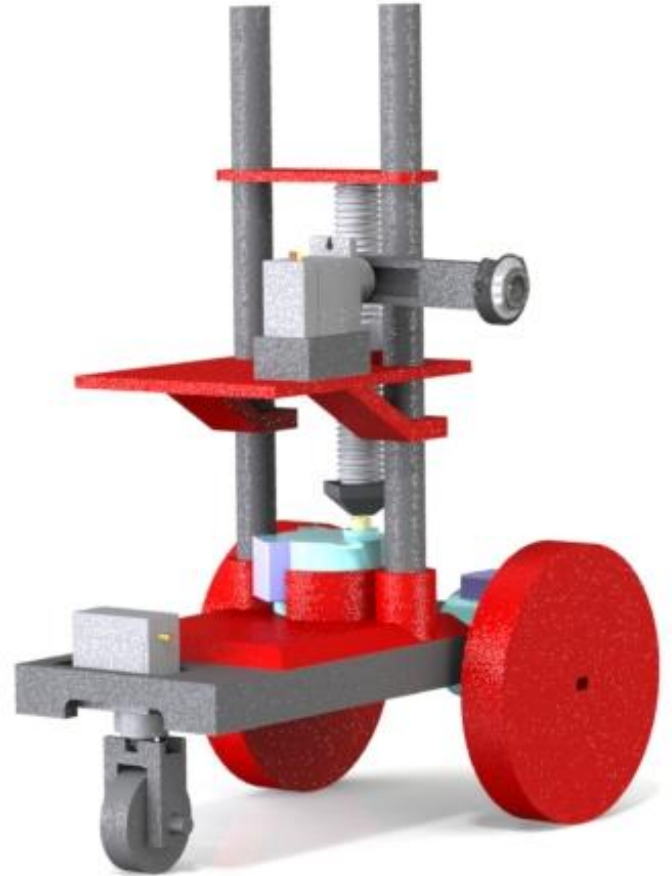


autoGrammetry



Who are we?

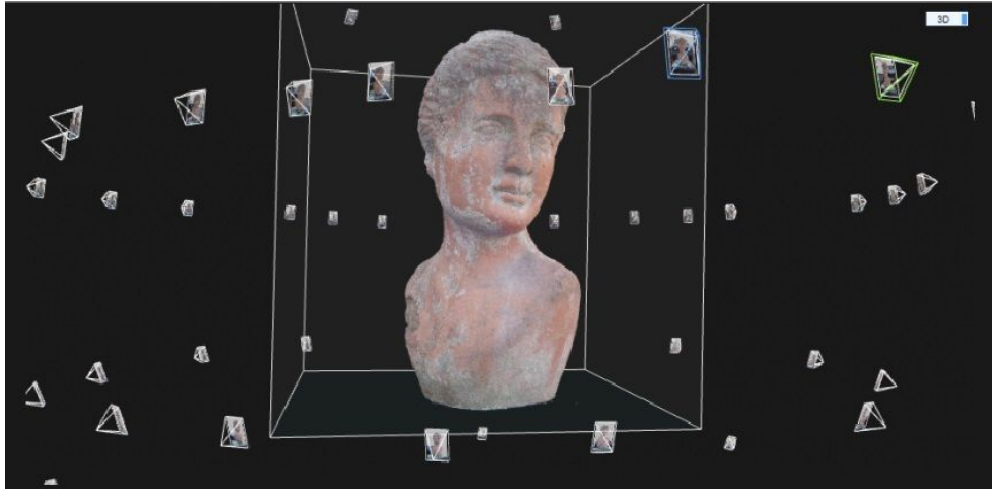
We a trio of engineering students from the University of British Columbia. Our interdisciplinary team has a multitude of technical skills including but not limited to mechanical engineering, electrical engineering, programming, and eating.

Manu is a top ranked 3rd year electrical engineering student, proficient in knitting

Friend is a top ranked 4th year mechatronics student, highly interested in indoor lighting

Jonathan is a humble and honest 4th year Integrated Engineering student

Photogrammetry



- Photogrammetry is the process of taking a series of 2D photos from various different angles and using software to stitch them into an accurate 3D model
- Many open source solutions exist for stitching the photos together, but the setup for taking the photos is very costly.
- Current setups for mid-sized Photogrammetry are costing in excess of \$30000 CAD

Current Products



Small size:

- Many open-sourced automated designs
- Mature, saturated designs



Mid size:

- Stationary design
- Manual setup
- No matured design



Large size:

- Demanded by researchers
- Extremely costly
- Mature, saturated designs

Close Competitor: PI3DSCAN



www.pi3dscan.com

Price: +10k EUR plus assembly labor and software

Issues:

- Low quality camera (PiCamera)
- Complicated set up
- Not easily portable, studio only

Result:

- Can not scan outdoor
- Lower quality photos
- Costly technician labor

Close Competitor: FoxyWalk



www.heliceo.com/en/produits-pour-geometres/foxywalk-terrestrial-photogrammetry/

Price: need quotes

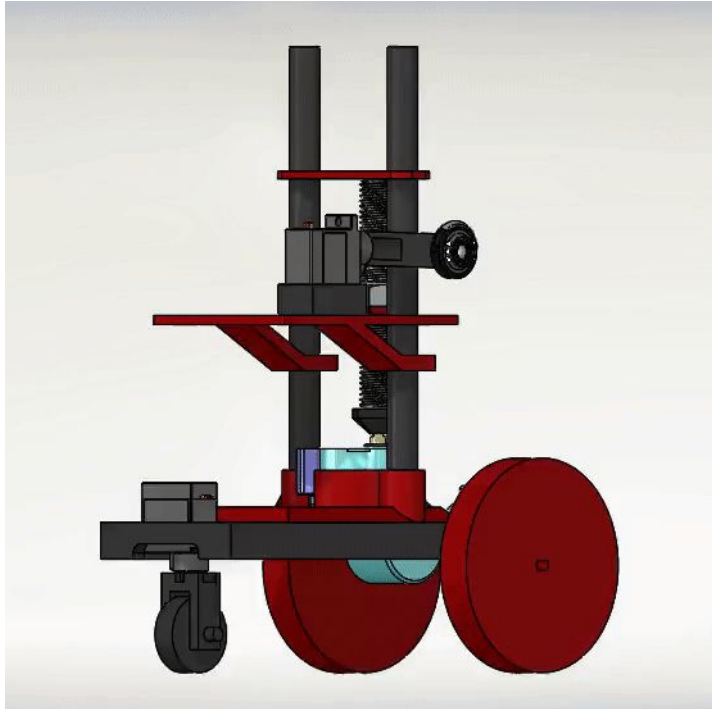
Issues:

- Uses person to handle
- No automated movement
- No path assignment
- No self balancing tool

Result:

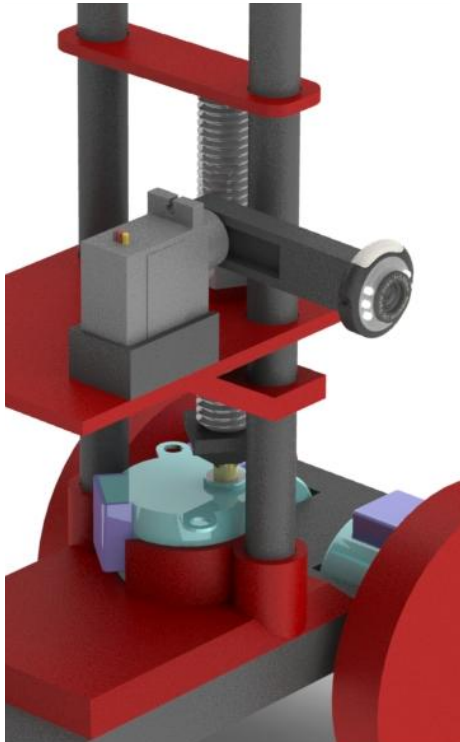
- Can not go into potentially dangerous areas
- Unsteady photos
- Costly technician labor

Our Project: autoGrammetry



- Using a low-cost unmanned autonomous ground vehicle to automate the process of positioning a camera and taking photos in the required angles for photogrammetry.
- The vehicle, with a mounted camera, circles an object at an adequate radius, taking photos at regular intervals/angles, at various different camera heights, creating a high quality set of photos suitable for photogrammetry.
- The photos can be sent to a computer or sent to the cloud, for remote scans.
- This prototype can be scaled up to scan larger objects, maintaining a low relative cost.

Technical Overview



- The vehicle is driven by two stepper motors to create an accurate trajectory for taking photos.
- The vertical position of the camera is driven by a linear stage, to enable the creation of the full perspective of the target objects.
- A servo motor adjusts the orientation of the camera as needed to get the optimal perspective.
- An arduino controls the system's movement.
- The camera is connected to a computer, taking photos, storing them and/or uploading them to the cloud for remote research.
- The current model has a vertical camera travel of 100mm, and the camera can adjust itself over 180 degrees.
- The prototype was built with components costing less than \$50.
- **Competitively priced, portable, suitable for rougher environments, remote usage, lesser hardware**

Future Expansion:

- Feedback loop using additional sensors
- Automatic path tracking and exporting
- Scaling up the prototype for larger scans
- Implementing bluetooth and cloud save functionality
- Full integration with photogrammetry software
- Gyroscope for enhanced uneven terrain stability
- Mobile app
- GPS and self deployment
- 4G/5G/LTE connectivity