Cleo

Revolutionizing Data and Reality Capture

Cleo Robotics

sales@cleorobotics.com

THE FUTURE OF WORK

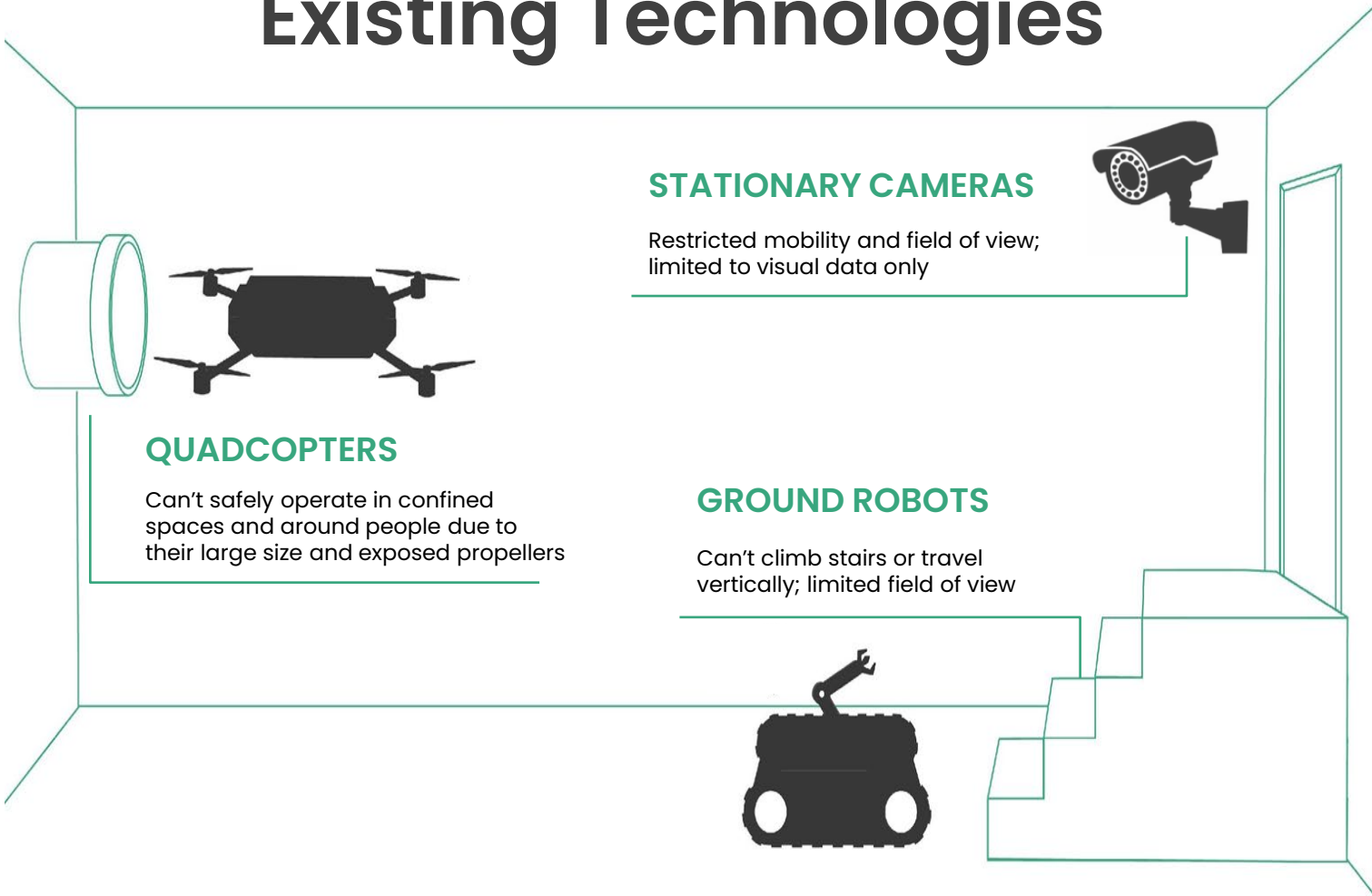
Automation and human-machine collaboration

- Elimination of dangerous jobs
- Automation of repetitive tasks
- Digitizing the physical world
- Utilizing AI and machine learning for decision making

Existing Robots are not Ideal because they Can't:

- **Safely operate around people**
- **Navigate challenging environments**
- **Operate in difficult to reach areas**

Existing Technologies



STATIONARY CAMERAS

Restricted mobility and field of view; limited to visual data only

QUADCOPTERS

Can't safely operate in confined spaces and around people due to their large size and exposed propellers

GROUND ROBOTS

Can't climb stairs or travel vertically; limited field of view

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THE SOLUTION - Dronut ™

Next Generation UAV

INTELLIGENT

A suite of sensors and an AI engine allow for autonomous operation

EFFICIENT

Operate twice as long as drones of similar size for extended missions

COMPACT

Collect data in places that no other robot or human can access

SAFE

Fly safely around around people and sensitive equipment

PATENTED TECHNOLOGY

Controlled by Cleo's proprietary thrust vectoring technology

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EVOLUTION OF DUCTED FANS

Hiller VZ-1
1953

Sikorsky Cypher
1988

Honeywell T-Hawk
2007

CyPhy Works
2014

All these and other attempts at commercializing these vehicles have failed due to significant challenges with control and maneuverability.

Dronut X1
2022

The world's first commercial ducted fan aerial vehicle

Cleo's patented technology
(13 patents and growing)

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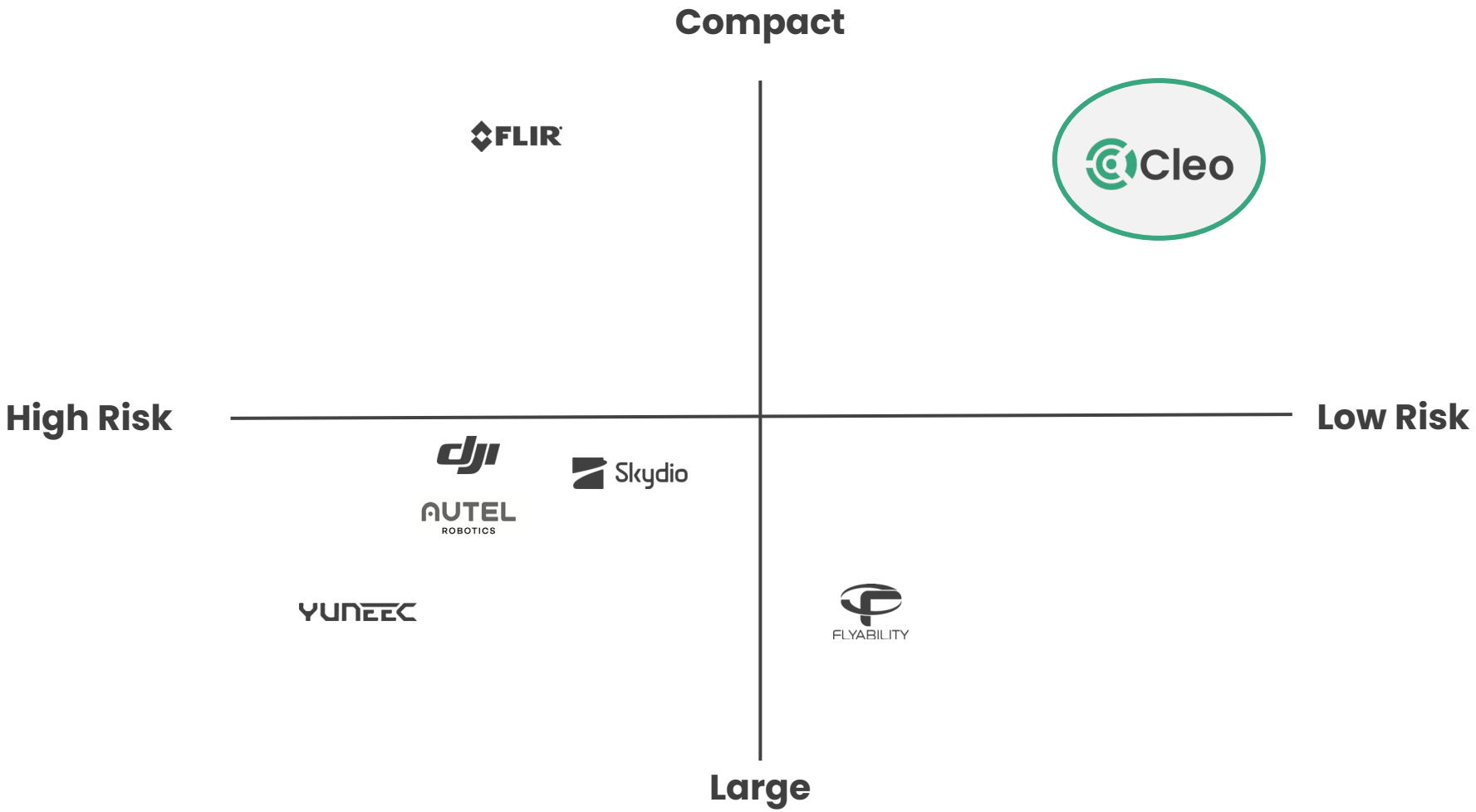
COMPETITIVE LANDSCAPE



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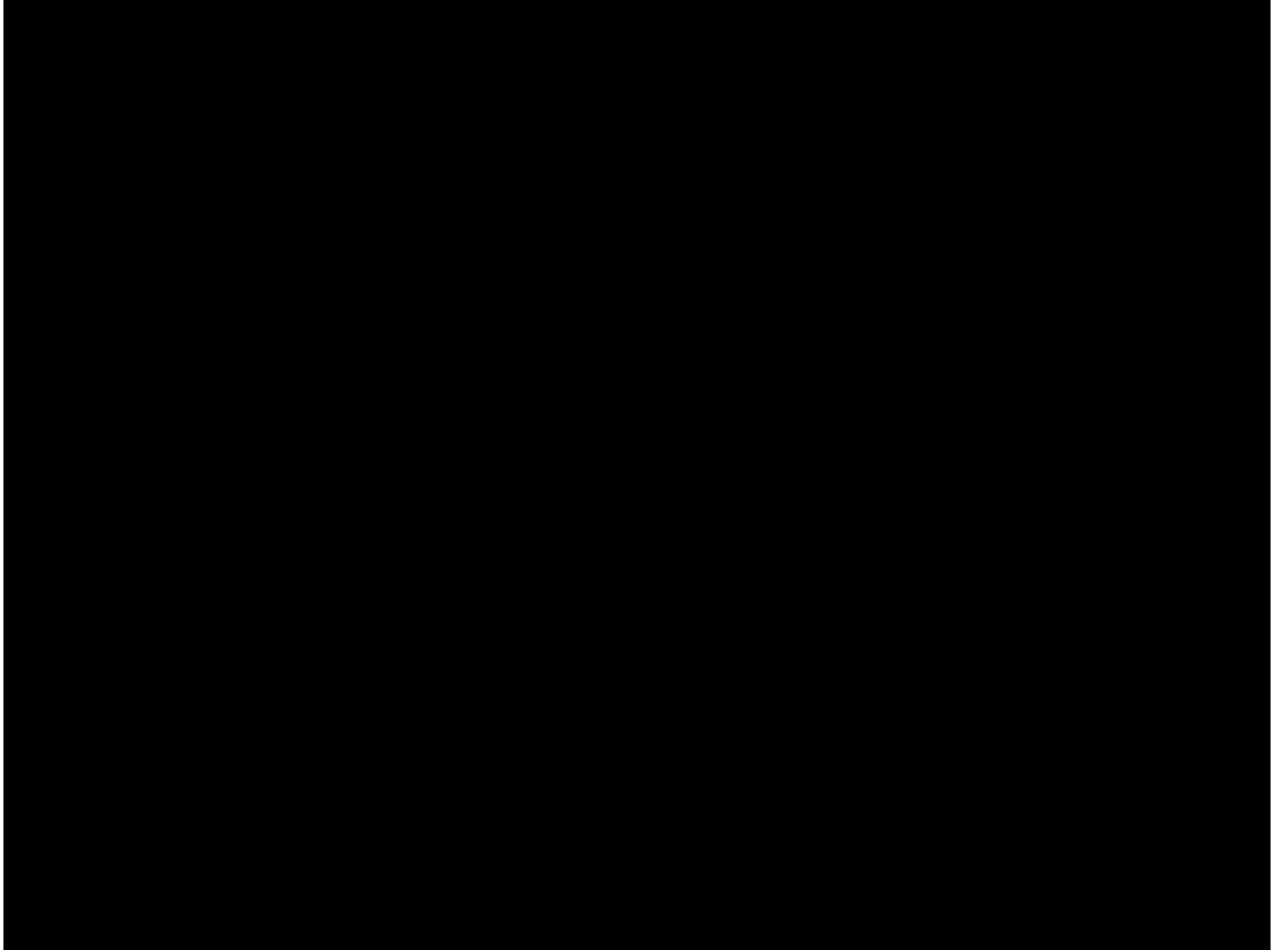
More than 50 Customers



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3D Mapping of Challenging Environments in Naval Vessels

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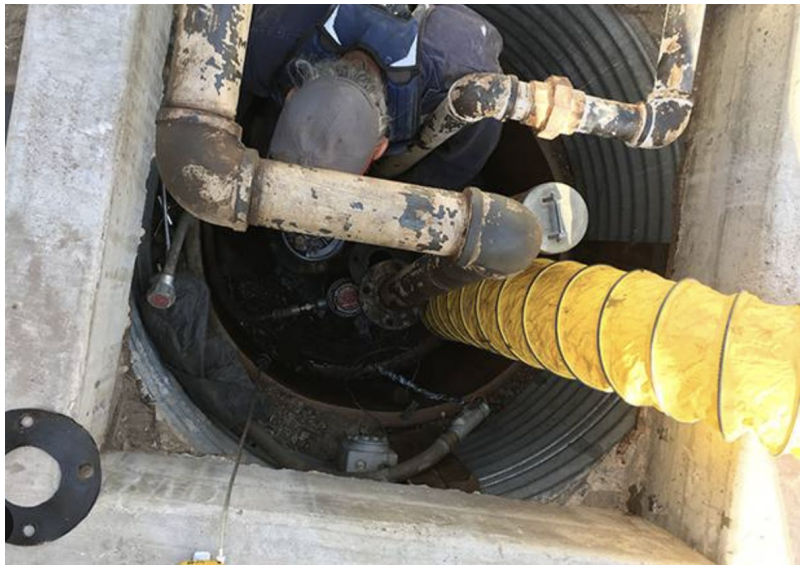
The Problem

1. Existing 3D mapping technologies used by the BIW and the shipbuilding industry are difficult to deploy in tight spaces typically encountered aboard navy vessels, and often cannot be used in confined or hard to access areas

1. Due to line-of-sight limitations presented by fixed-point scanning, common scan techniques often leave “blind-spots”, resulting in incomplete compartment scans

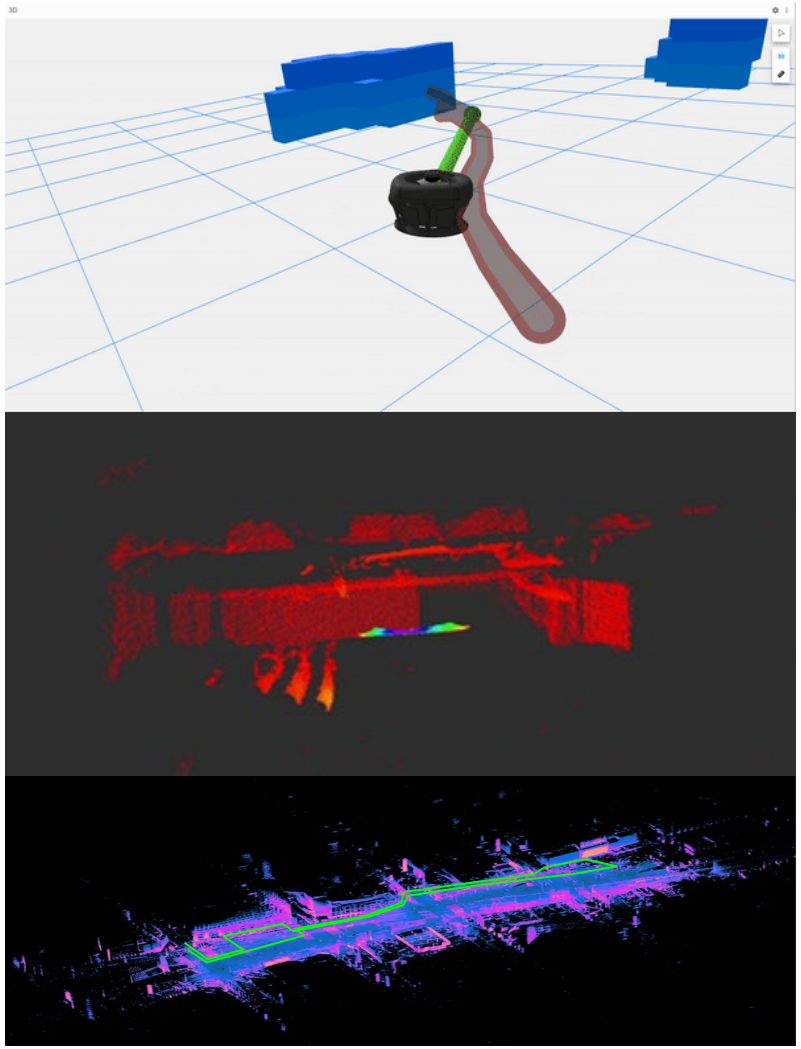


The Solution

- The proposed solution will collect data in these challenging environment in minutes, significantly reducing the manpower and time needed to 3D map entire ships

- Data collection will be accomplished through Cleo's Dronut UAV platform and will include LiDAR point cloud data and high resolution imagery. Data will then be processed to generate high fidelity 3D maps

- The process will be aided by Cleo's autonomous capabilities that enable safe and quick execution of these missions



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Project Requirements

Key Features and Functionalities

- Ability to capture 4K video footage
- Collection of 30,000 Lidar data points per scan at a frequency of 10 scans per second
- The system should operate reliably in confined and challenging shipboard environments
- Operation by skilled drone operators with minimal training (3 hours)
- Data must be transferable via SD card to a desktop computer
- The data must be processed using Cleo’s specified cloud-accelerated software to generate colorized 3D point clouds
- Generation of 3D maps at a rate of 15 minutes per 100 sqft

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Progress Update

Ability to capture 4K video footage	The camera was updated to enable high resolution video and images
Collection of 30,000 Lidar data points per scan at a frequency of 10 scans per second	The LiDAR sensor was configured to enable data capture at this rate
The system should operate reliably in confined and challenging shipboard environments	Additional navigational aids and autonomy were implemented to ensure reliability in confined spaces
Operation by skilled drone operators with minimal training (under 3 hours)	User interface aids such as proximity sensing were added meet this requirement
Data must be transferable via SD card to a desktop computer	SD card data transfer has been verified
The data must be processed using Cleo's specified cloud-accelerated software to generate colorized 3D point clouds	Software development is underway. A prototype has been developed that can generate a point cloud but the resolution is needs to be improved. Further development is underway to increase the resolution

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We boldly go where **no robot has gone before**

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