Project: UAV Payload Retract Mechanism

Company Background

Ascent Vision Technologies is a U.S.-based company, that specializes in the manufacturing and distribution of gyro-stabilized gimbal systems for the manned and unmanned aerospace industry. Ascent Vision’s product line-up includes the CM202U designed specifically for counter-UAS missions, and the CM202G for aerial gas leak detection. The CM202, CM160, and the CM100 are actively deployed guiding autonomous vehicles, on small UAV’s, and in marine environments. The company’s customer base includes large and small defense contractors, a big-three automaker, commercial sales, and foreign governments. Based in Bozeman, Montana, Ascent Vision enjoys a unique geographical advantage due to its proximity to some of the world’s leading photonics companies as well as Montana State University.

Introduction

Ascent Vision is looking for a capstone group of mechanical engineers to design and develop a working prototype of a new UAV retract mount for one of our lightweight gimbal systems, the CM122. The retract mount will be integrated with the Silent Falcon UAS. The intent of the retract mechanism is to deploy the payload during flight of the aircraft and retract the payload for landing of the aircraft. Please see the below images for renderings of both the aircraft and the payload.

![Figure 1 – The Silent Falcon UAS in flight](image-url)
The CM122 is a dual sensor gyro-stabilized gimbal system that is primarily used for unmanned aerial vehicle applications. The system is used for a variety of military and commercial surveillance applications.
Technical Specifications

- The retract mechanism shall retract the CM122 within a 9 inch payload module that will be provided to the team.

- Approximate dimensions of the payload bay are as follow:
  - 230mm x 140 mm x 200mm deep

- The retract mechanism shall have an interface that allows operation in flight.

- The retract mechanism shall include additional vibration isolation to mitigate aircraft vibration.

- The retract mechanism shall include a failsafe to retract in the case of aircraft power loss.

- The total maximum weight of the retract mechanism assembly shall not exceed 3.5 lbs.

- The retract mechanism assembly should include payload bay doors that operate in flight.
CM122

DATASHEET

Multi Sensor Gyro-Stabilized Gimbal

IP66  <1Kg  LWIR  Low SWaP-C

ITAR FREE
Technical Specifications

Gimbal Capabilities
- Mechanical Axes: 2 (Pan and Tilt)
- Position Accuracy: 0.0046° (80 μrad)
- Elevation: ±120°
- Azimuth: 360° Continuous
- Slew Rate: 300° / sec
- Power: Start Up 20W / Av. Rating 12W
- Voltage: 9 – 36V
- Modes: Rate/ Scene/ Track/ GEO-Lock
- Communication Link: Ethernet / RS232

Internal Video Processor Features
- Recording on Board: ✓
- Encoding: ✓
- Object Tracking: ✓
- E-Stabilization: ✓
- Scene Steering: ✓

Hardware
- Weight: 1000g
- Diameter: 120mm
- Height: 200mm
- Temperature: -10°C to +50°C
- Environment: IP66
- MTBF: > 1000 hours
- Shock Limit: 20 G
- Peripherals: 1x GPIO, 1x SMA
- GPIO Functions: Power, Ethernet, RS232, AHRS, Composite Video

Video Specifications
- Analogue Output: Composite
- Digital Output: h.264 MPEG2 TS / RTP
- Snapshots: 1280x720 (Stored On Board)
- Standards: MISB (D01010, 60017, 60332, 06043, and 09033) & STANAG (4609) Compliant

Internal INS
- Horizontal Position Accuracy: 2.0m
- Vertical Position Accuracy: 3.0m
- Heading Accuracy: 0.8°
- Accelerometer Range: Up to 16g
- Supported Systems: GPS L1 / GLONASS L1, GALILEO E1 / BeiDou L1
- Timing Accuracy: 30ns

Standard Configurations

Electro-Optical (EO)
- Type: CCD Global Shutter
- Resolution: 1280 x 720
- FoV: 31.4° Wide to 1.1° Tele
- Zoom: 30x Optical
- Frame Rate: 25 Hz

Infrared (IR)
- Sensor: Tau 2 640, XTM640, Quark 640
- Type: LWIR, LWIR, LWIR
- Resolution: 640x480, 640x480, 640x480
- Lens: 35mm, 3x Optical, 3x Optical
- Frame Rate: Up to 30Hz, Up to 30 Hz, Up to 30 Hz

Laser
- Sensor: Nano Point
- Wavelength: 852nm
- Class: IIIB
- Power: Up to 150mW

Other sensor configurations are available. Contact a member of the sales team for more information.

Detect, Recognize, Identify

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<th>IR at 124°</th>
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<td>150 m</td>
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