

Fixed-Wing Drone Autonomous Re-Flight Platform

Mark Turner, Faculty Advisor Jonathan Cue

Opportunity

- Aerial surveillance provides vital information in many applications including weather research, wildlife tracking, maintenance, and security
- Many of these applications will benefit from remotely repeatable, autonomous flight capabilities
- Fixed-wing drones represent a strong combination of low environmental impact, high area coverage, and cost effectiveness

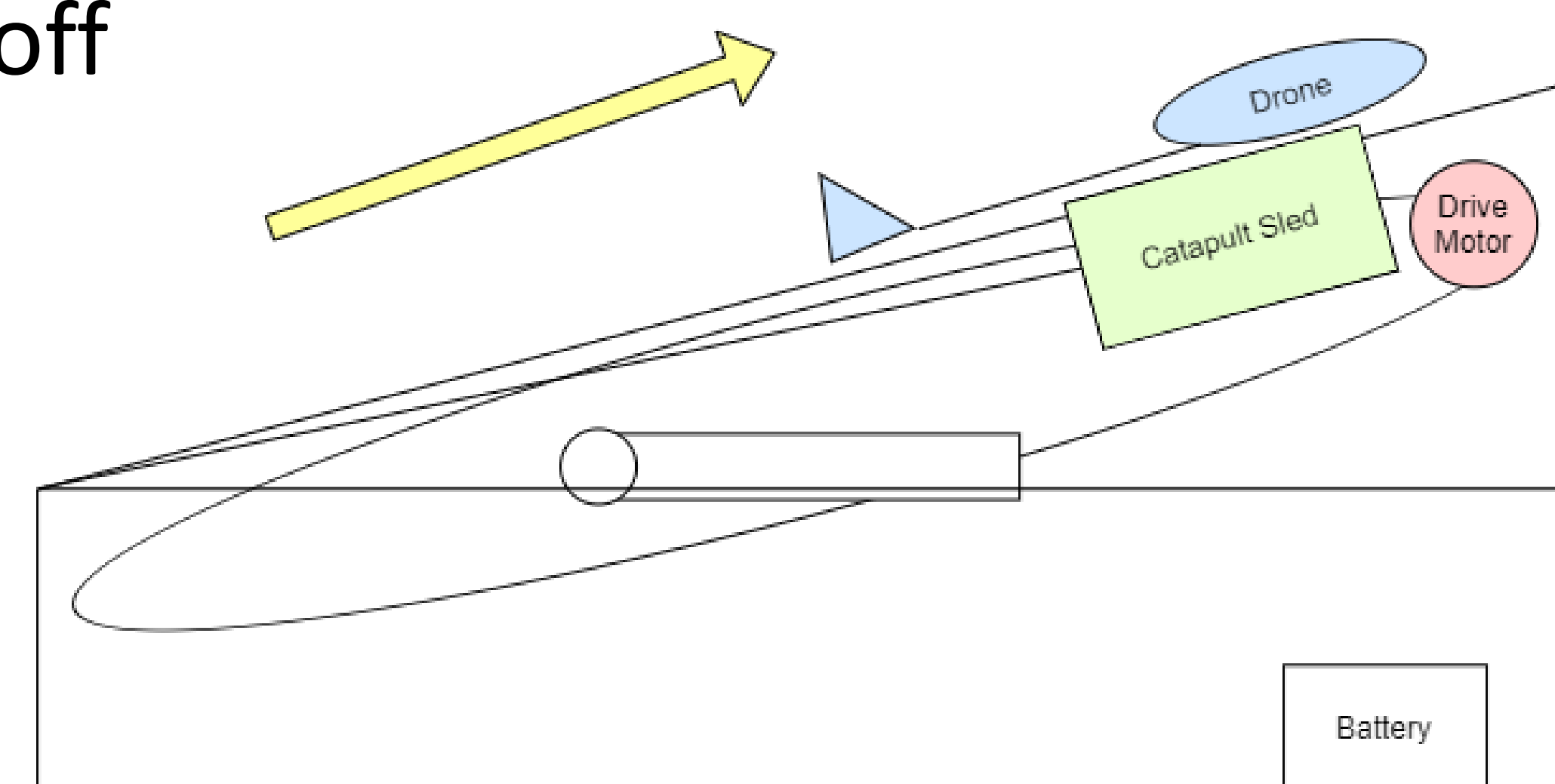
Approach

- Design a platform to support fixed-wing drones through repeated autonomous flights
- Handle three main functions: drone launch, capture, and recharging
 - Railed catapult system driven by electric motor
 - Capture system ensures safe and controlled landing, repositions drone on catapult
 - Drone is charged directly on the catapult sled
- Semi-modular construction allows for feature expansion

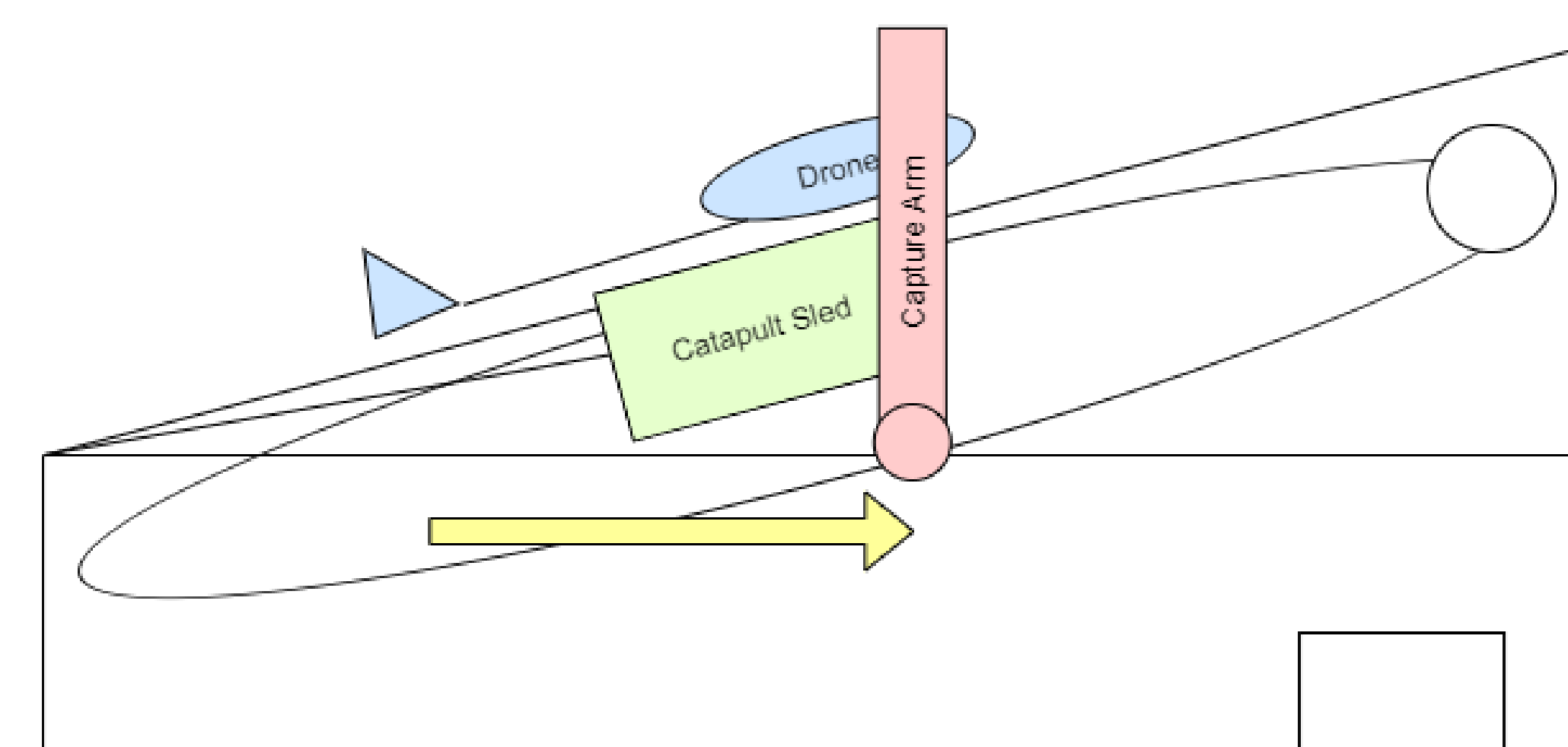
Data or Results

- Projected production cost per unit: ~ \$650
- Performance target: 8 kg max load @ 12 m/s takeoff

Diagram illustrates launch and landing phases of operation, moving parts and direction of motion are highlighted



Top: Motor pulls catapult sled along angled upper rail, releasing drone at apex



Bottom: Raised capture arms and catapult sled cycle forward on drone contact, providing controlled deceleration

Impact

- This project aims to enable the rapid and unmanned reuse of fixed-wing drones, while remaining extremely cost effective
- Allows for long term surveillance missions to be conducted remotely, at extreme cost efficiency and reduced environmental impact compared to traditional aircraft operation
- Prospective applications include weather & wildfire monitoring, wildlife activity tracking, and uninterrupted route patrolling