**Motivation, Challenges, and Goal**

- **Efficient and Resilient Autonomous Swarms** is essential for diverse application scenarios.
- **Challenge 1**: distributed resource-constrained nodes.
- **Challenge 2**: complex cyber-physical UAV systems.
- **Challenge 3**: low-voltage reduce energy quadratically but induce bit errors bringing reliability concern.

**Goal**: Enable resilient and efficient autonomous swarms under low-voltage operation. (performance-efficiency-resilience co-optimization)

**Proposed Mulberry Framework**

- **Mulberry**: multi-agent robust learning framework to achieve aggressive energy savings & compute-resilience

**Key Features**:
- Two-stage offline and on-device robust swarm learning.
- Low-voltage UAV payload optimization.
- Collaborative sprint-or-slack operation.
- Dynamic communication and parameter adjustment.

**Evaluation Results: Towards efficient and resilient autonomous swarms**

- **Evaluation Setup**
  - Closed-loop eva.; Diverse environments, UAVs, models.
  - UAV compute hardware and reliability characteristics.

- **Resilience-Efficiency Improvement**
  - Improve resilience, processing efficiency, and mission efficiency under robust low-voltage operation.
  - Generalize across chips, voltages, environments, models, UAV types, and swarm sizes.