

# Collaborative Research: NRI: High Throughput Multi-Robot Weed Management for Specialty Crops

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**Background** Most conventional sprayers apply agrochemicals uniformly, despite the fact that distribution of weeds is typically patchy, resulting in increased costs, crop damage risk, pest resistance to chemicals, environmental pollution and contamination of produce.

## Objectives

1. Develop a low-cost, high throughput, and smart technology to simultaneously scout and spray a variety of weeds with different herbicides
2. Develop low-cost and multi-crop autonomous vehicles equipped with the precision spray technology
3. Design and develop a high-level task planning and control
4. Conduct comprehensive economic analyses of the proposed multi-robot

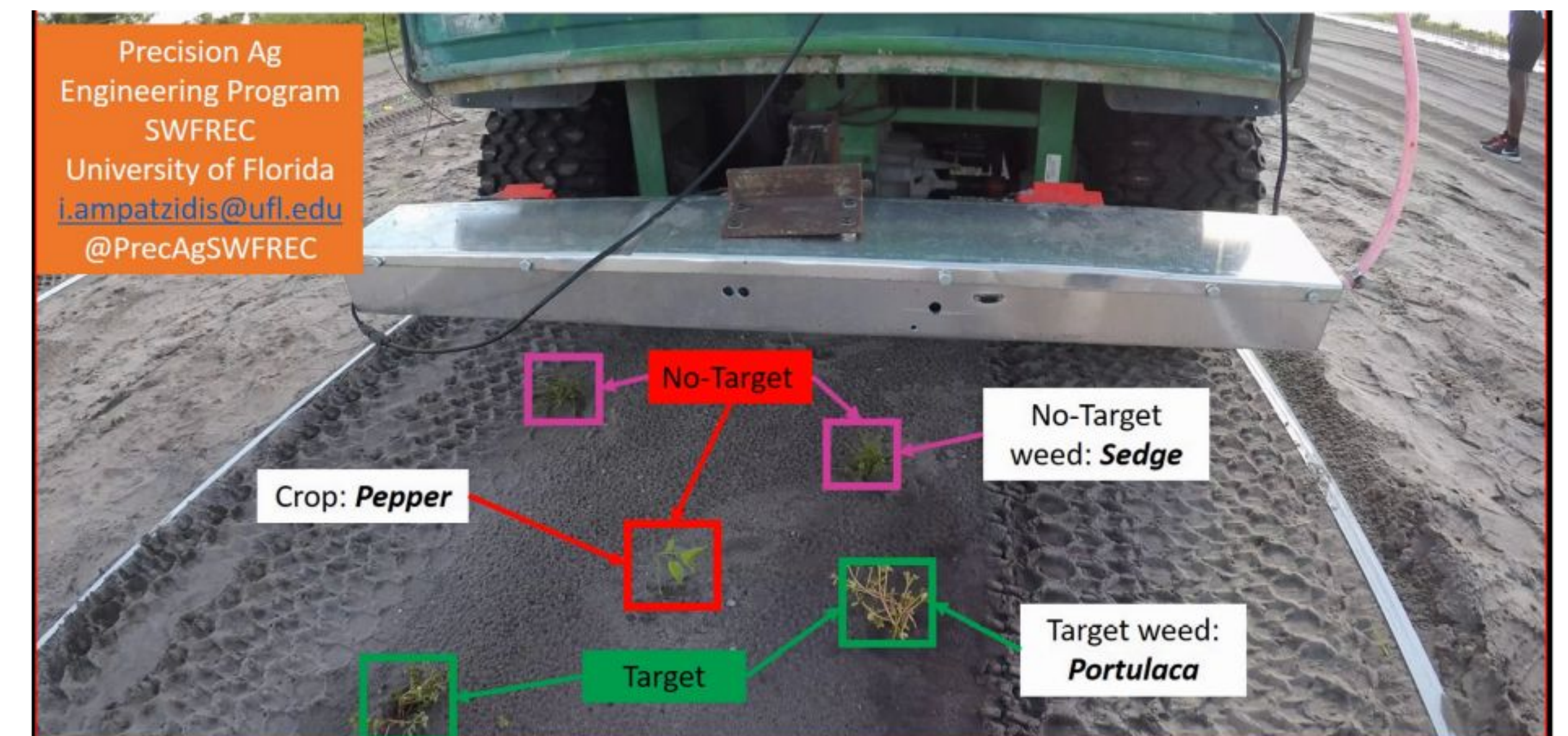
## Methods

- Robot System



Robot Features: High ground clearance, Width expansion, multiple steering modes including skid steer, ackerman, crabbing etc.

- Smart weed sprayer Robot System



**Results** Preliminary field test of the robot system in field conditions shows that the robot system can adjust wheel base to different row width, detect three different varieties of weeds and spray accordingly.

## Scientific Impact

- Multi-crop, low-cost, autonomous, and precision spraying robots.
- A self contained smart sprayer system that could be attached to any farm vehicle

## Broader Impact

- Summer internship for undergraduates, professional training for graduates.
- Reduces spraying costs, dependence on agrochemicals and labor.
- No major changes to way growers currently grow crops.
- Leadership opportunities to staff both at UD and CMU..