# CAREER: Morphological Computation for Resilient Dynamic Locomotion of Compliant Legged Robots with Application to Precision Agriculture

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## The Problem

- Unprecedented challenges to meeting the continuously growing demand for food globally
- Need to sustain or improve current productivity with fewer inputs and at more harsh conditions

## Significance and Goal of this Project

- Efficient and resilient robotic legged locomotion can transform precision agriculture outcomes
- Develop and validate experimentally a theoretical and computational framework for compliant and soft legged robots to navigate over natural terrain while harnessing compliance to improve efficiency of locomotion and resilience to perturbations

## Aims of this Project

1. Finite DoF Compliant Dynamic Legged Locomotion (Yrs 1-3)
2. Infinite DoF Compliant (Soft) Legged Locomotion (Yrs 2-5)
3. Autonomous Locomotion in Agricultural Fields (Yrs 3-5)

## Intellectual Merit

- Compliant legged robot design and modeling principles
- Locomotion controllers harnessing robot compliance
- Compliance-aware planning and navigation strategies

## Ongoing Investigations

- Development of baseline articulated compliant and soft legged robots
- Investigation of effect of waist joint compliance to articulated compliant quadruped gait stabilization
- Feedforward control for soft legged robot navigation across natural type of terrains

## Integration of Research and Education & Broader Impacts

- Robotics Makerspace Program for UCR Undergraduates, which extends beyond engineering students
- UCR – Redlands USD Robotics Summer Academy Camp for 8$^{th}$ grade female students of diverse socio-economic status
- Shaping the theory and practice of compliant legged locomotion to enable deployment of legged robots in precision agriculture

2021 NRI & FRR Principal Investigators' Meeting
March 10-12, 2021

Award ID#: **2046270**