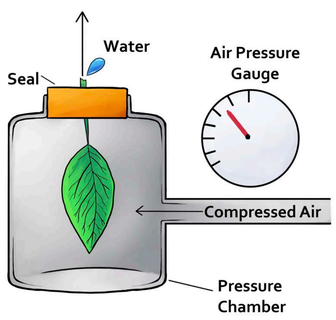
Mobile Robotic Lab for In-Situ Sampling and Measurement

Stefano Carpin, Joshua Viers, UC Merced – Konstantinos Karydis, Amit Roy-Chowdhury, UC Riverside

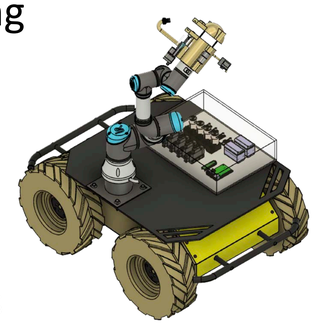
Problem

- Leaf water potential measurements are key to precision agriculture but are time consuming
- Measurements must be frequent in time and spatially dense
- Data collection with pressure chambers is the current bottleneck



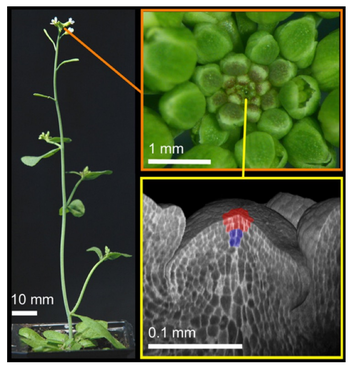
Proposed Solution

- Develop a multi-robot system automating the sampling process
- Aerial robots identify *interesting* regions to sample
- Ground robots navigate to points of interest, pick a leaf and perform analysis in situ



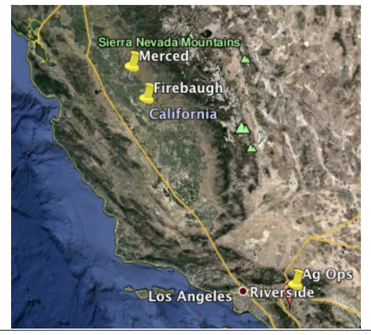
Technical Tasks

- Robotized Pressure Chamber Development
- Leaf Picking
- Visual Sensing for Accurate Determination of leaf water potential
- Multi-Robot Coordination and Planning
-



Field Evaluation

- Four different testbeds
- Hypothesis: current practices fail to capture meaningful variability
  - across testbeds
  - in time and space
- Multiple commercial partners



Location	Crop	Area
Firebaugh	Grapes	77
Merced	Almonds	156
Riverside	Citrus	450
Coachella	Avocados	540

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

Award ID#: 2021-67022-33452