UBIQUITOUS SOIL SAMPLING ROBOTS FOR CONFLUENT SOIL MONITORING

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Objectives:

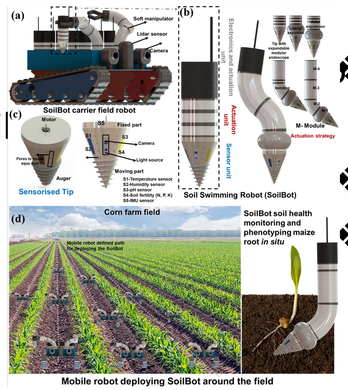
AIM I: Design and develop soil swimming robots for soil sensing of the maize plant root and its rhizosphere with an above-ground carrier mobile robot to support large-scale field campaigns.

AIM II: Develop the use of the soil robot collective to identify interactions between maize roots and soil water relations at critical plant development time points

AIM III: The project will share the impact and scientific findings of this project with the greater scientific community and public by implementing a coordinated set of activities that engage students, scientists, growers, and the public.

Technical Approach:

- Worm-like soft robot for soil navigation
- Wheeled carrier robot for deploying Soil
- Below and above ground phenotyping
- Envirotyping of the field environment



Mobile robot deploying SoilBot around the field

Key Innovations and New contributions :

- High powered 3D printed fiber innervated soft actuators
- Spatio-temporal measurement of near-root and bulk so… me…
- Study critical aspect of plant breeding , rh… …

Scientific Impact:

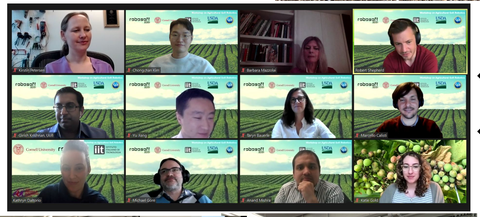
- Transdisciplinary research
- Advanced manufacturing
- Combining Geno, Phenol and envirotyping
- Lab to field test
- Rhizosphere phenotyping
- Bigdata on crop breeding research

Impacts on Society:

- Growers can directly benefit from crop breeding efficiency and root phenotype study
- Creating dialogue among plant scientists, engineers, growers and computer scientists
- Industrial cooperation

Education and Outreach:

- Transdisciplinary workshops
- Robotics training to K-12 students RET program for high school faculties



Potential Impacts:

- In situ measurements
- Low-cost sensing for below and above ground phenotyping
- Genomics to field
- Highly predictive crop science

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