CAN A ROBOTIC-ASSISTED METHOD FOR MOUNTING HELIOSTAT FACETS DRIVE DOWN THE COST OF CSP FIELD DEPLOYMENT?

Similarities:

Economic

- Large labor pools & remote locations
- Large labor cost driver(?)

Technical

- Large, heavy, fragile panels
- Precision installation
- Reflective surface
- Varied height of installation

Unknowns:

Economic

- Facet installation costs
- Adaptability of field designs and hardware

Technical

- Facet design specifications
- Compatibility with robotics
- Ability to detect facets and precisely place
- Differences in field construction

(Prodiel and Power China ... 2019); Heliostats | Solar Dynamics LLC (solardynllc.com); Walsh, B. (2013)

PHASE 1: ECONOMIC IMPACT STUDY

Is deploying robotics a cost-effective strategy to lower CSP LCOE?

CSP Construction Literature Research

- Costs and Design
- Which methods support robotic installation?

Economic Analysis – Areas of Impact

- Baseline Construction Costs
  - Facet Installation Costs?
- Hardware Design Compatibility and Adaptations
- Site Design Considerations
- Operation and Maintenance
  - Are cost savings feasible?

Risk Analysis

- What is necessary for cost effective deployment?
- What business risks exist?

PHASE 2: TECHNICAL INVESTIGATION

Can robotics for PV installations be deployed or adapted for CSP?

Related R&D

- Project: “Outdoor Autonomous Manipulation of Photovoltaic Panels” (O-AMPP)
  - Goal: Reduce LCOE and automate the flow of PV modules from delivery to installation

Hardware - end of arm tooling (EOAT)

- Existing hardware suitability
- Limitations
- Gap Analysis

Software

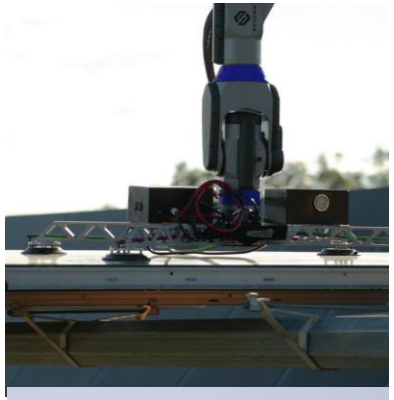
- Perception system evaluation
- Modification strategy to adapt algorithms

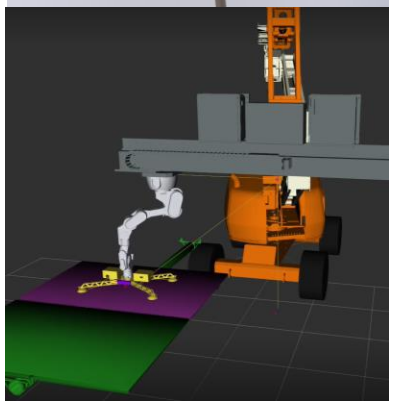
Simulation

- CSP field parameters
- EOAT considerations

Demonstration

- O-AMPP system pick and place test





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