

HelioControl

Closed-Loop, Camera-Based Control and Calibration for large Heliostat Fields

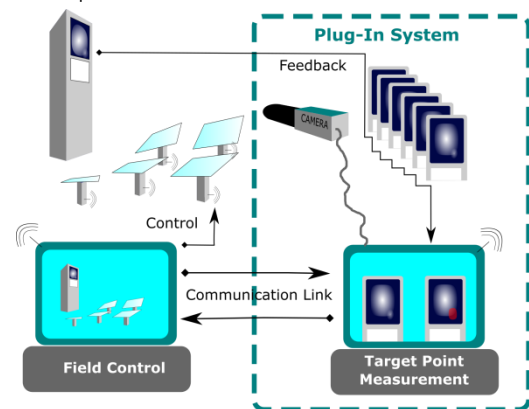
We propose a novel closed-loop heliostat control system. While being more accurate and robust than conventional control approaches, it also offers the potential to reduce the heliostat costs per mirror area.

State-Of-The-Art

Commercially available heliostat control systems use an open-loop approach. Tracking uncertainties of the heliostat surface normal between 1.5 mrad up to 3 mrad depending on the drive system are typical. Regular re-calibration of the entire field is required.

Working Principle of *HelioControl*

A novel *closed-loop* heliostat control approach is suggested, which uses one or several *HDR cameras* and makes use of advanced *computer vision* techniques.

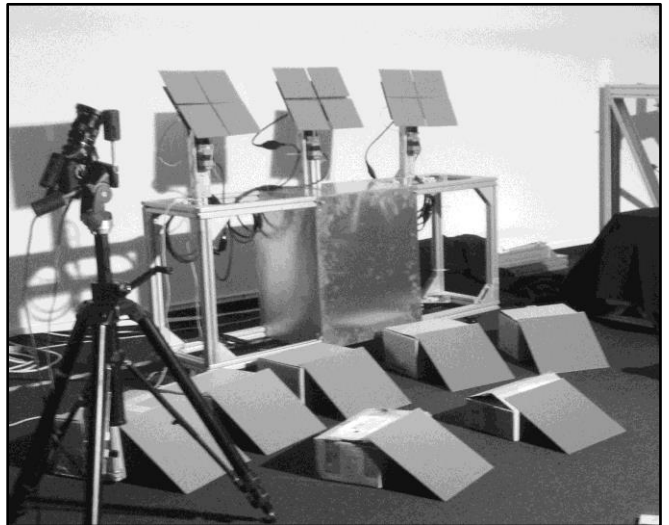


Working principle of the HelioControl approach

A well-defined periodic movement is applied to selected heliostats in the field. By observing the receiver with the camera(s) and through analysis of the resulting sequence of images, the position of the individual focal spots of the selected heliostat can be determined accurately (Target Point Measurement). This information is then fed back to the Field Control, where the heliostat's orientation is adjusted accordingly. This procedure is continuously repeated such that each heliostat in the field is focused on its designated aim point.

Performance Assessment

The system has been tested in simulations, with a lab-scale prototype and in an existing Solar Tower system. Results show that the heliostats' focal spot positions can be determined robustly and accurately.



Test bench with micro-heliostats and camera

Advantages

- No recalibration necessary
- Improved tracking accuracy
- Reduced spillage
- Reduced risk of hot spots
→ Safer operation
- Less heliostat precision required
→ Cost reduction
- Plug-In to existing systems
- Readily applicable for initial calibration of large heliostat fields

Interested?

The HelioControl technology outperforms conventional tracking approaches in every aspect. We are convinced that your plant needs HelioControl. Ask us for more information!

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