CPS: TTP Option: Medium: Multiobjective Control of Catoptric Systems

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1. INTRODUCTION

FIXME: What are we doing?

FIXME: Where (if at all) should we define Open-Source Architecture (OSArc) as distinct from open-source software? How do the notions of OSArc integrate with what we are doing? (This is a Chandler question.) Is [11] a good citation (I just found it on wikipedia)? How about one or more things that Chandler has written?

FIXME: Articulate specific research questions below.

This research will investigate the following questions:

1. ***What are the qualitative and quantitative benefits that can be achieved for bulding daylighting and thermal management through the use of catoptric systems?***

   Issues within this question include FIXME: talk about multi-objective control.

2. ***How do we provide for the safety, reliability, maintainability, and continued efficacy of these systems?***

3. ***How do we generalize the above into abstractions that can be leveraged more broadly for arbitrary cyber-physical systems development?***

FIXME: Brief description of who we are and what we've done.

2. BACKGROUND AND RELATED WORK

FIXME: Describe first two installations.

FIXME: Literature review [1, 2, 7, 8, 9].

3. RESEARCH DESCRIPTION

3.1. Intellectual Merit

The intellectual contributions of this project are FIXME: describe summary of intended intellectual merit [6].

4. EVALUATION/EXPERIMENTATION PLAN

5. PROJECT MANAGEMENT AND COLLABORATION PLAN

6. BROADER IMPACTS

FIXME: Describe broader impacts: environmental benefits of energy savings and quality of life benefits to building occupants.

At the undergraduate education level, this work is closely related to FIXME: describe CSE 132 connection.

At the graduate education level, this work will support 4 graduate students at Washington Univ. in St. Louis. FIXME: Expand, including REUs, multidisciplinary angle.

We will leverage a pair of existing university programs to help us attract students from traditionally underrepresented groups. The Olin Fellowship Program (for women) and the Chancellor's Fellowship Program (aimed at underrepresented minority students) have had a successful track record of enabling individuals to pursue graduate study. In our experience, the most effective method for attracting students from underrepresented groups is by personal contact with a suitable role model. To facilitate this, we regularly ask the appropriately qualified individuals

in our group to be actively involved in the recruiting process. This cohort currently includes two minority graduate students (one African-American student and one hispanic student). FIXME: Can we strengthen the BPC story? Maybe somehow with 132 and maker spaces?

7. RESULTS FROM PRIOR NSF SUPPORT

CSR: Small: Concurrent Accelerated Data Integration (CNS-1527510, PI: R. Chamberlain), 10/2015–9/2019, $519,275.

Intellectual Merit – This project investigates the accelerated execution of data integration workflows, which increasingly are bottlenecks in data science. Execution platforms being targeted include both graphics engines and FPGAs. Publications resulting from this work include [4, 5, 10, 12].

Broader Impacts – This research project has supported 3 graduate students and 4 REU students. The applications investigated come from the fields of computational biology, astrophysics, and the Internet of Things, further expanding the scope of the students' experience. A benchmark suite of these workflows has been released as a community resource [3].

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