

FORCES: Foundations Of Resilient CybEr-physical Systems

Education & Outreach

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Kick-Off Meeting

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Presentation Outline

- Overview
 - Scope of Education Work
 - Research behind our Plan Implementation
- FORCES Education Goals
 - Curriculum Development
 - Outreach to Community
 - Broadening Participation
- Wrap Up
 - Goals Year 1
 - Plan for Execution

FORCES Education - Scope of Work

- Curriculum Development

- Address the gaps in the EE, CS, and Systems curricula in the area of large-scale cyber physical systems.
- Incorporate new concepts and tools based on the theory of resilient network control, game theory, mechanism design, and network economics in teaching of CPS Applications.
- Real-world case studies from transportation, electricity, and information networks.

- Outreach to Community

- Provide training to the researchers and practitioners working in the area, and seeking degrees in the area of cyber-physical systems.

- Broadening Participation

- Infuse the EE and CS pipeline with (1) more diverse participation in the area and (2) increase the number of women and URMs involved in cyber-physical systems work.

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Curriculum Development

- Outcome 1: A Junior/Senior Level Undergraduate Course in the Integrated Design of CPS
 - Berkeley & Vanderbilt:
 - Leverage existing collaborations in embedded systems and model-based design and extend to resilient CPS design
 - MIT:
 - Leverage existing capabilities in Networks course and Engineering for Sustainable Infrastructures.
 - Michigan:
 - Game theory and Mechanism design
 - Electricity CPS networks
 - Year 1: Examine the current classes
- Outcome 2: A Master's/Ph.D. Level Design Course on Resilient Networks
 - Include concepts from theory of network control, game theory, and mechanism design
 - Year 1: Synergy Development across all four partner institutions

Outreach to the CPS Community

- Outcome 3: Professional Development Workshop/Seminar
 - In collaboration with the HiCons Conference
 - Years 1: Develop a workshop in response to an industry or professional need related to large-scale CPS
- Outcome 4: A MOOC on Resilient Networks
 - Berkeley: AI Class, Security (Song) through partnership with EdX
 - Year 2-3: Design a series of online modules
- Outcome 5: Develop capabilities to disseminate course material via CPS-VO.
 - Year 1: Use CPS-VO to share course materials and outcomes of student projects

Broadening Participation

- Outcome 5: Student Internship Experience
 - Select among our talented undergraduates for year long research projects
 - Growing the community focused on this topic area
- Outcome 6: Modified REU
 - Cross Campus exchange of year long research students. Provide students with exposure to other aspects of CPS on different campuses to develop well roundedness
 - Find a way to locate more/new talent
 - Year 1: 1-2 REU students per campus

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 - Goals Years 1-5

Goals Year 1

- Examine current classes taught in the area of CPS across our institutions
- Identify the expertise of 4 partner institutions in the this area
- Plan for module development in these areas and how would these KSAs be employed through a Capstone Project, which employs real-world scenarios from various CPS domains
- Conduct outreach on topics of interest to professionals and graduate students who will attend conferences like HiCons 2014 and sister CPSWeek Conferences
- Identify a talented pool of students on each of our campuses who want to conduct research in CPS
- Plan for REU deployment in the summer of 2014