FORCES
Knowledge Transfer

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Knowledge Transfer Summary

* New Programs & Activities
  * Siebel Energy Institute
  * Workshop on Cyber-Physical Systems
  * Transportation and Energy Conservation
  * Vehicle Transportation Network Testbed

* Ongoing Programs & Activities
  * Resilient Societal-Scale CPS
    * Philippine-California Advanced Research Institutes (PCARI)
  * Resilient Water Networks
    * Singapore-MIT Alliance for Research and Technology (SMART)

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Siebel Energy Institute

SIEBEL
ENERGY INSTITUTE

The Siebel Energy Institute is a consortium of international universities focused on advancing data analytics research for energy systems in an open, collaborative, and publicly-available manner.

The Institute funds cooperative and innovative research grants in data analytics, including statistical analysis and machine learning for the electrical smart grid, the oil and gas industry, and other modern energy systems.

www.siebelenergyinstitute.org

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Siebel Energy Institute

Consortium for Innovative and Research

INSTITUTE DIRECTOR: S. Shankar Sastry, Dean of Engineering, UC Berkeley

INSTITUTE CHAIRMAN: Thomas M. Siebel, The Thomas and Stacey Siebel Foundation

Siebel Energy Institute

Fostering High-Impact Collaboration

Seed Funding for Development of Large Proposals - funding of ~15-18 new projects a year at $50,000 each

Matching Grants for Successfully Funded Projects – Matching grants up to 20% for eligible projects, capped at $75,000 a year

Industrial Advisory Board – An exclusive industry partner program that fosters active collaboration between the private sector and the Institute members and researchers

Research Conferences – Annual conference to disseminate the results of the projects associated with the Institute

Selected Topical Research Workshops – Special in-depth workshops on new and emerging areas for energy analytics

Siebel Scholars – Coordination with the Siebel Scholars Foundation to select eight students to receive $35,000 as a merit-based award
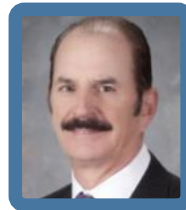
RESEARCH WILL BE PUBLICLY AVAILABLE

FORCES
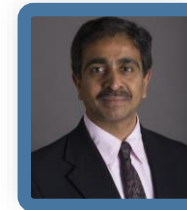FOUNDATIONS OF RESILIENT
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Industry Partnerships

C3 Energy

Ed Abbo
President & CTO

Entergy®

Mark Savoff
Executive Vice President & COO

EVERSOURCE ENERGY

Tilak Subrahmanian
Vice President, Energy Efficiency
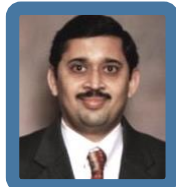
Honeywell

Datta Godbole
CTO, Honeywell Building Solutions

PG&E

Deborah Affonsa
Vice President, Customer Service

RWE

Thomas Birr
Senior Vice President, Strategy & Innovation

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Siebel Energy Institute

Workshop on Cyber-Physical Systems

Joint FORCES-ACCESS Workshop – Oct 26-27, 2015, KTH

* Goal to investigate and identify future opportunities and challenges
* Single track presentations, poster sessions, and group breakout sessions
* Topics included:
  * Communications
  * Energy and transportation systems
  * Security
  * Education
* Participants from academia and industry (EU, US, UK, Asia)
  * ABB, Ericsson, Modelon, and SAAB
* Workshop program and presentations online:
  * https://www.access.kth.se/en/newsandevents/workshops/access-forces-workshop-on-cyber-physical-systems-1.590182

Transportation and Energy Conservation

Leveraging Data Analytics and Incentives

* Urban Parking Management
  * Seattle Department of Transportation (Paulo Nunes-Ueno, Transit Division Director)
  * Parking in downtown region of city
  * Congestion incentives to shift modes of transportation
  * Living laboratory

* Mobility Electronic Market for Optimized Travel (MeMOT)
  * ARPA-E project to design, build, and trial a system to incentivize people to adapt travel choices to conserve energy
  * Rewards people to shift routes, departure times, modes of travel, and vehicles based on information they receive from MeMOT
  * Points awarded based on energy savings, can be redeemed for travel-related and other benefits at participating vendors
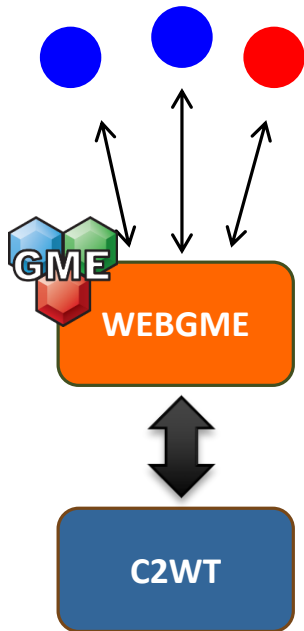
Vehicle Transportation Network Testbed

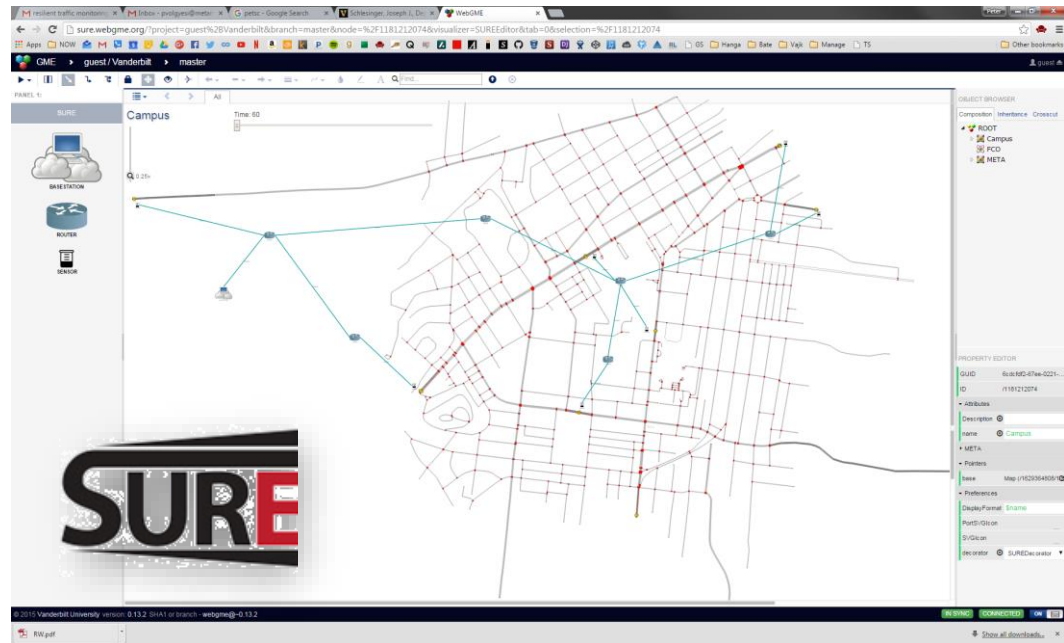## **S**ystem science of sec**U**rity and **RE**silient for cyber-physical systems (SURE)

SCOPE: Evaluation testbed for vehicle transportation networks. Developed by SURE, used by FORCES.

OBJECTIVE: Use heterogeneous simulations of attacker-defender games to evaluate resilient monitoring and control in CPS

WEBGME

GME

C2WT

Simulation Integration Platform

http://sure.webgme.org/

5/29/15

Resilient Societal-Scale CPS

Philippine-California Advanced Research Institutes (PCARI)

* Republic of the Philippines – University of California program
  * Secure and Resilient Cyber-Infrastructures
    * Definitions and impacts on resilience
    * Case studies, threat models, library of faults, failures, and attacks
    * Mitigation strategies, tools, and techniques
  * Resilient Building Energy Management
    * Defining the scope and metrics
    * Identifying and documenting testbed specifications
    * Instrument a testbed
    * Collect and analyze testbed data
  * Microgrid for Resilient Rural Electricity Service
    * Runtime policies for generation and storage
    * Control theory to optimize storage + generation
    * Economics and policy affecting implementation
    * Field deployment
  * Testbed for Cyber Secure Infrastructures
    * Specifications, architecture, and deployment plan
    * Install testbed (hardware & software), conduct V&V testing and training

Resilient Water Networks

Singapore-MIT Alliance for Research and Technology (SMART)

* **Resilient Water CPS in Sinapore**
  * MIT, SMART-CENSAM,
  * Visenti Pte., PUB, NRF
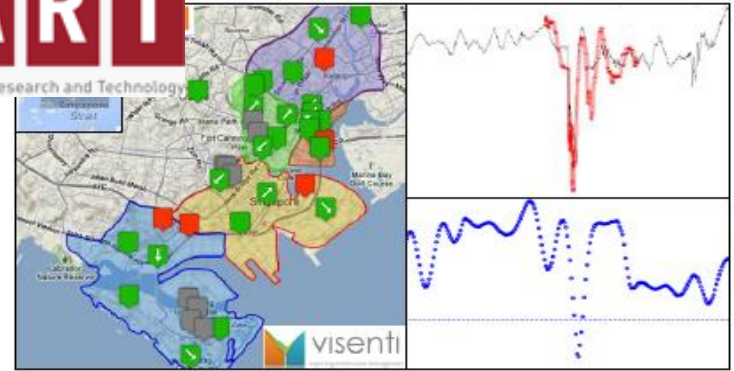
* **SWaT: Secure Water Treatment**
  * Funded by: Ministry of Defense
  * Design review: PUB and SUTD
  * Extensions: water storage and distribution
* **FORCES research contributions**
  * Network control
  * Vulnerability assessment
  * Resilient monitoring and diagnostics

SWaT: Secure Water Treatment Test Bed