Pictures at SERE 2014

Day 3 (July 2)

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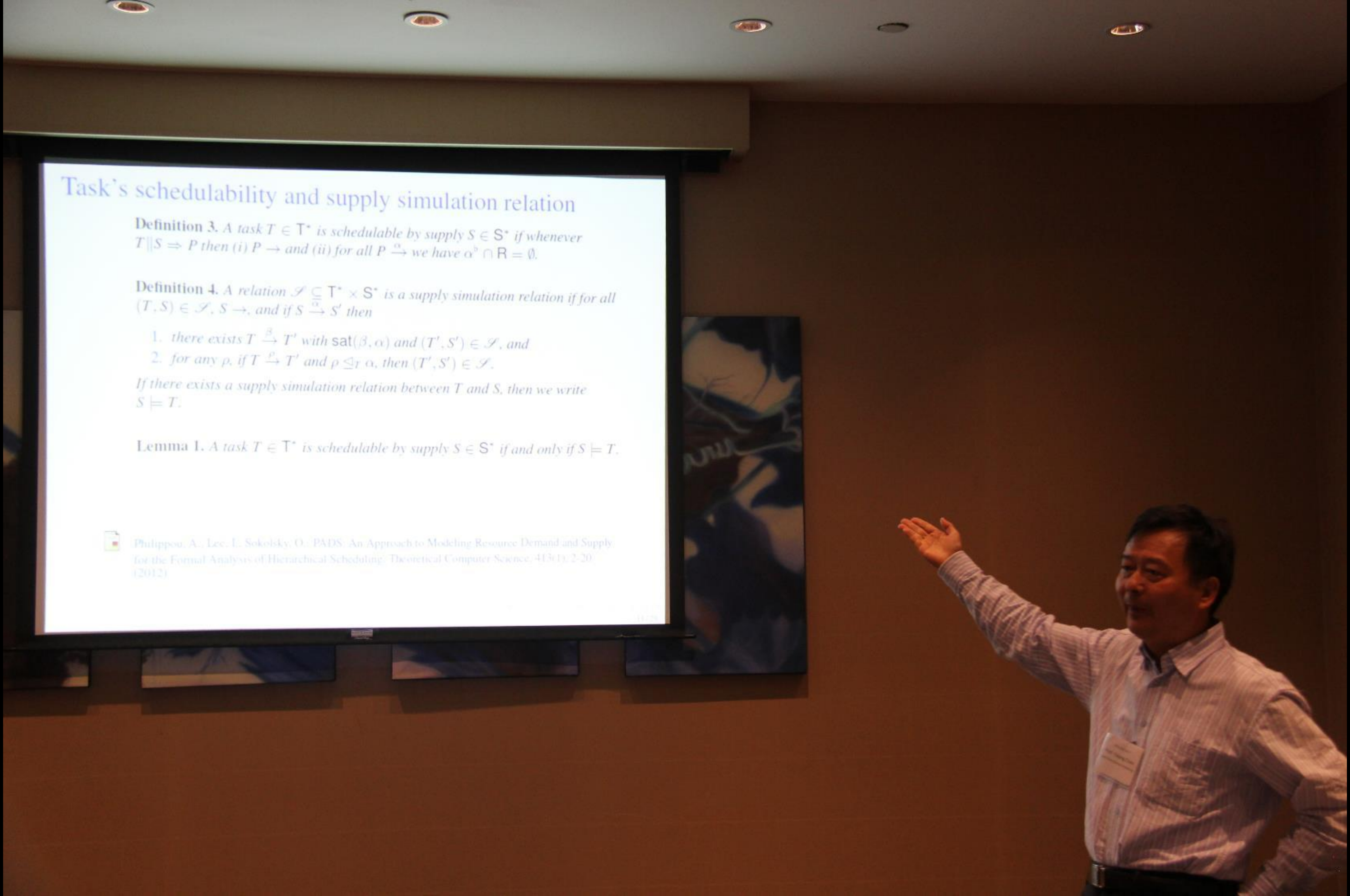
Collision analysis pro

- Step 3: Identification of C
  - Cut set
    - The combination of coexiste
      (A set of minimal leaf nodes
    - We applied MOCUS algorit
  - Purpose of identifying Cut
    - Analyze whether the action
      device or not

T1
R1
PA1
PA2
R2
Cut
PA3
R3
PA4

Qualitative Analysis
Design Safety Model
Failure Mode Analysis
FMEA
Failure Cause Analysis
Failure Effect and Severity Analysis
Criticality Analysis
FMECA Check List
The most probable causes for each failure mode should be identified and described in FMEA property of error model



Task's schedulability and supply simulation relation

Definition 3. *A task* $T \in \mathsf{T}^*$ *is schedulable by supply* $S \in \mathsf{S}^*$ *if whenever* $T \| S \Rightarrow P$ *then (i)* $P \rightarrow$ *and (ii) for all* $P \xrightarrow{\alpha}$ *we have* $\alpha^{\flat} \cap \mathsf{R} = \emptyset$.

Definition 4. *A relation* $\mathscr{S} \subseteq \mathsf{T}^* \times \mathsf{S}^*$ *is a supply simulation relation if for all* $(T, S) \in \mathscr{S}$, $S \rightarrow$, *and if* $S \xrightarrow{\alpha} S'$ *then*

1. *there exists* $T \xrightarrow{\beta} T'$ *with* $\mathsf{sat}(\beta, \alpha)$ *and* $(T', S') \in \mathscr{S}$, *and*
2. *for any* ρ, *if* $T \xrightarrow{\rho} T'$ *and* $\rho \trianglelefteq_T \alpha$, *then* $(T', S') \in \mathscr{S}$.

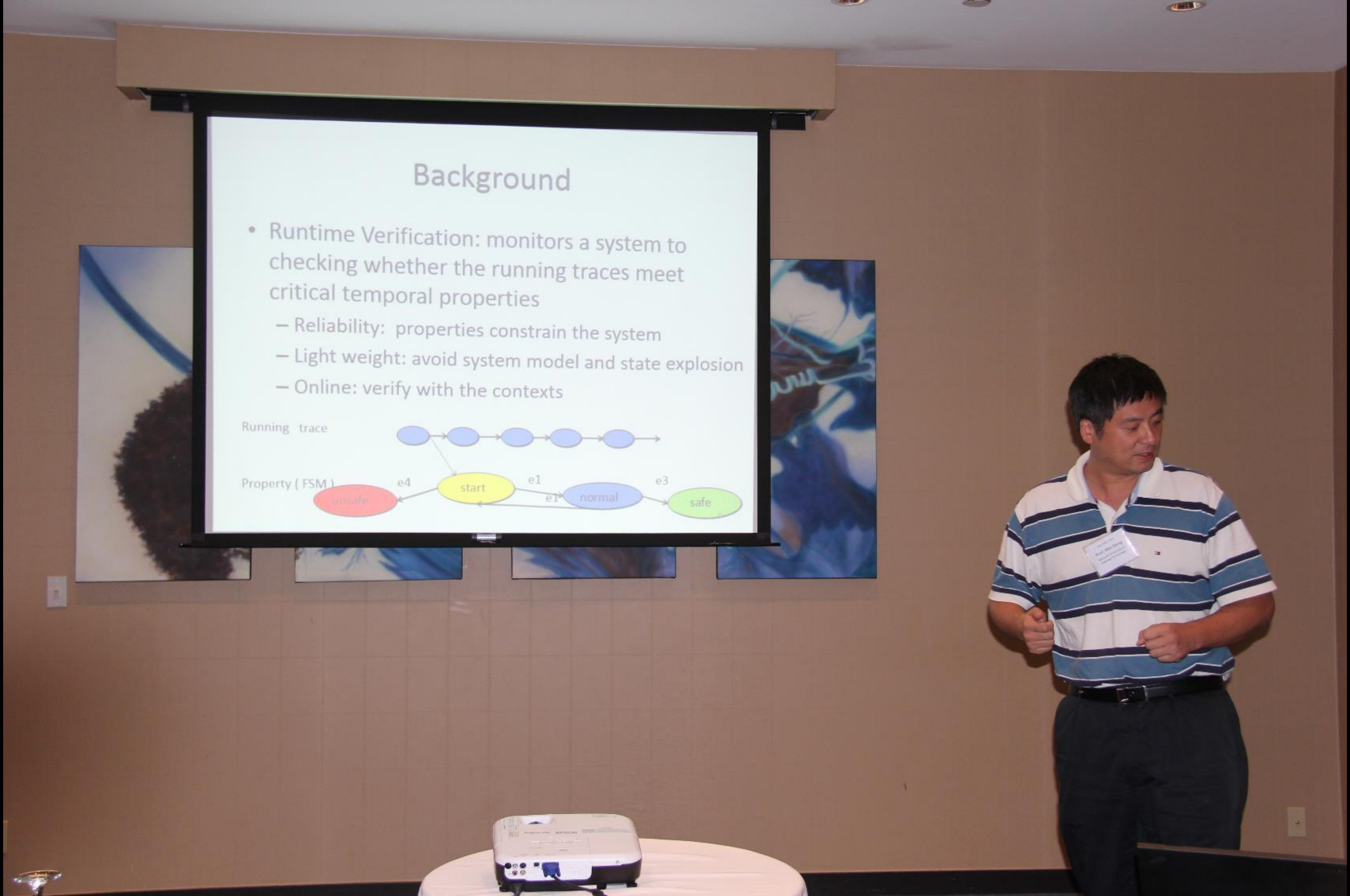
If there exists a supply simulation relation between T *and* S, *then we write* $S \models T$.

Lemma 1. *A task* $T \in \mathsf{T}^*$ *is schedulable by supply* $S \in \mathsf{S}^*$ *if and only if* $S \models T$.

Philippou, A., Lee, I., Sokolsky, O.: PADS: An Approach to Modeling Resource Demand and Supply for the Formal Analysis of Hierarchical Scheduling. Theoretical Computer Science, 413(1), 2-20 (2012)

Background

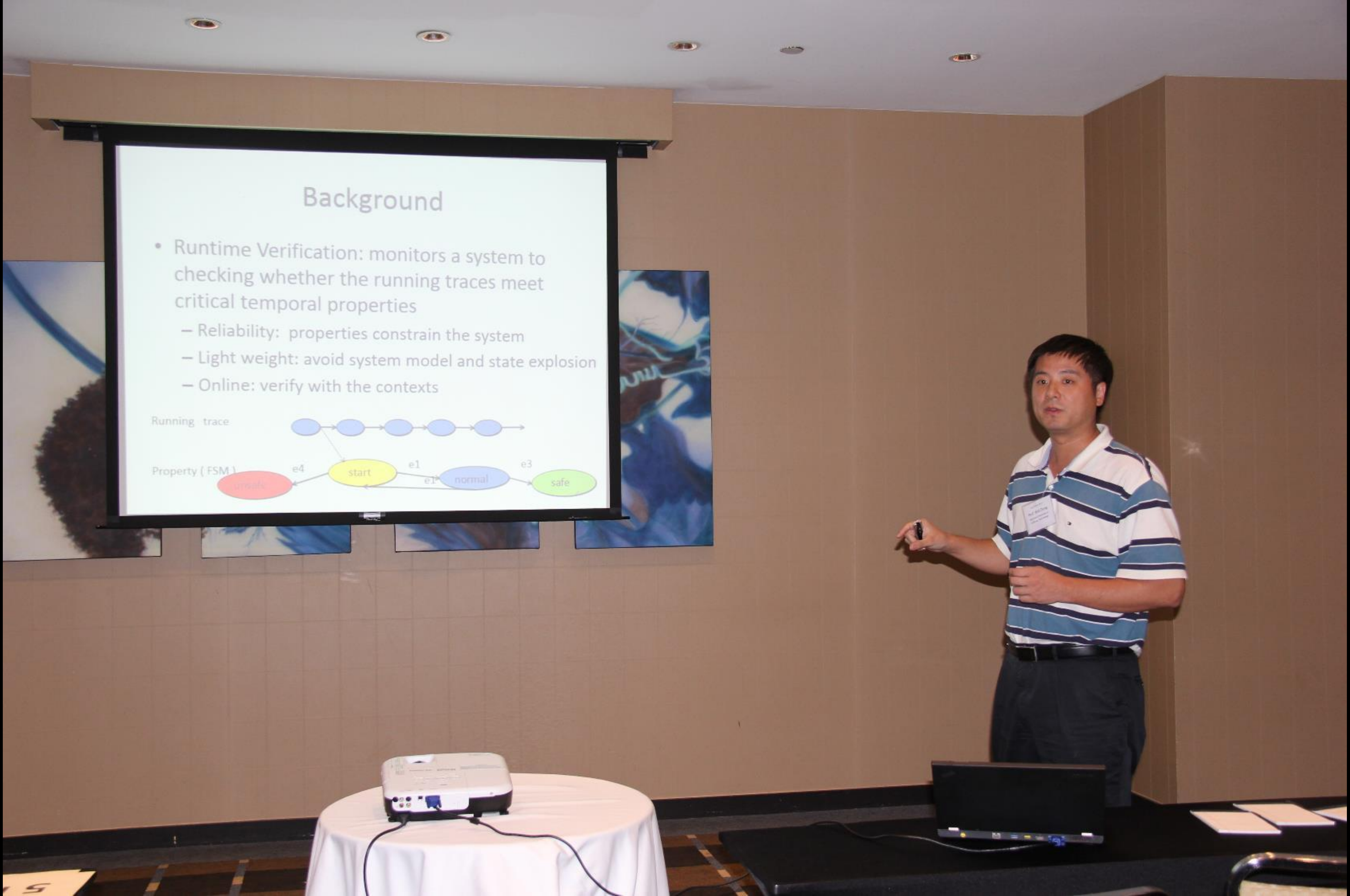
- Cyber-Physical System (CPS) in Many Key Areas: energy, transportation, aviation, etc.
  - Complex: open, large scale, multi-components
  - High Reliability Requirements



Background

- Runtime Verification: monitors a system to checking whether the running traces meet critical temporal properties
  - Reliability: properties constrain the system
  - Light weight: avoid system model and state explosion
  - Online: verify with the contexts

Running trace
Property (FSM)
e4
start
e1
e3
unsafe
e1
normal
safe



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NORTHWESTERN POLYTECHNICAL UNIVERSITY

A Load Scheduling Strategy for Electric Vehicles Charging System

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