

Designing Safe and Robust Human-machine Interactions with Fuzzy Mental Models

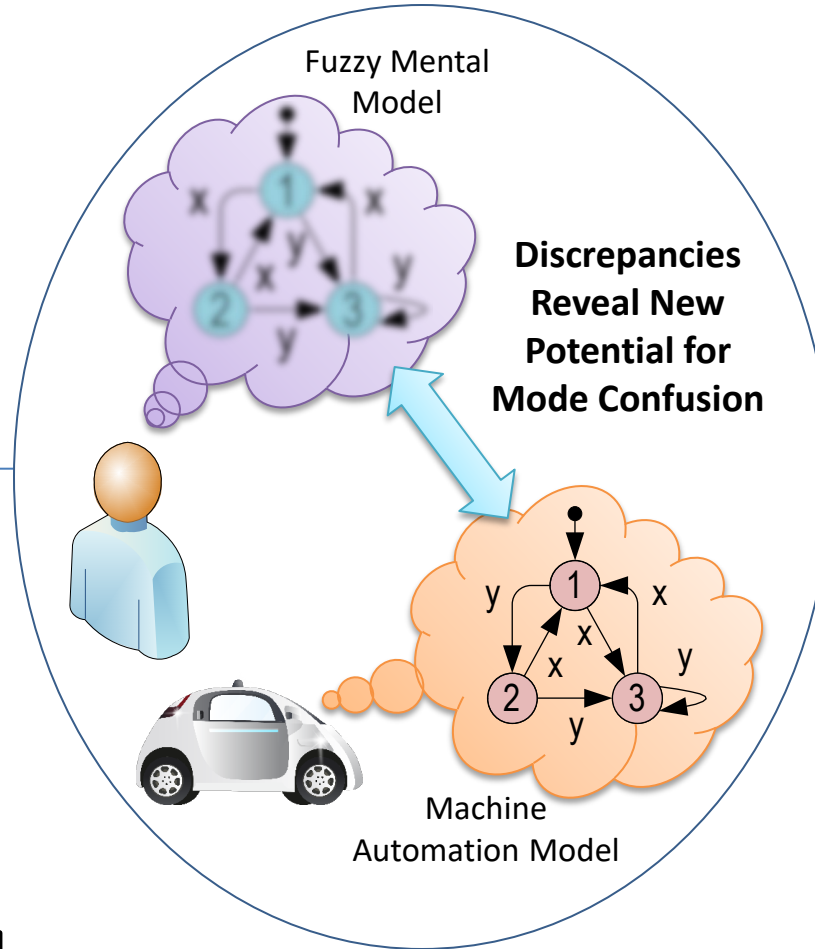


Challenge:

- Humans use **mental models** to track system automation
- Finite state machine mental and automation models can formally identify mode confusion: mismatches that encourage human error
- Finite state machine mental models fail to capture human mental **vagueness**

Solution:

- New **Fuzzy Mental Model (FMM)** formalism to capture mental model vagueness with fuzzy logic
- New method to **elicit FMMs** from people
- New formal **verification** and **repair** methods to discover and fix mode confusions



Scientific Impact:

- Unprecedented ability to accurately capture human mental models
- Novel formal verification and repair methods for analyses with the new formalism
- Ability to detect new, valid mode confusions (e.g., vacuous and nondeterministic confusion)

Broader Impact and Broader Participation:

- Means of detecting and fixing mode confusion, which will prevent human error and systems safety failures
- Support for multiple graduate and REU students from underrepresented groups

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