

# Modeling and Simulation in Robotics Workshop

Breakout Summary Slides

Team 5

Breakout 1

# Slide 1: Consensus Thinking

- Role of modeling and simulation in development and testing (may be different)
  - Verification and Validation
  - Risk analysis
  - Autonomy Development vs Control Development
  - Embedded models: models used for control
  - ML for lifecycle prediction, reliability / maintainability
  - Non-temporal models, finite element models, structures analysis, load balancing
- Planning
  - gait, mobility, manipulation, multi-agent,
- HRI
  - HCI, HMI, VR, AR
- UAVs, UGV, UxV... Medical, Legged, Winged, Rotor, Manufacturing/Industrial, Home, Entertainment, Perception/Action System

## Slide 2: “Somewhat contentious” Ideas

- Augment analytical models with empirical models – extent
- Maintain virtual model of robot (digital twin)
- Require metrics for safety (how do I do this?)
- XAI – interpreting/analyzing “black box” models, guarantees

## Slide 3: Odds and ends, out there thoughts, fun stuff

- What is the framework for understanding when you need high/low fidelity for models
- Is a single simulator reasonable? How do you integrate multiple simulators/models?
- Assured learning

# Cheat Sheet Slide

- Breakout Themes, “M&S in Robotics” workshop:
  - Breakout 1: Panoramic view of opportunities  
[a time to dream]
  - Breakout 2: What’s stopping us from getting there  
[the reality check]
  - Breakout 3: Pragmatic suggestions for moving forward  
[what funding organizations, the robotics community,  
or other vested parties can/should do]

- Breakout session, things to keep in mind
  - You have 25 mins to generate your three slides
  - Select a scribe to generate your three slides
  - Decide who will present your slides in plenary
  - Do not argue within team for more than 2 mins about an idea. Move it to “Slide 2” and proceed
  - Generate diverse/original/out-there ideas
- Plenary session, things to keep in mind
  - Each team has 5 mins to present its slides
  - We seek to collect as many original ideas/points of view/opinions as possible
    - Settling contentious issues not a priority
  - Use open-floor discussion to add to what the teams have presented
  - Limit your remarks to one to two minutes. Give others an opportunity to speak. Keep it fun, keep it friendly