

Autonomy Working Group

Day 2 Discussion

- Connection to Nano (the bridge)
 - System pull vs. technology push
 - Nano should originate from functional and system needs
 - Requirements for autonomous systems: high energy density storage, computational/information processing (sensing, compute, decision and actuation) density
 - Identify new functions/fabrics available from nano
 - Power requirements for computation vs. sensing vs. connectivity/communications: autonomous car (~200 W computation, ~200 W sensing/~50 kW gas power)

- What are the Cross-Layer Research Opportunities and Challenges in a 10-year timeframe?
 - Need for infrastructure and access to shared facilities
 - Designing materials and devices in their application context
 - Promote access for academics/small groups
 - Education: how to train next generation of students
 - Project-based training/experiential maker labs for research translation
 - Promote large-scale systems thinking
 - Security and privacy issues

- How do you know we've moved the needle
 - Building system demos with new capabilities
 - Simulation, models, modular architecture
 - Platform testbeds
 - Defining proper metrics aligned with testbeds
 - Need to avoid point solutions
 - Programmable and reconfigurable
- What are the intermediate steps?
 - Model and simulation
 - Revolutionary vs. incremental steps
 - Combining new materials and functions
 - Setup ecosystem and funding sources

- What are the metrics?
 - Need for real-world benchmarks, cannot be static and should be evolving, broad goals
 - Should be at functional level tied to system needs, not device level
 - Accuracy of decision making for autonomous systems for high-level behaviors
 - How to measure quality of integration from device to algorithms? Cannot just stack modules on top of each other