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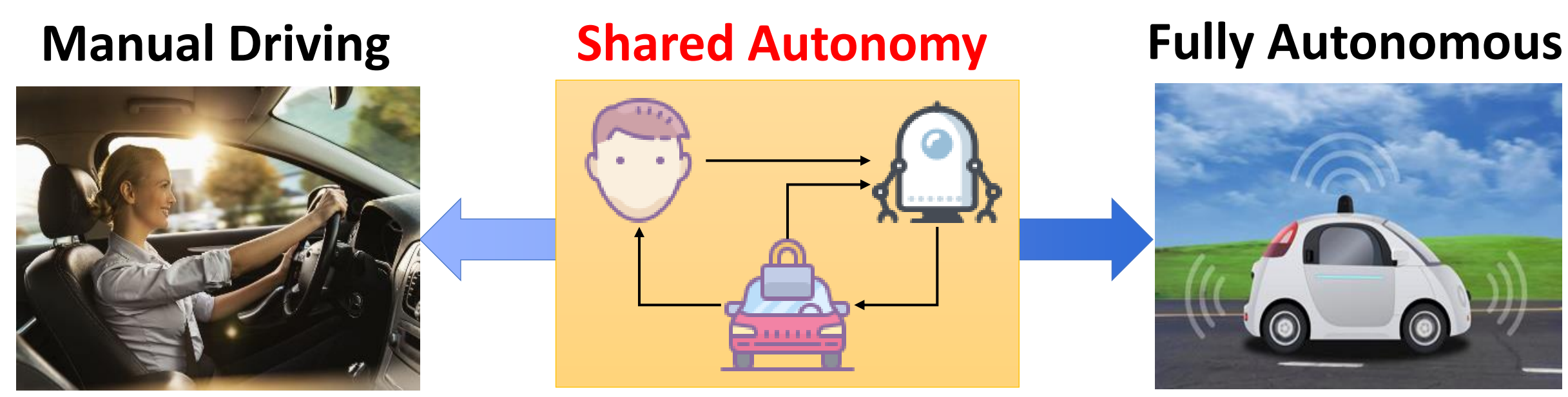
1: The Learning Agents Research Group (LARG) at The University of Texas at Austin

2: US Army Research Laboratory (ARL)

3: Sony AI

Motivation

More Than Fully Autonomous Systems...



• Responsiveness
(e.g., En-route destination changing)

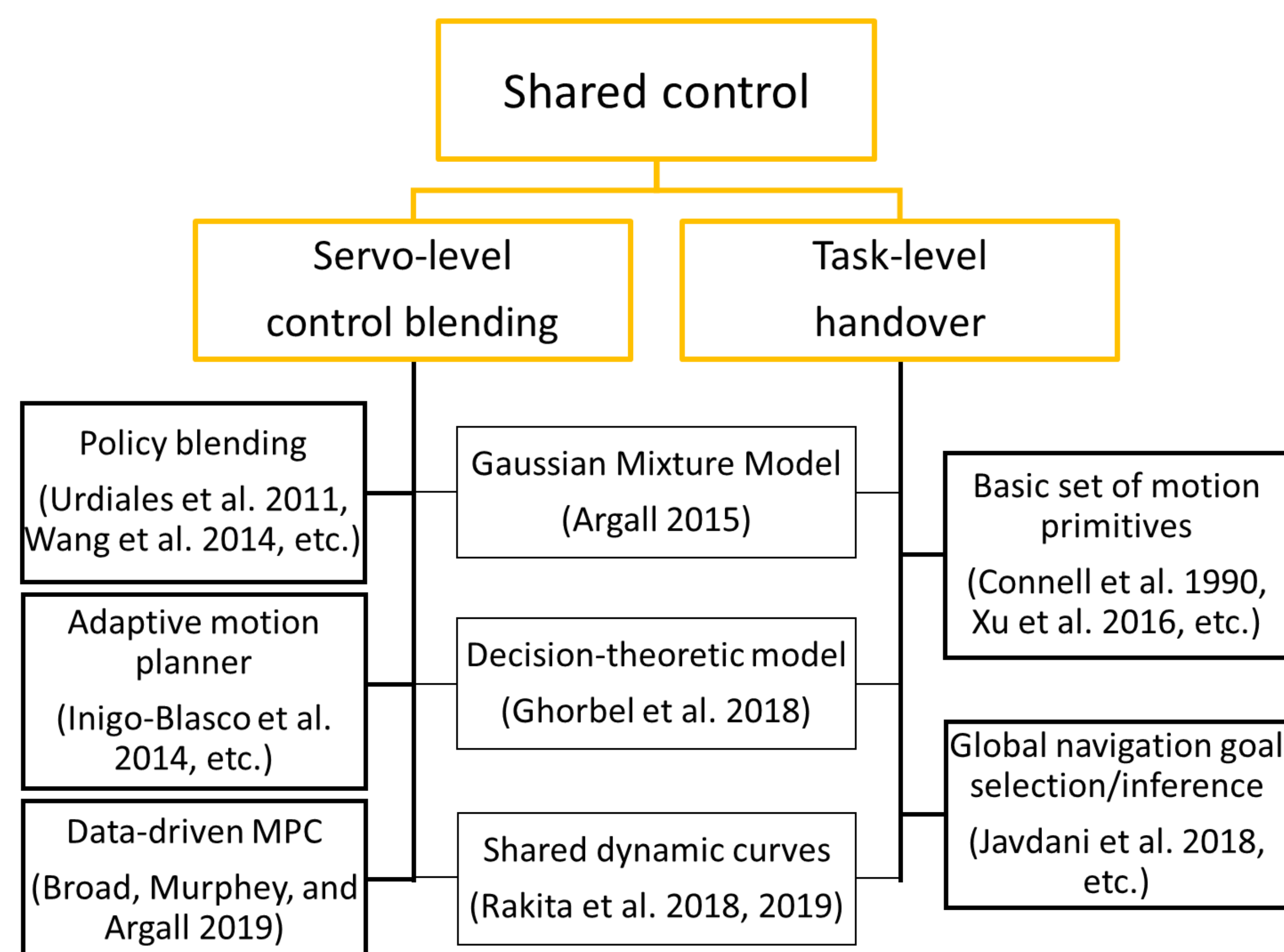
Can we achieve the advantages of both autonomy and responsiveness?

• Safety
• Efficiency
• Human workload reduction

Related Work

Shared Autonomy Taxonomy

- Servo-level shared control: provide assistance by combining the user's low-level motion commands with those output by the local motion planner of the robot—responsiveness is limited in cluttered environment.
- Task-level shared control: employs fully-autonomous takeovers for certain predefined tasks, full human control for other tasks—ignores human command when the robot has full control authority.
- Hybrid: responsiveness is intrinsically limited similarly as the servo-level shared control.



Responsiveness



We quantify *responsiveness* as the Hausdorff distance between a user's intended path and the path actually driven by the vehicle.

$$h(A, B) = \max_{a \in A} \{ \min_{b \in B} \{ d(a, b) \} \}$$

Less is better.

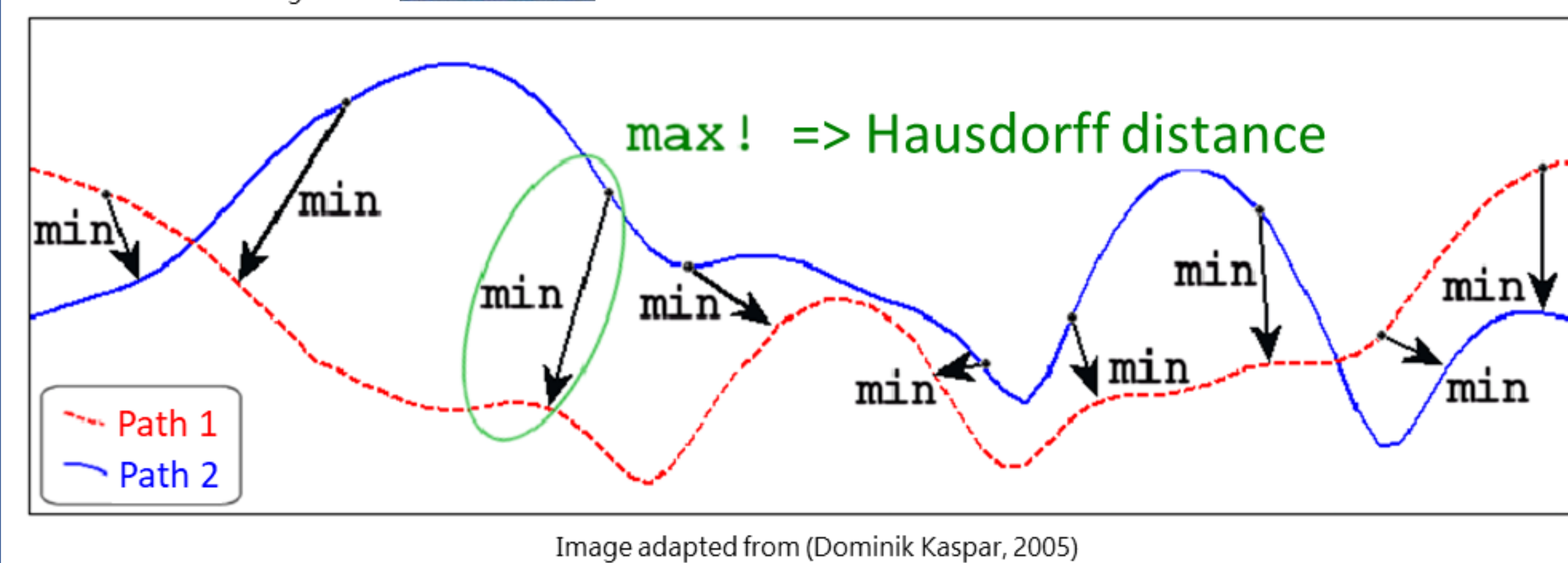
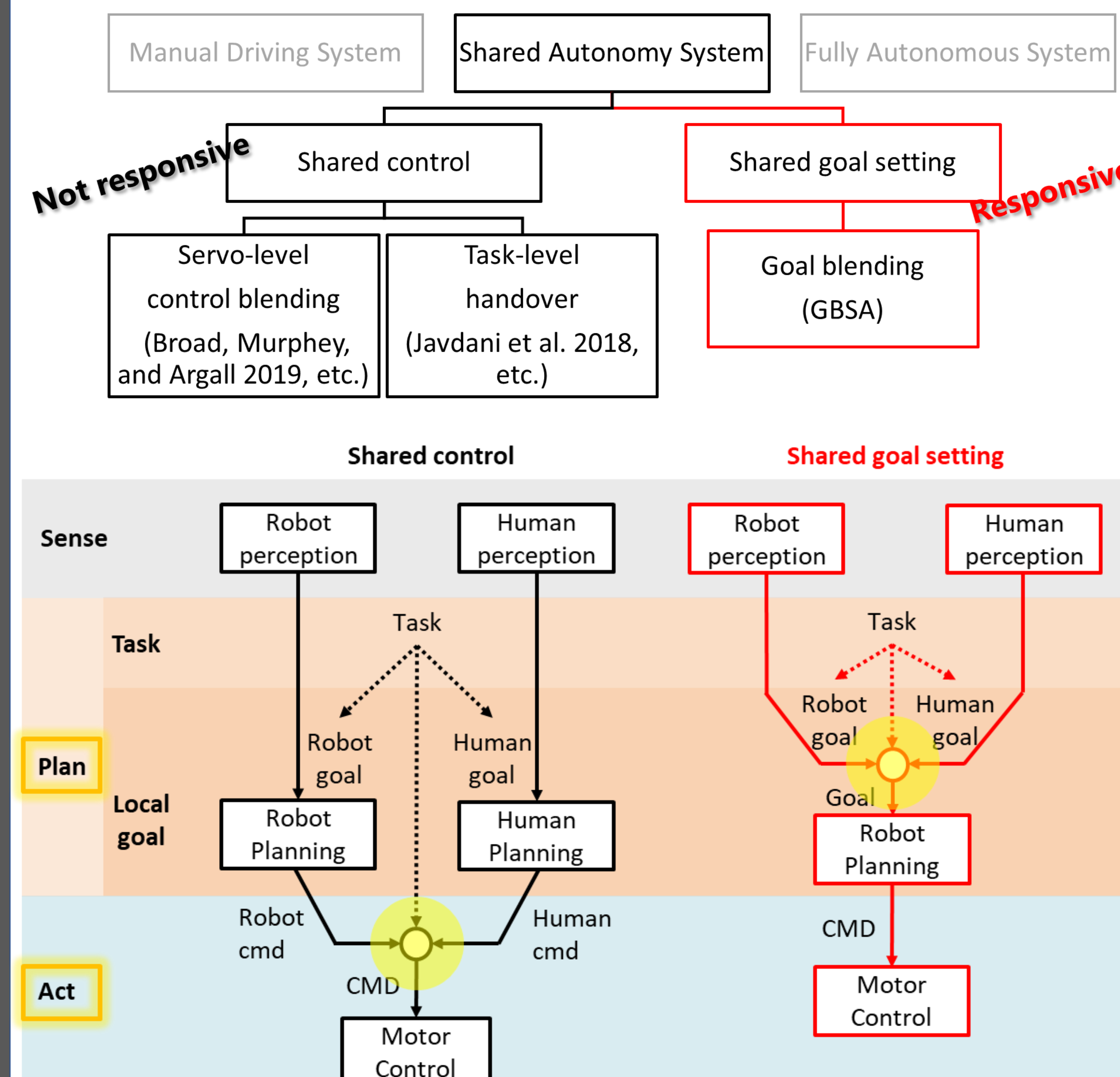
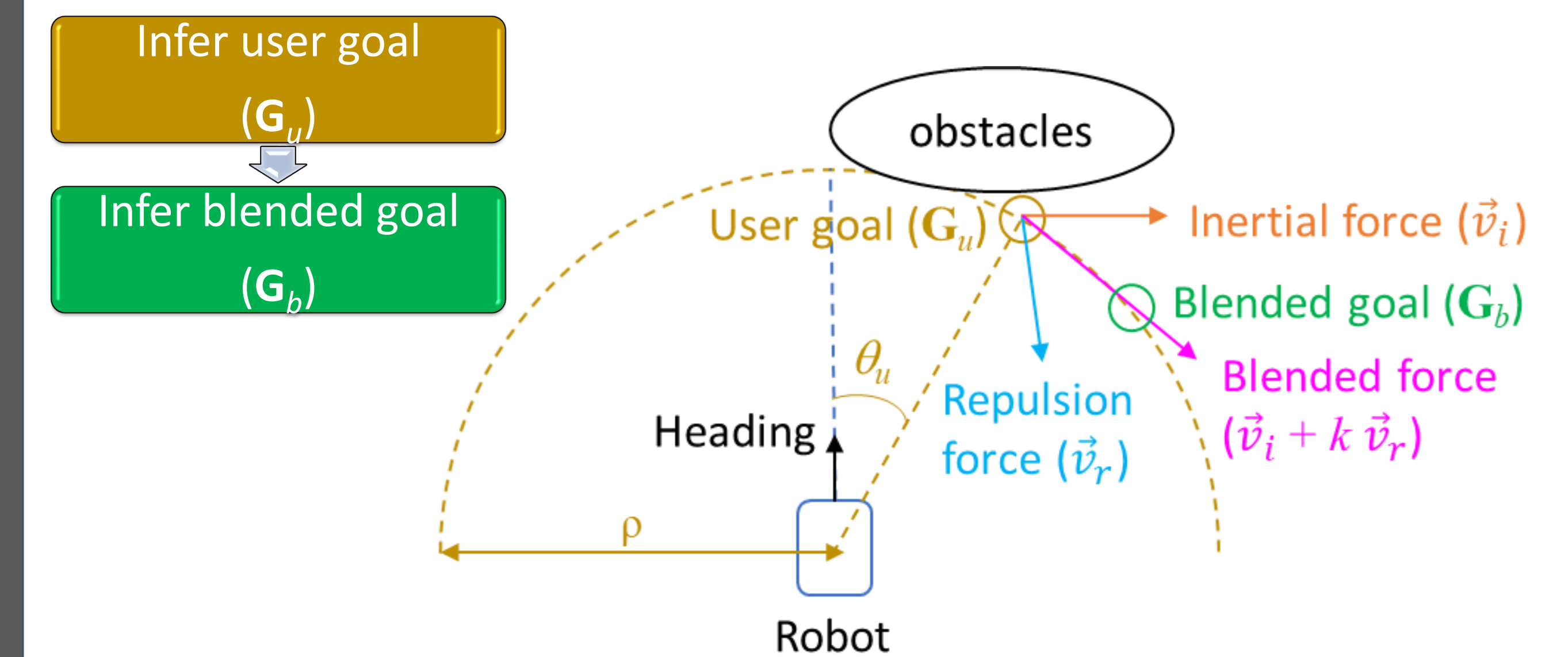


Image adapted from (Dominik Kaspar, 2005)

Goal-Blending Shared Autonomy



Goal Inference and Blending



Experimental Results (Simulated Wheelchair)

