# NRI: FND: Efficient algorithms for safety guiding mobile robots through spaces populated by humans and mobile intelligent machines and robots

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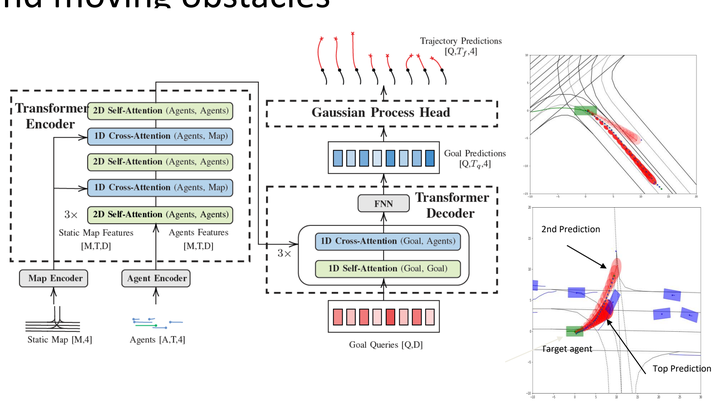
https://www.nsf.gov/awardsearch/showAward?AWD_ID=1924790&HistoricalAwards=false

**Goal**: Combine local motion planning and motion prediction for safe operation of robots sharing a common space with other agents (e.g., humans, robots, and intelligent machines)

*Research Challenges:*

- Motion Prediction Problem: Predict the intent and future trajectories of nearby mobile agents/obstacles based on real-time data and construct "probabilistic" obstacles
- Local motion planning problem: Compute safe trajectories that keep mobile robots away from static and moving obstacles

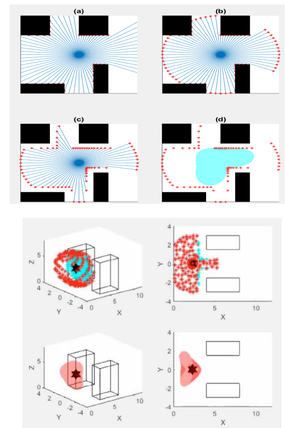
Use a transformer neural network to infer motion intent of agents near ego-agent and Gaussian Process regression to predict corresponding trajectories using past observations and context information




*Impact to research community in robotics*:

- Contributions to local motion planning using information obtained by onboard sensors
- Contributions to intent-aware motion prediction of robotic systems operating in dynamic environments

Use information obtained by onboard sensors to characterize safe area near the ego-agent using Spherical Harmonics and subsequently compute a feasible trajectory by solving a tractable optimization problem in real time.




*Broader impact (society)*: Ensuring safety and harmonious co-existence of humans and robots for smooth integration of robots and intelligent machines into our everyday lives and workplace of the future.

*Broader impact (education & outreach)*: Undergraduate and under-represented students will participate in the validation of this research (computer simulations and / or experiments using low-cost platforms)

*Broader impact (economy)*: Promote safe operation of robots working in the same space with humans by preventing collisions that can cause damages and injuries, economic losses or even loss of life.