Research Statement   **(Last edited on October 2025)**

My research explores how robots can remain steady, purposeful, and reliable when the world around them is unpredictable. I am fascinated by how intelligent behaviour emerges not from perfect perception or abundant data, but from the ability to interpret uncertainty, anticipate delay, and act gracefully under incomplete knowledge.

Early in my journey, I was drawn to control systems and sensing, areas that celebrate precision and predictability. Yet, as I moved from idealized simulations to real environments, I began to notice that the world constantly resists neat modelling. Sensors misfire, feedback arrives late, and humans change plans mid task. Even small delays in perception can throw off an otherwise stable system. Over time, I realized that reliability in robotics is not about removing noise but about learning to live with it intelligently.

This understanding shaped how I think about perception and control. Instead of designing robots that react to the latest sensor reading, I focus on those that can anticipate, that understand the passage of time between observation and action, and that adjust their goals when the world shifts. A robot that reasons about latency and uncertainty behaves differently; it does not merely respond, it predicts. It carries a quiet sense of expectation about the world, updating its intent as conditions evolve. I see that anticipation as a form of intelligence in itself. A related challenge lies in how robots learn when information and human supervision are limited. In most real settings, feedback is not infinite; people cannot guide every decision or label every experience. I am interested in how learning systems can decide when to seek help, when to trust their own judgment, and when to explore safely on their own. I see learning not as a constant stream of supervision but as a conversation, where the robot learns to ask questions selectively, conserving both data and human effort.

Across my work, a central theme has emerged: responsible autonomy. I want robots that not only achieve goals but also understand the conditions under which those goals remain meaningful. They should be able to sense when perception lags, when confidence falters, or when human input would restore balance. Reliability, in my view, is as much about how a robot behaves as what it achieves. A system that pauses instead of guessing, that communicates uncertainty clearly, and that aligns its behaviour with human expectations feels trustworthy. I try to bring that same philosophy into modern learning and control, where intelligence should never come at the expense of clarity or composure. Looking ahead, I want to continue building robots that manage uncertainty as naturally as people do: systems that plan ahead for delays, reason about the cost of feedback, and act with measured confidence. My broader goal is to make learning and control more resource aware, interpretable, and robust to the limits of perception.

Ultimately, my research aims to bridge the technical and the human. A truly intelligent robot is not one that moves fastest or learns the most, but one that behaves wisely, staying composed when the world surprises it, and collaborating with people in ways that feel natural, stable, and meaningful.

....*Anamika JH*