Towards Predictable and Reliable Remote Control for Autonomous Vehicles

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Purpose and goal

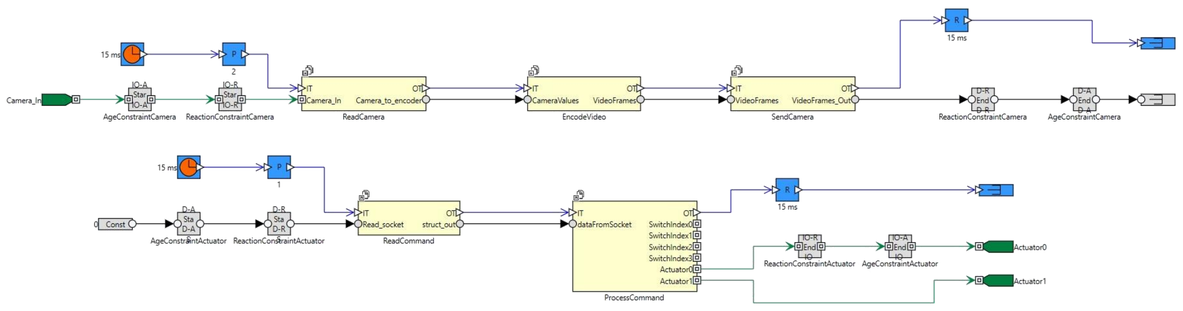
- Long-term goal to implement a highly time-predictable and reliable remote control for a set of autonomous vehicles
- Short-term goal to focus on communication between one non-autonomous vehicle and a control station
- Goal of end-to-end delay less than 100ms
- User from the control station shall control the vehicle with a joystick without experiencing a delay
- Deployed in dangerous environments
- Replacing repetitive, dangerous, and unpleasant jobs

Keywords

- Low latency
- Reliability
- Predictability
- Wi-Fi

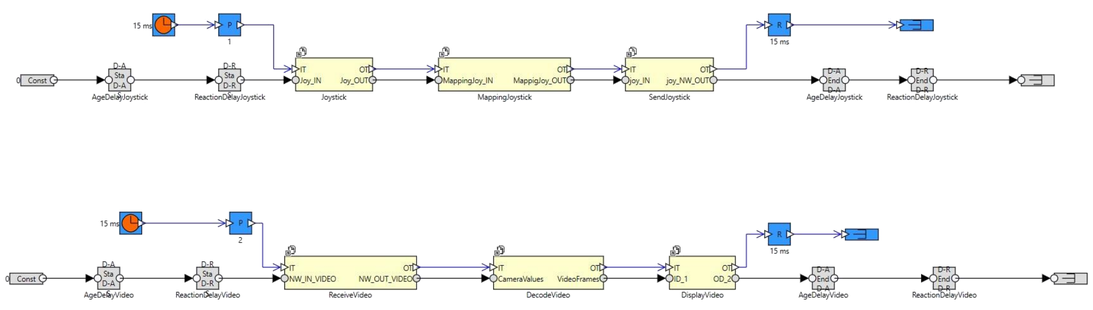
Vehicle

- Real-Time patched Linux
- Camera mounted at the front capturing the environment
- Single Board Computer used for intersystem communication and motor control



Control station

- Local Machine with Linux Real-Time patch
- Controlling the vehicle with a joystick using SFML
- Display showing the vision from the vehicle



Complete System

- Camera encoding & decoding using OpenCV and B.64
- Communication using UDP sockets
- Scheduling of threads using Posix Real-Time

- Rubus Modelling Reaction delay:
  - Vehicle 52.997ms
  - Control station 52.997ms