

# Embedded Systems Specification and Design

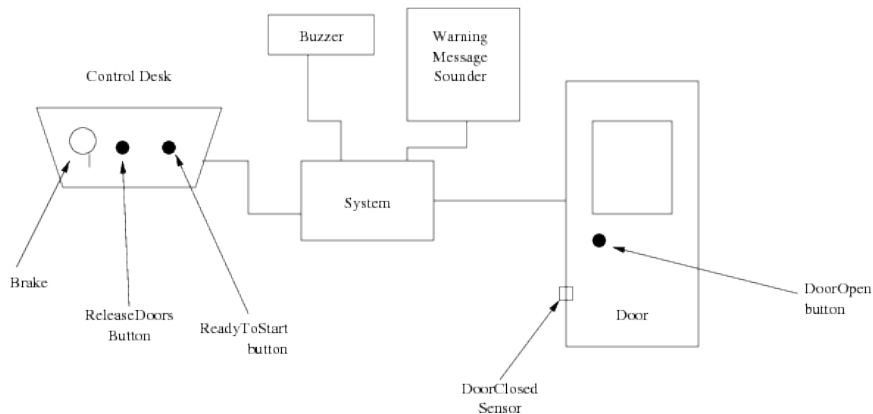
David Kendall

- Uppaal language extensions for timed automata
  - Discrete variables +
    - Constants
    - Bounded integer variables
    - Arrays
  - Urgent locations
  - Committed locations
  - Urgent channels
  - Broadcast channels
  - Value-passing synchronisation

See the Uppaal tutorial

- Uppaal case study
  - Metro door controller

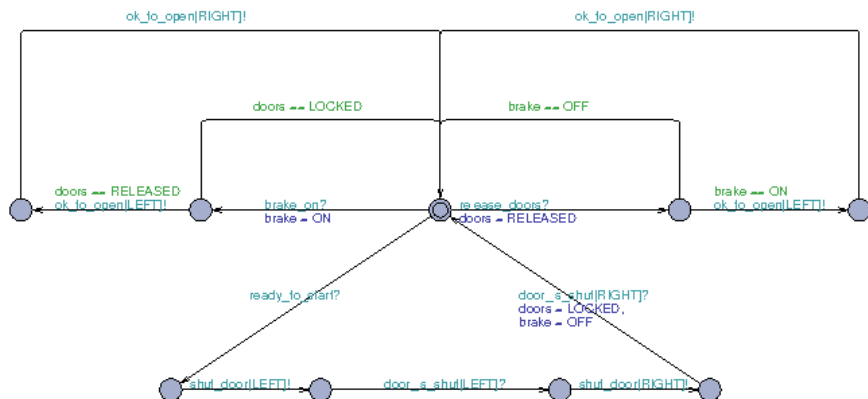
# Metro Door Controller



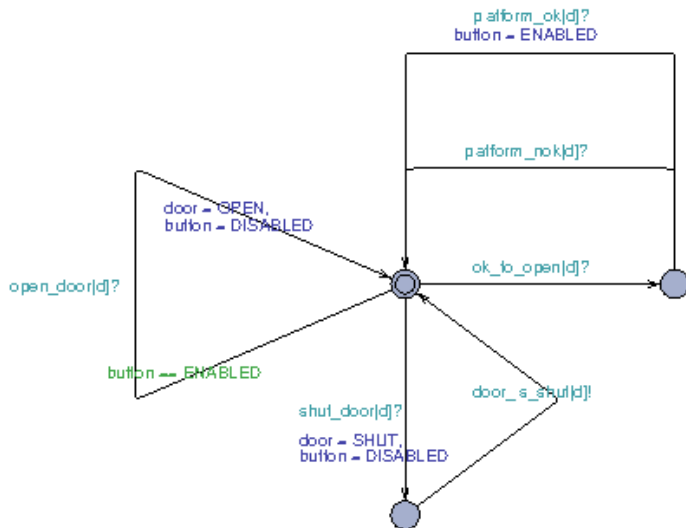
# Metro controller specification

On the San Serif Metro System, each train has two sliding doors—one on each side. When a train stops in a station, the driver presses the *ReleaseDoors* button. Provided the brake is applied and the train is stationary, this enables the buttons beside the door which is next to the platform (there is a sensor which informs the system of this). When enabled, pressing the *DoorOpen* button opens the relevant door. When the driver is ready to start, he presses another button—the *ReadyToStart* button. This causes a buzzer to sound, followed by a warning message “Stand clear of the doors, please”. The door is then closed after 5 seconds.

Note that the brake cannot be released until the door has actually closed, and is detected to be closed by a sensor.



# Door



# Driver, Passenger, Platform

