Traffic Signal Control Simulation Cookbook

1. Introduction ***(Q. He, T. Li and A. Stevanovic)***

    1) Background
    2) Purpose of this Cookbook and How to Use it?
    3) Organization of the Traffic Control Simulation Cookbook

2. Signalized Intersection Control

    1) Modeling Intersection Control Logics
        - Fixed-time Control ***[J. Won, Q. Wang]***
        - Actuated Control ***[J. Won, Q. Wang]***
        - Coordinated Control ***[J. Won, Q. Wang]***
        - Isolated/Free Control ***[J. Won, Q. Wang]***

    2) Special Control
        - Signalized Diamond Interchange ***(H. Zhou)***
        - Continuous Flow Intersection
        - Diverge Diamond Intersection
        - Traffic signal control near Freeway Ramp Metering
        - Movable Bridge Control

    3) Multimodal Control
        - Special Pedestrian Control
        - Transit Signal Priority ***(Q. He and A. Stevanovic)***
        - EV Preemption
        - Traffic Signal Preemption near railroad grade crossing

    4) Responsive Control ***(Q. Wang??)***
        - Pattern-matching
        - Time-Of-Day
        - …

    5) Adaptive Control ***(A. Stevanovic, T. Li)***
        - Morden adaptive signal control systems ***(A. Stevanovic)***
        - Simulation framework for new adaptive traffic control logic ***(T. Li)***

    6) Advance traffic signal control simulation: concepts and implementations
        - Standard Emulators in the Loop (***J. Won)***
            - RBC
            - VISSIG
            - …
        - Hardware in the Loop ***(T. Li)***
            - Controller in the loop

    - Cabinet in the loop
  - Software in the Loop
    - Econolite ASC/3 ***(T. Li, C. Day, A. Stevanovic)***
    - D4
    - McCain 2033
  - System Performance Evaluation
    - Traffic Signal System performance evaluation with simulation (Utah System, MSU-MDOT system, any other open-source systems) ***(C. Day, T. Li)***
    - Build multiple standard benchmark models for comparing different signal control algorithm. **(Y. Feng)**
  - Driving Simulator in the loop ***(Q. He)***

3. Non-signalized Intersection Control
    1) Stop Intersection Control
    2) Yield Intersection Control
    3) Roundabout Intersection Control

4. Intersection Control with Connected and Automated Vehicles (CAVs)
    1) Control for Homogenous CAV Fleet
        a. Reservation-based Control
        b. Eco-Driving/Eco-signal Control (***G. Wu, Y. Feng)***
    2) Control for Mixed Traffic
        a. Mixed traffic simulation with CAVs and Human driven vehicles (**Q. He**)
        b. Signal control with mixed traffic

Note: The simulation cookbook is fully example based. Each chapter shall include editable source files of at least one simulation model. Source code is encouraged to be included as well. We plan to distribute it on Github.