Dataflow programming languages: Simulink

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Simulink

Data-flow programming with MatLab, very engineering-oriented

PRO: Compile/deploy to many systems

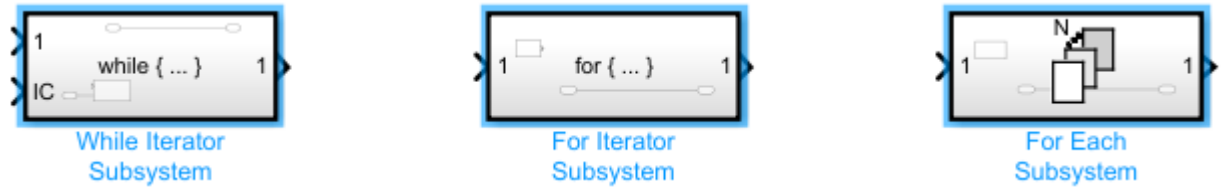
- Android devices
- Apple iPhone/iPad
- Raspberry Pi
- Arduino
- Beagleboard

- Nao robot
- Xilink FPGA boards
- Lego Mindstorms EV3
- Parrot mini drones

Features

Typed wires?	YES	(but no standard colors)
Functions?	YES	(in Matlab or in Simulink)
Functional programming?	NO?	
Recursion?	YES	(but in Matlab only)
Loops?	YES	(for, foreach, while)
External languages?		
- Matlab, C, Fortran	YES	
- Python ecc…	YES	(through Matlab)
File I/O	YES	
Modularization?	YES	(subsystems)

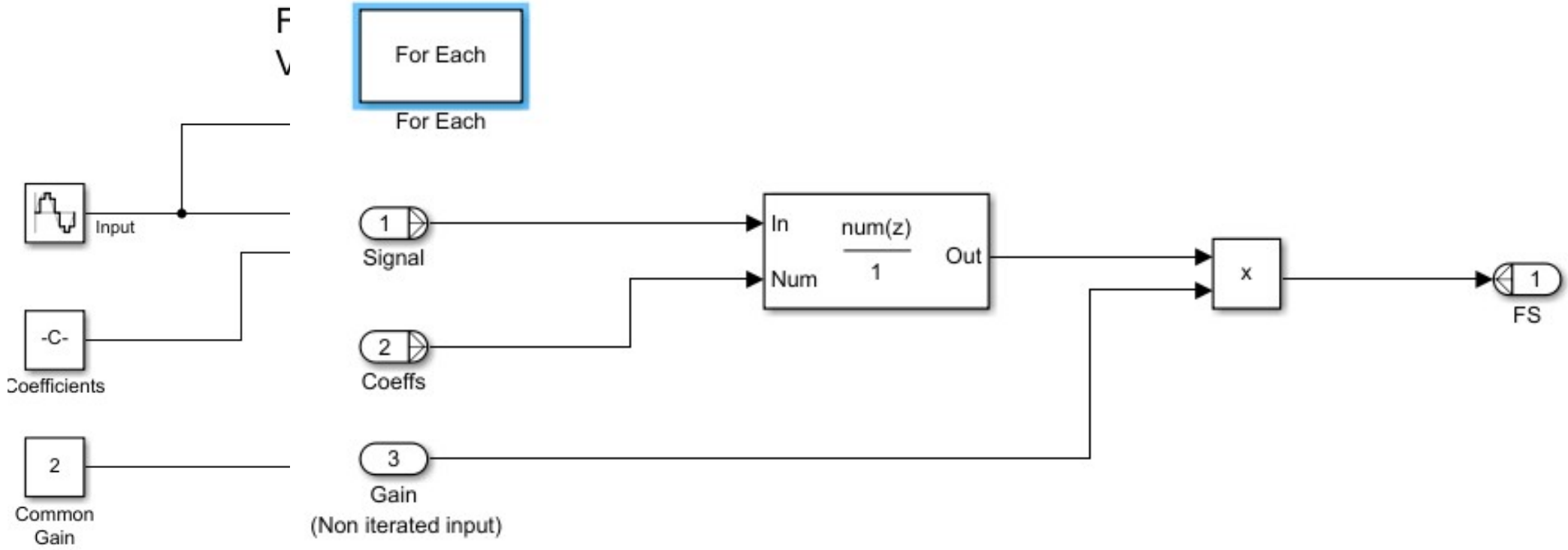
Subsystems/loops



Subsystems are used for:

- Hierarchical model definition (modularization)

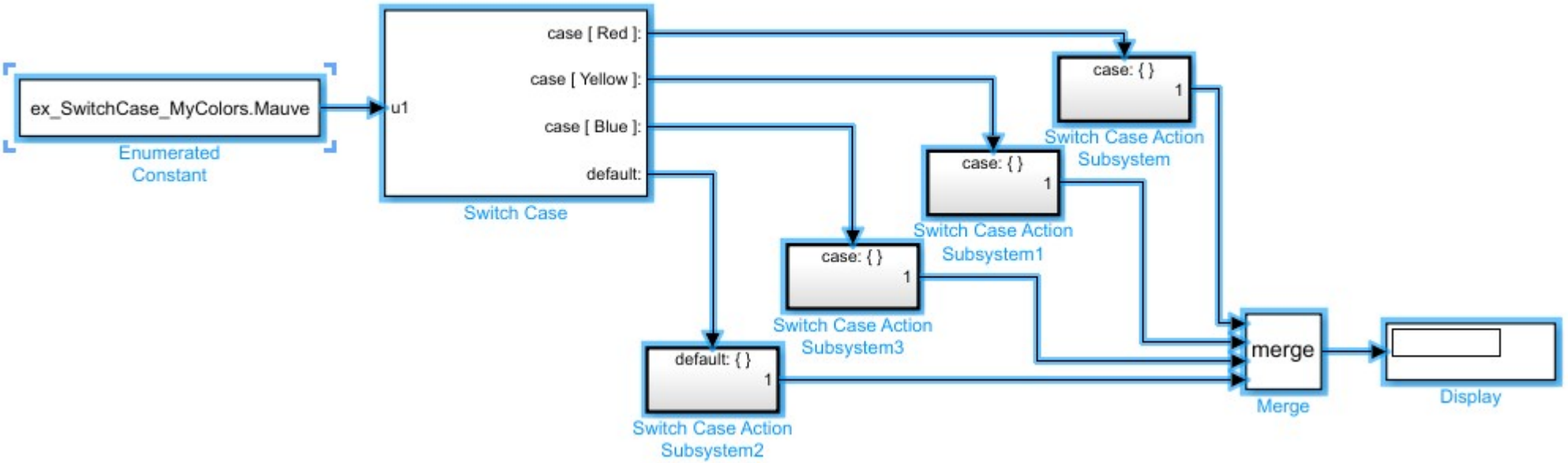
- Repeated execution (for/while/foreach)



Conditionals

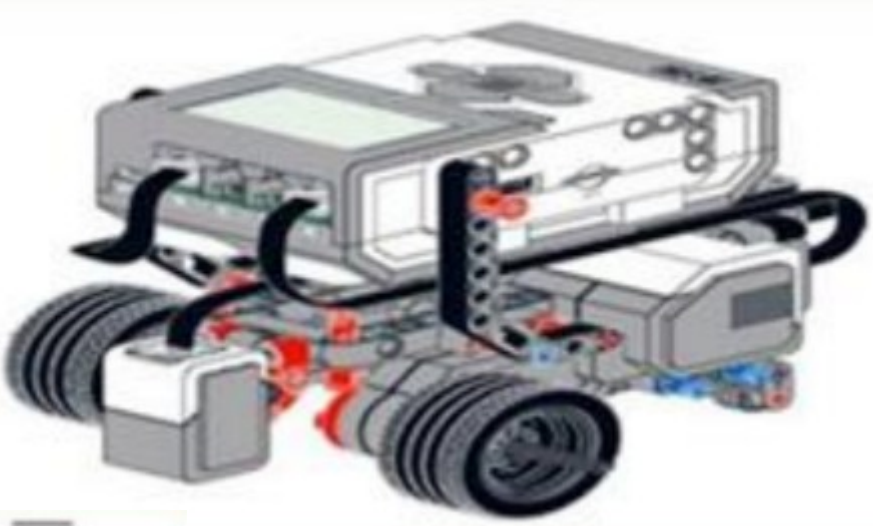
Conditional execution (if/case) is made by:

- if/case block with tested input and “enable” outputs
- a separate circuit/subsystem for each case (with “enable” port)
- a merge block collecting all alternate outputs

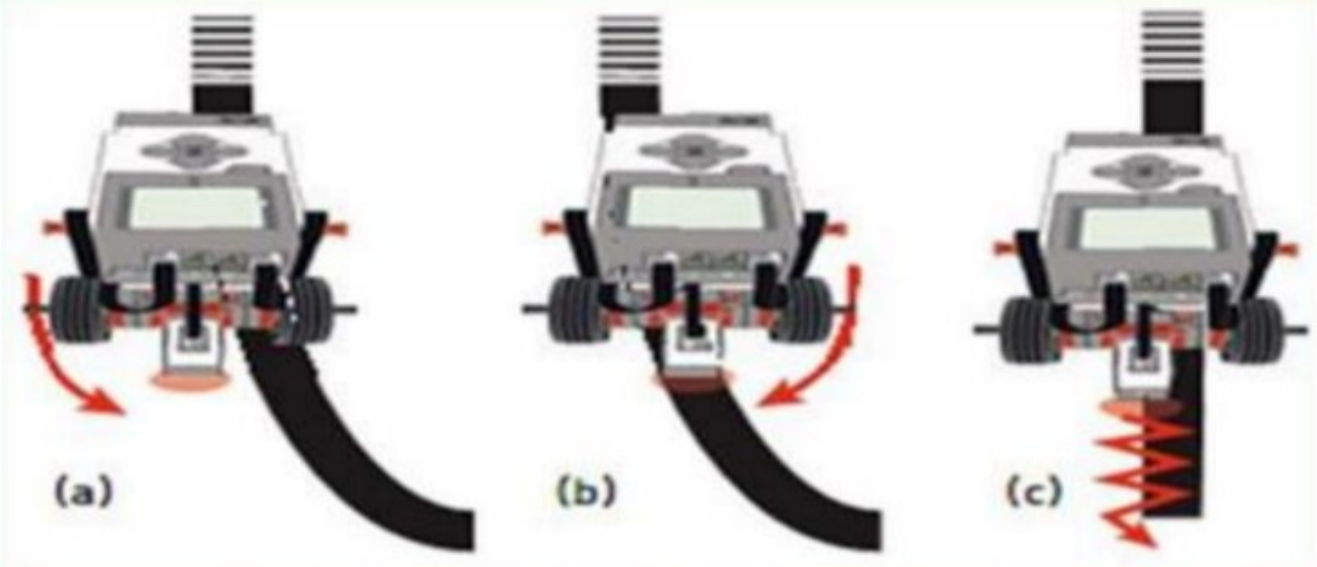


Lego EV3 line follower

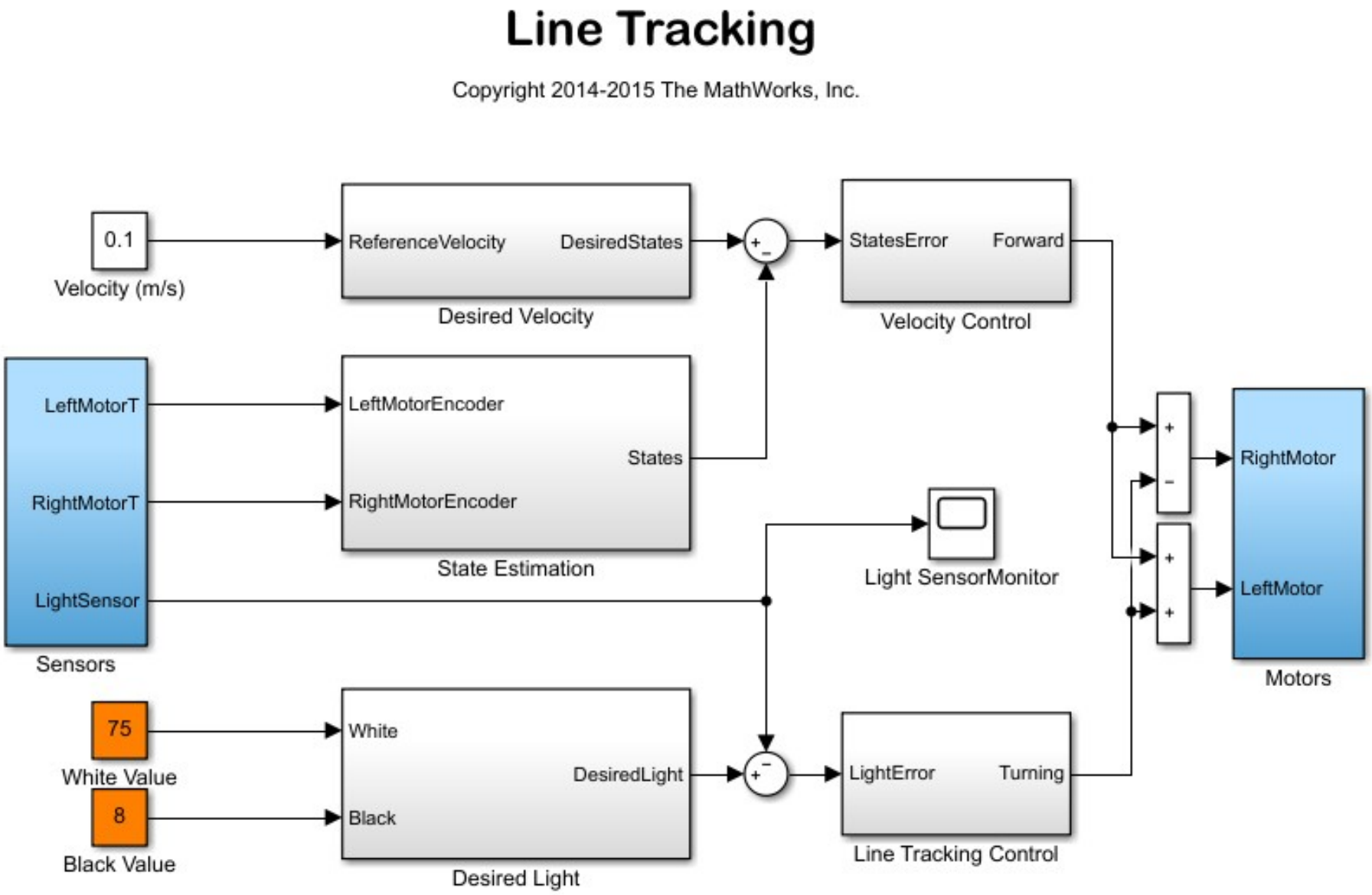
EV3 with light sensor facing down



Follow the B/W border of the line



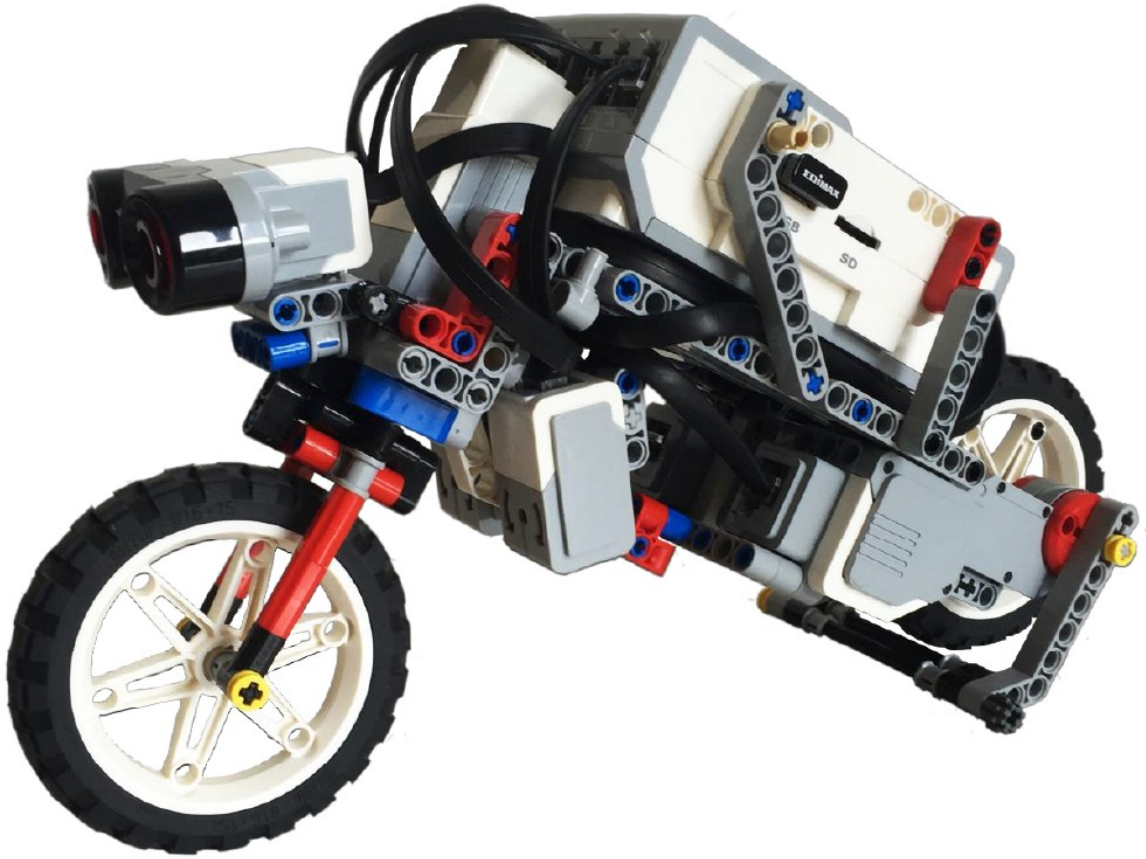
Line follower: control system



Line follower details

SIMULINK … loading

Lego Bike: keep a bicicle up by steering (@UNI-FI)



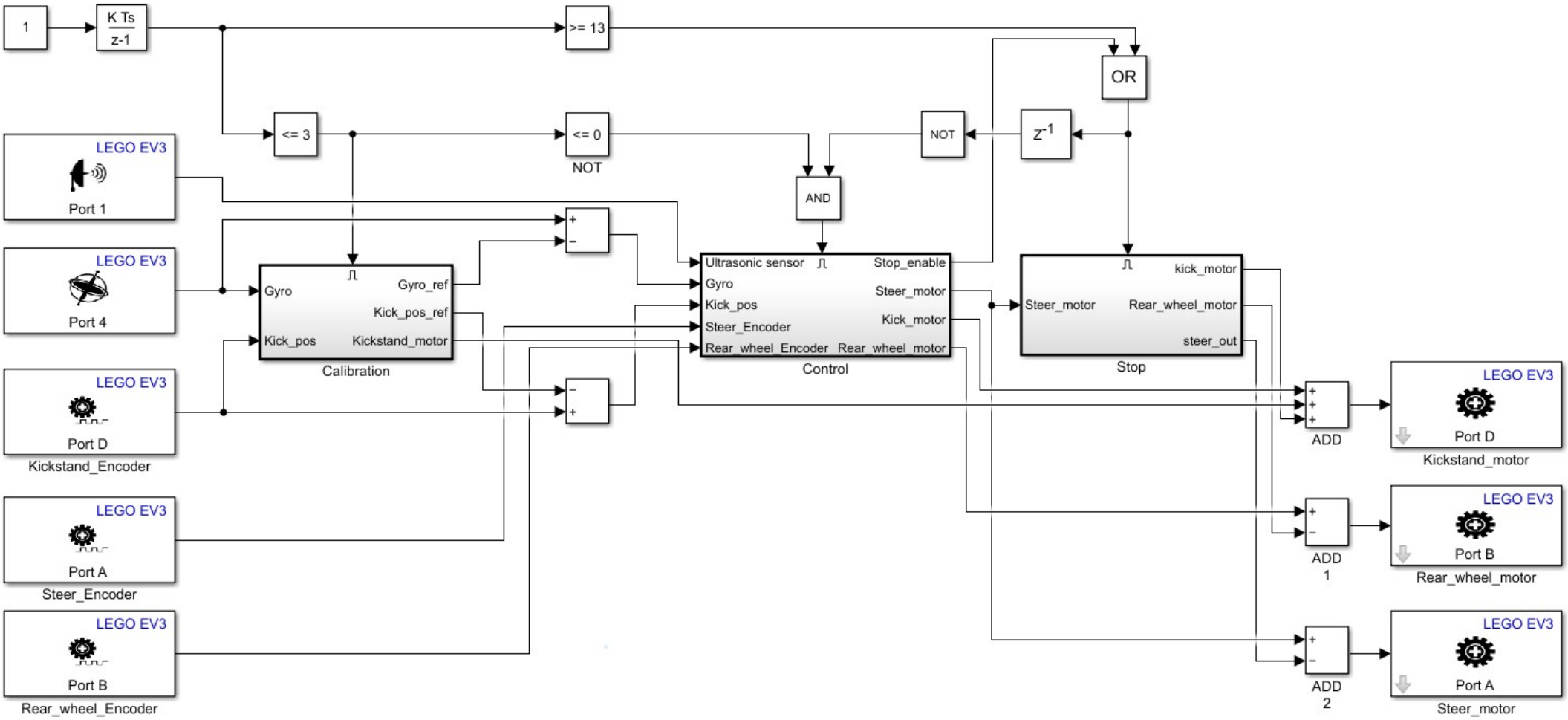
Sensors:

- gyroscope
- ultrasound distance
- front wheel angle
- rear wheel rotation

Actuators

- front wheel angle
- rear wheel speed
- rear stand

Lego Bike: control system



Lego Bike in action