

# FMU in Matlab

Project Design

AV Algothrim FMU

Localization

Planning

Obstacle Detection

Solution

## Project Design

**FMU Version:** FMU 2.0

**Platform:** AVL fmi.lab in Matlab

**Reference:** Buggy Code (using ROS)

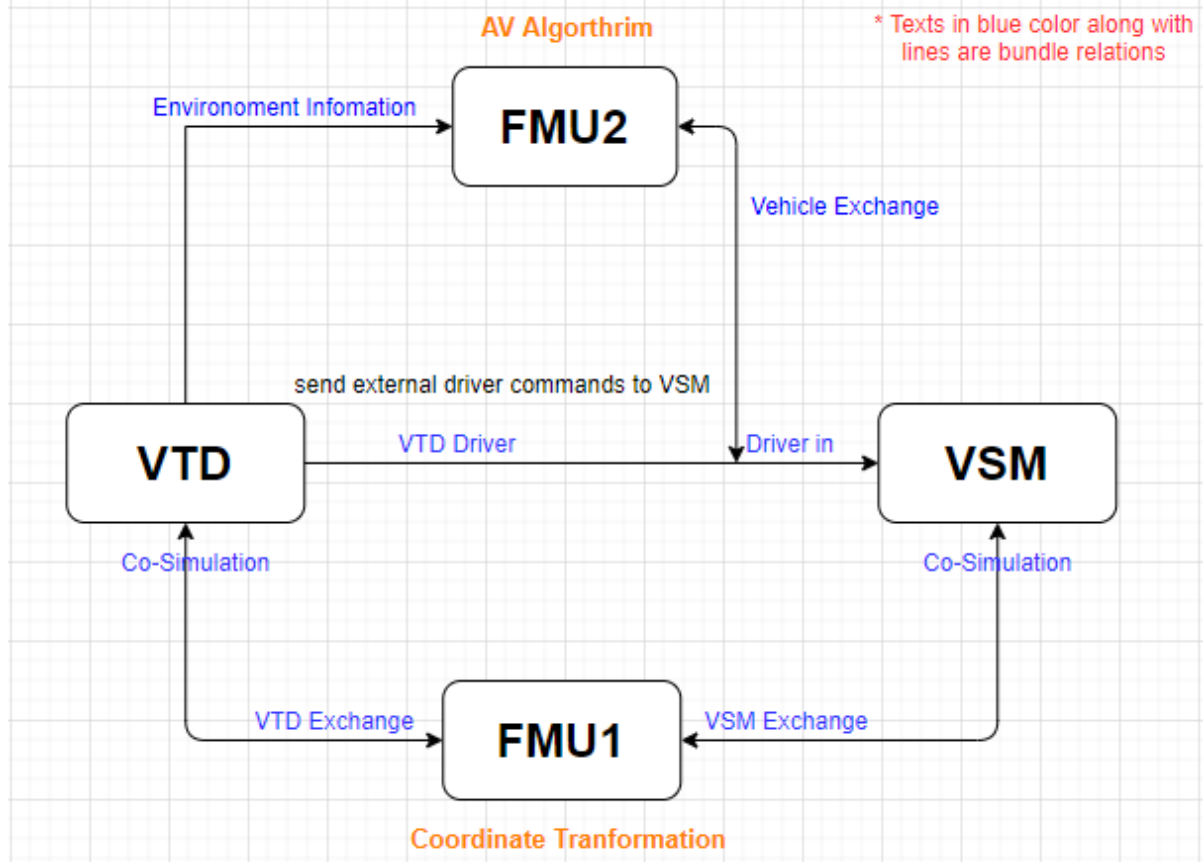
Components	
VTD	<b>&lt;Virtual Test Drive&gt;</b> Define <b>scenarios.xml</b> file which contains 1. Player/Obstacle's info: start & end position, speed, waypoints/trajectory 2. Ego/Bus's information: start & end position, speed, waypoints/trajectory Define <b>configuration.xml</b> file which contains 1. Sensor's information, such as front sensor 2. Lidar's information: Pointcloud data, current position (Need to be implemented)
VSM	<b>&lt;Vehicle Simulation Model&gt;</b> Define bus's modules : Vehicle, Steering system, gearbox ..
FMU1	<b>&lt;Functional Mockup Interface standard (FMI)&gt;</b> Coordinate Tranformation For data exchange between two system
FMU2	<b>&lt;Functional Mockup Interface standard (FMI)&gt;</b> AV bus algothrims such as Localization, Planning, Obstacle detection modules

**VTD Version:** VTD2020

**VSM Version:** AVL VSM 2020 R1.4

**ModelConnct Version:** AVL Launcher R2020.2

## FMU Project Design



## AV Algorithrim FMU

There are three modules will be covered in **AV Algorithrim FMU**.

### Localization

**In real bus :**

Compare Real-time PointCloud data with vector map files to localize.

Refer [lidar\\_localizar/ndt\\_mapping.cpp](#)

**In simulation project :**

→ **Localization Controller**

### Planning

**In real bus :**

Based on waypoint data (trajectory), defines motion of the vehicle with a twist of **velocity** and **angle** (also **curvature**).

Refer [waypoint\\_follower/pure\\_pursuit\\_core.cpp](#)

**In simulation project :**

→ [Planning Controller](#)

## Obstacle Detection

**In real bus :**

Pointcloud data is used for analyzing obstacle's position (higher density). With waypoints, we can find stopline to stop/change speed of vehicle.

**In simulation project :**

→ [Detection Controller](#)

## Solution

1. Understand the logic of each modules (refer buggy code)
2. Implement those modules using Matlab-Simulink
3. Import simulink modules into fmi.LAB
4. Export FMU files and import into ModelConnect Project