Report No: 3
Team: BKBuilder
Date: 12/02/2023

1 Architecture:

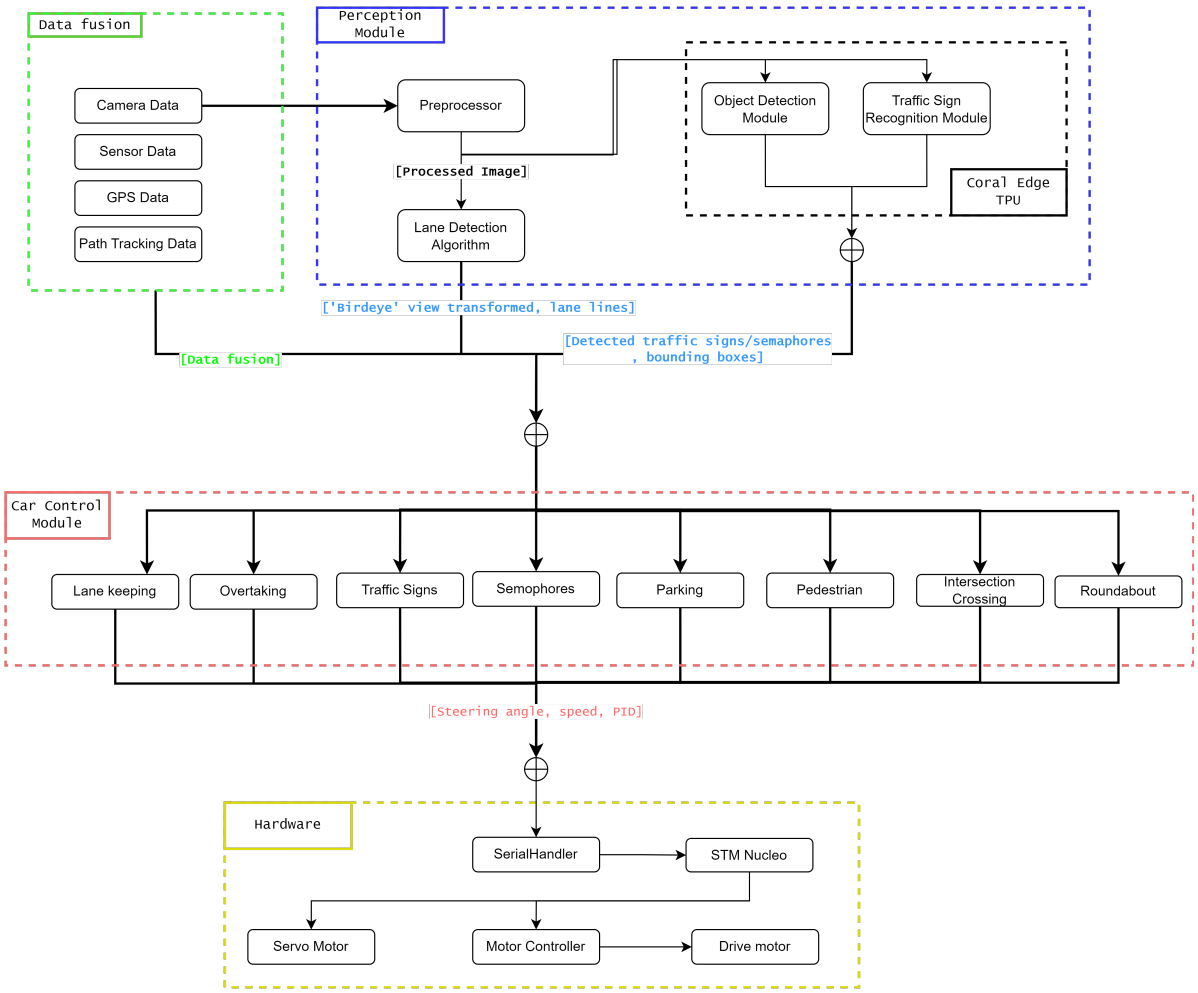


Figure 1: Software Architecture

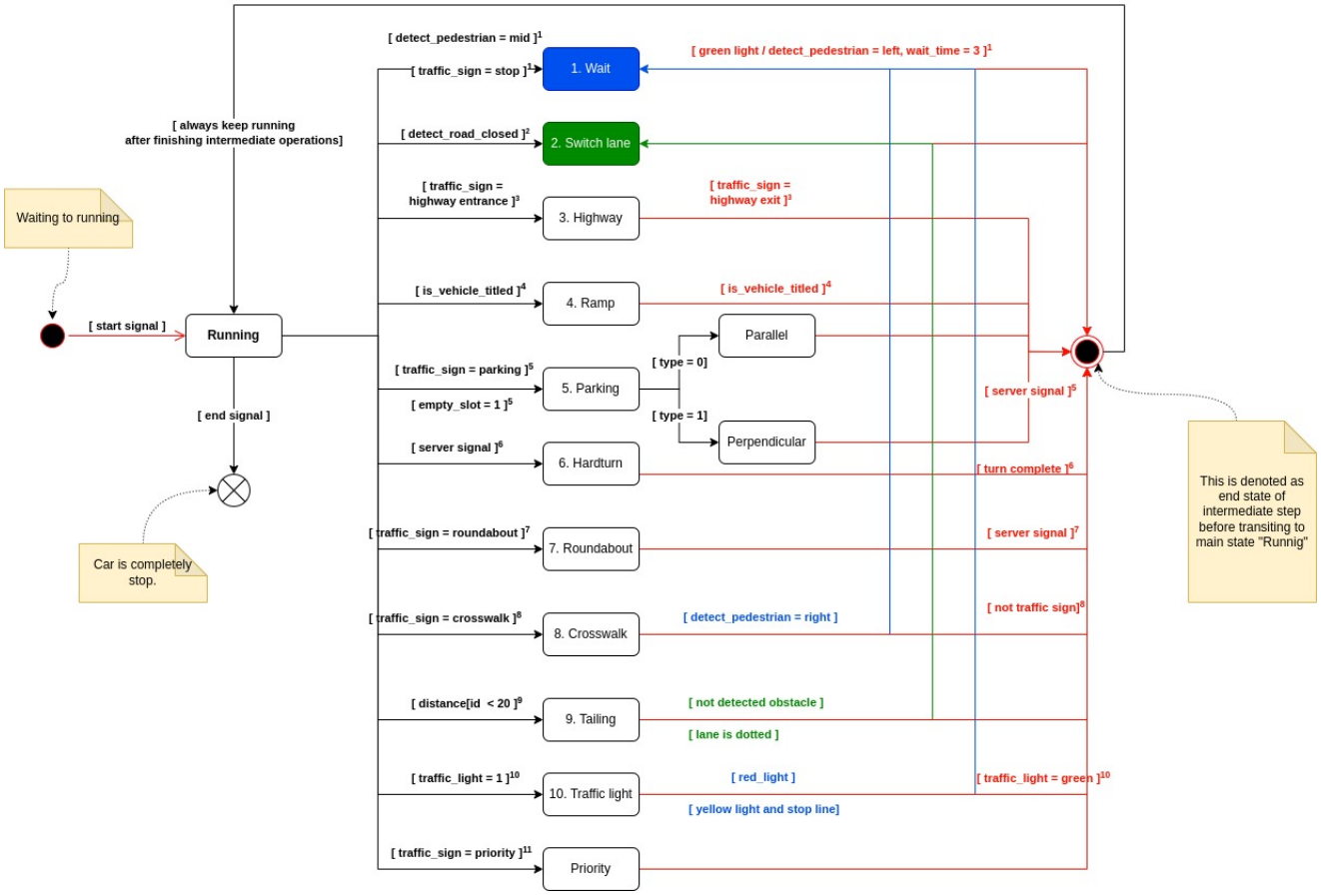


Figure 2: Finite State Machine

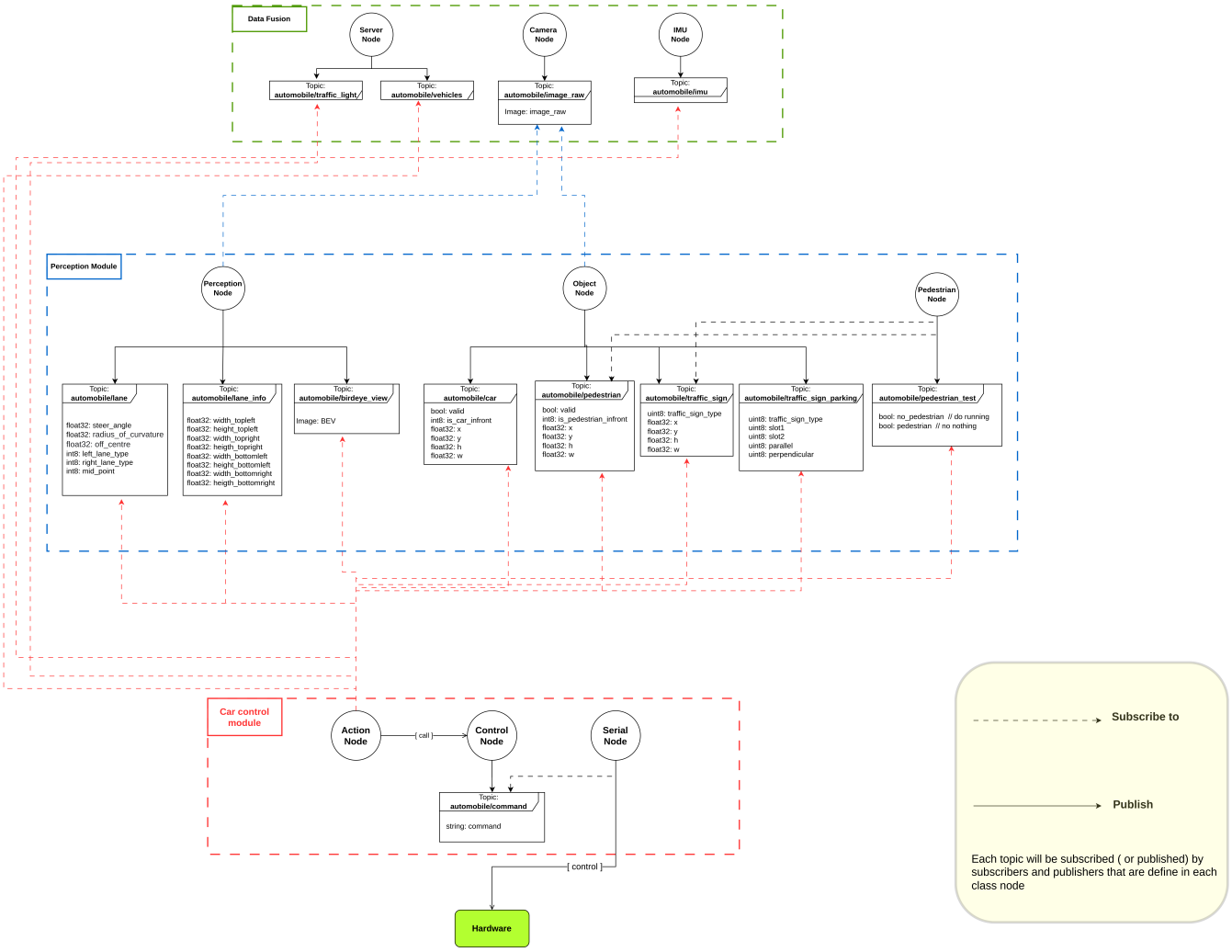
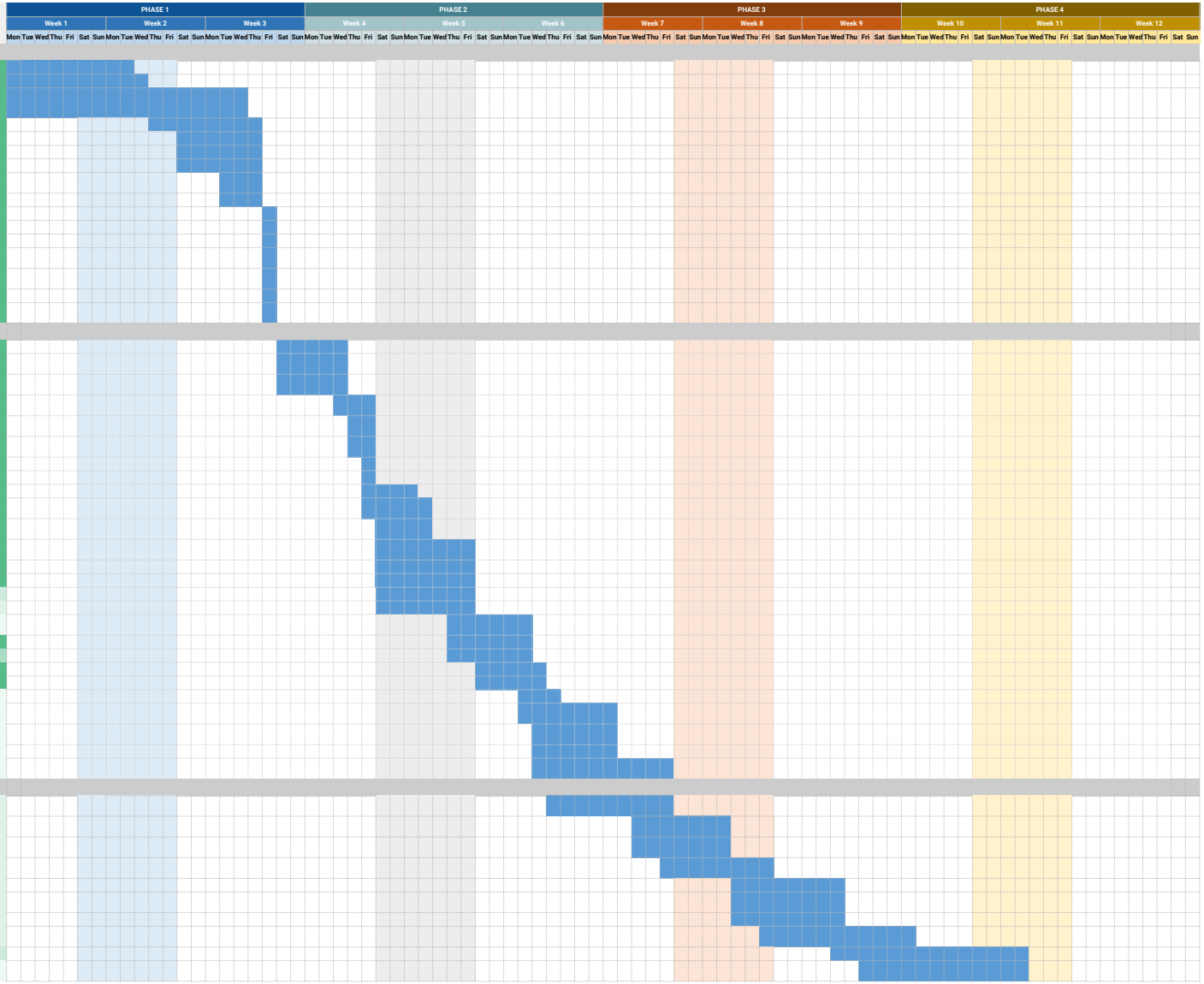


Figure 3: ROS Architecture

BOSCH FUTURE MOBILITY 2023

Project	Bosch Future Mobility 2023		
Team	BKBuilder	**Date**	17/12/22

Work Break Down Structure Numbers	Task Title	Person in charge	Start date	End Date	Period (days)	Progress
1	**Baseline 1**					
1.1	**System setup**	Hai + Nhat	04/12/22	11/12/22	7	100%
1.1.1	Setup initial workspace for the Kit	Hai	04/12/22	11/12/22	7	100%
1.1.2	Install dependencies and provided software (Brain, Brain ROS and Embedded platform)	Nhat	04/12/22	11/12/22	7	100%
1.2	**Remote control setup**	Tien + Quang	11/12/22	18/12/22	7	100%
1.2.1	Setup provided Remote Control system	Tien	11/12/22	18/12/22	7	100%
1.2.2	Run intial tests on race track	Quang	11/12/22	18/12/22	7	100%
1.3	**Controlling the car with MCU**	Tien	11/12/22	18/12/22	7	100%
1.3.1	Send the command from the computer to MCU though serial port to control the car	Tien	11/12/22	18/12/22	7	100%
1.4	**Sensor reading**	Hai	11/12/22	18/12/22	7	100%
1.4.1	Read and verify data from IMU and Encoder	Hai	11/12/22	18/12/22	7	100%
1.4.2	Read and verify data from Camera	Hai	11/12/22	18/12/22	7	100%
1.5	**Streaming**	Hai	11/12/22	18/12/22	7	100%
1.5.1	Stream image from camera to the computer remotely	Hai	11/12/22	18/12/22	7	100%
1.5.2	Research fusion methods with GPS and image data	Hai	11/12/22	18/12/22	7	100%
1.6	**Simulatation setup**	Quang	11/12/22	18/12/22	7	100%
1.6.1	Can read the log data from simulation test and send to the brain car	Quang	11/12/22	18/12/22	7	100%
2	**Baseline 2**					
2.1	**Lane detection**	Quang	20/12/22	30/12/22	10	100%
2.1.1	Car can detect straight line land (structure land)	Quang	20/12/22	30/12/22	10	100%
2.1.2	Car can detect intentional changes such as drifting	Quang	20/12/22	30/12/22	10	100%
2.2	**Autonomous driving based on software commands**	Nhat + Tien	20/12/22	30/12/22	10	100%
2.2.1	Car can move and steer through defined functions	Tien	20/12/22	30/12/22	10	100%
2.2.2	Car can act accordingly to detection and GPS signals	Nhat	08/01/23	16/01/23	8	100%
2.3	**Object detection**	Hai	28/12/22	02/01/23	4	100%
2.3.1	Car can detect obstacles and pedestrian	Hai	28/12/22	02/01/23	4	100%
2.3.2	Car can detect traffic light and signs	Hai	28/12/22	02/01/23	4	100%
2.4	**Car stop when knowing the pedestrian signals**	Hai + Nhat	28/12/22	02/01/23	4	100%
2.4.1	Car can know the pedestrian which is about to cross the crosswalk	Hai	04/01/23	16/01/23	12	100%
2.4.2	Car can map pedestrian detection to motors instructions	Nhat	04/01/23	16/01/23	12	100%
2.4.3	Car can execute motors instruction	Nhat	04/01/23	16/01/23	12	100%
2.4.4	Car can send acknowledgement to PC	Hai	04/01/23	16/01/23	12	100%
2.5	**Overtake static car on road**	Hai + Nhat + Quang	04/01/23	16/01/23	12	30%
2.5.1	Car can process data from V2X	Quang	04/01/23	16/01/23	12	20%
2.5.2	Car can identify immobile vehicles on current path	Hai	08/01/23	16/01/23	8	10%
2.5.3	Car can identify line signal	Quang	08/01/23	16/01/23	8	100%
2.5.4	Car perform overtaking manuver	Nhat				50%
2.6	**Parking**	Tien	08/01/23	16/01/23	8	100%
2.6.1	Car parks in right slot under given situation	Tien	08/01/23	16/01/23	8	100%
2.7	**Pass the ramp**	Nhat + Tien	08/01/23	16/01/23	8	10%
2.7.1	IMU can be utilized for the car is about to face the ramp	Tien	08/01/23	16/01/23	8	10%
2.7.2	Car can speed up based on imu data to pass the ramp	Nhat	08/01/23	16/01/23	8	10%
2.8	**Pass through the Roundabout**	Nhat	08/01/23	16/01/23	8	10%
2.8.1	Car can flow coordiate sent from V2X server	Nhat	08/01/23	16/01/23	8	10%
3	**Baseline 3**					
3.1	**Car stop when knowing the pedestrian (middle of the land - random positions)**	Hai			0	20%
3.1.1	Car can detect the pedestrand the distance to it	Hai				20%
3.2	**Overtaking manoeuvre on highway of moving car**	Quang			0	20%
3.2.1	Car can caculate the speed needed to accelerate safely	Tien				20%
3.2.2	Avoid parallel running	Tien				20%
3.3	**Road closed stand on the One way & Two-lane road**	Nhat			0	20%
3.3.1	Car can recalculate path on encounter	Nhat				20%
3.4	**One way & one-lane road – tailing the leading vehicle**	Nhat			0	20%
3.4.1	Car can accelerate on encountering vehicle	Nhat				30%
3.5	**Random start positioning on the map by the Jury**	Tien			0	10%



3.5.1	Car can process GPS to locate itself on the given map	Tien		10%
3.6	**Reach the Finish line**	Nhat + Tien	0	0%
3.6.1	Car can follow from the start to the finish from v2x signals - coordinates.	Nhat + Tien		0%