Hands On Controls (HOC)

Training program on ADAS/AD systems

FCW & AEB feature development & Testing + AutoML for perception

Structure & Timing

Time Period	Activity	Completion Flag
Jun 1 to Jun 15 6 webinar span over two weeks	Training/Orientation on ADT, Stateflow ,Matlab/Simulink & Autonomous Driving+ **Udacity Baidu free course on self-driving car + Learn C++/Linux from resources online**	Basic Understanding of AD/ADAS
Jun 16 to Jun 30 Webinar for Testing Demonstration + Daily Meeting for guidance	Compatibility with DSB app + **Autoware coursework** +Scope up project methodology / Research Paper collection + Functional safety analysis	Solid High-level architecture plan for project Execution
July 1 – July 31	'Testing & Verification of ADAS features + 'Functional safety analysis-HARA,FMEA+FTA reading'+SOTIF/**Feb 7**+Research Paper collection on Computer vision +DNN + Vehicle dynamics & Reading'-**FEB 14 + Actual modelling**	MIL should have completed partially
Aug 1 – Aug 31	Integration of all units + MIL Function testing	Ready for Realtime simulation using speedgoat/RCP/Auto code generation/HIL.

0. Basics (96 hours)

Sr. No	Webinar Topic	Assignment	Duration(days)
1.	Matlab ,Simulink & Stateflow	1- Simulink plant model 2.Control system model in matlab 3. LKA stateflow	3 days(1/day)
2.	Control system theory & controller design	1. Transfer function & state space model, 2.PID,LQR & MPC 3.reinforcement learning	3 days
3.	Driver scenario reader app & ASAM standards	1. Scenario building as per NCAP for FCW & AEB	3 days(2 days for lecture & 1day practice)
4.	Control system Design & Analysis for any system 2 nd order	1.Develop longitudinal(1 day) & 2.Lateral control transfer functions(1 day) 3a. Stability analysis(1 day) 3b. Sensitivity & comp. Sens analysis 3c. Bandwidth of	3 days

1. ADAS system modeling(200 hours)

SR. NO	WEBINAR TOPIC	ASSIGNMENT/TOPIC TO COVER	DURATION(DAYS)
1.	Model Based System Engineering • Systems Engineering (V Diagram) • Requirement Diagram	1- study NCAP requirement for FCW & write requirement for it	4 days(1+3)
2.	Architecture of self-driving cars & architecture for FCW+AEB feature	1. suggest improvements	3 days(2+1)
3.	Functional Safety • Objective and Structure • Specification and Requirement Level • ISO 26262 & ISO 21448(SOTIF) & Tools	1. Do HARA 2. Give ASIL code to it 3. Run DFA(FTA+FMEA) 4. Pareto for prioritization+SOTIF+HAZOP	5 days(1 tool each day)
4.	Low level architecture	1. Sensor fusion modelling 2. Prediction(AMM) modelling 3. Planning(4) modelling 4. Vehicle dynamics + Controls modelling	13 days(3 day/module)

2. MIL testing & Auto code generation(200 hours)

Sr. No	Webinar Topic	Assignment/topic to cover	Duration(days)
1.	Scenario creation for MIL testing	1- Create FCW/AEB scenario's for testing in DSR and log the results & analysis	5 days(1+4)
2.	Auto code generation using Embedded coder & overview about SIL+Report writing	1. Create code for controller only(sensor fusion +planning +control) & not detection generator & vehicle dynamics block	5days(1+2+2)
3.	Application validation	Validate using experimental build	20 days

Topics
2+3 /1+3

MPC for Longitudinal Control & lateral control as per requirements of a Highway driving- 2 batches with 3 students each.

AutoML for perception- 2 batches with 2 student each(2 features to each batch)

Testing & Verification of current features - 3 batches with 2 student each.(Perform functional safety + functional analysis)

- Features to be tracked:
- **Traffic signs, Traffic lights, indicator lights, Lanes lines on the road.**
- Drivable area, curbs, Barricade, WIP Cones, construction, Trees, Poles, Vehicles, Bicycler, Motorcyclist, Pedestrian, Other vehicle feature Headlights, windshield, doors open, Animals - Cat, Dog etc
- Generating Data images from video, annotation, creating network, train, validate, deploy
- GPU optimization

Thank You!