

Self-Driving Car With Anomaly Detection

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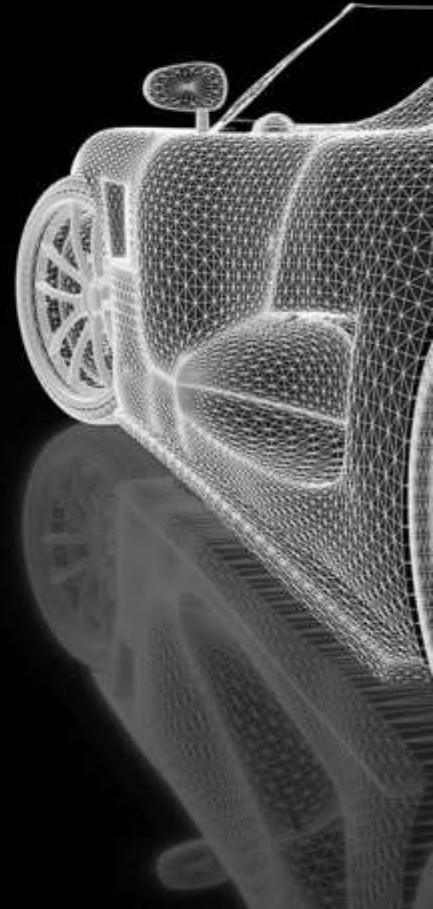
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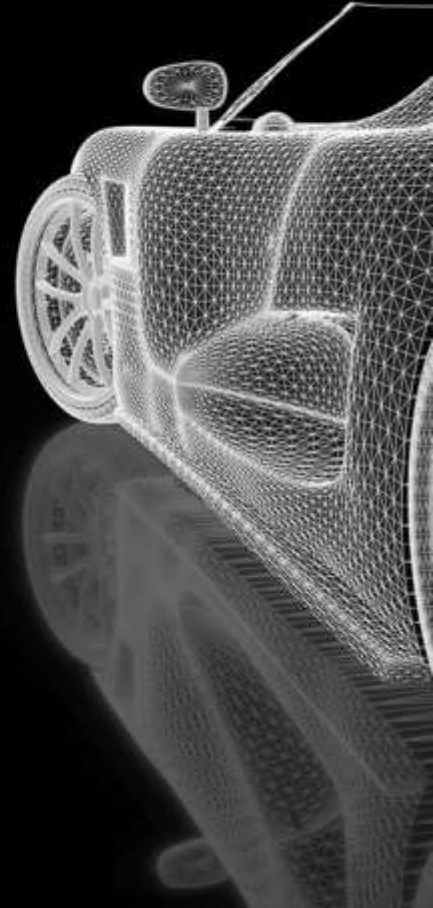
Introduction



Self-Driving car technology is being developed everyday.

There are 30k people die each year due to cancer as a result of car air pollution

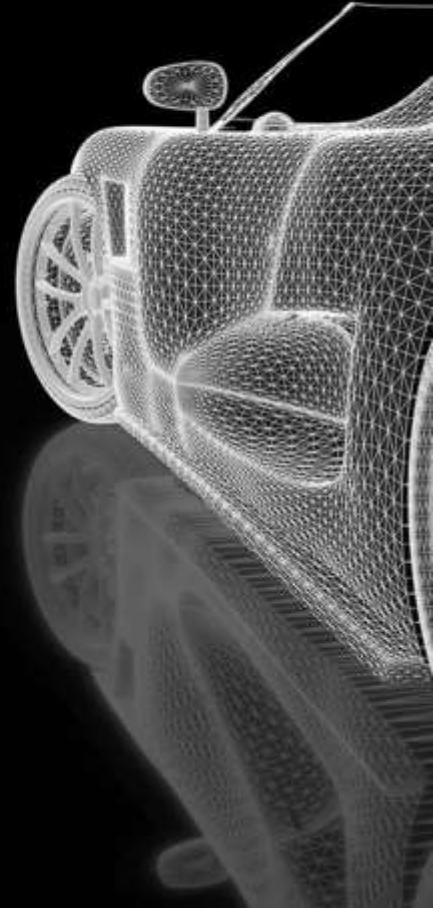
There are 1.5 million accidents occur each year, autonomous vehicle could save half million lives.



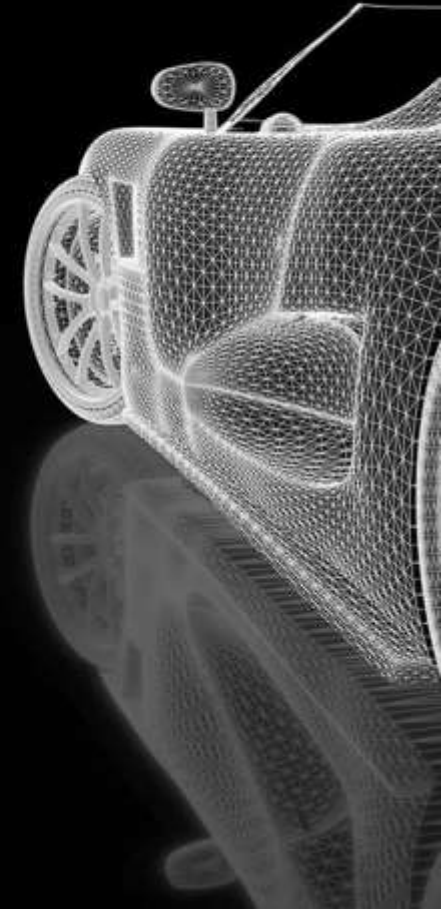
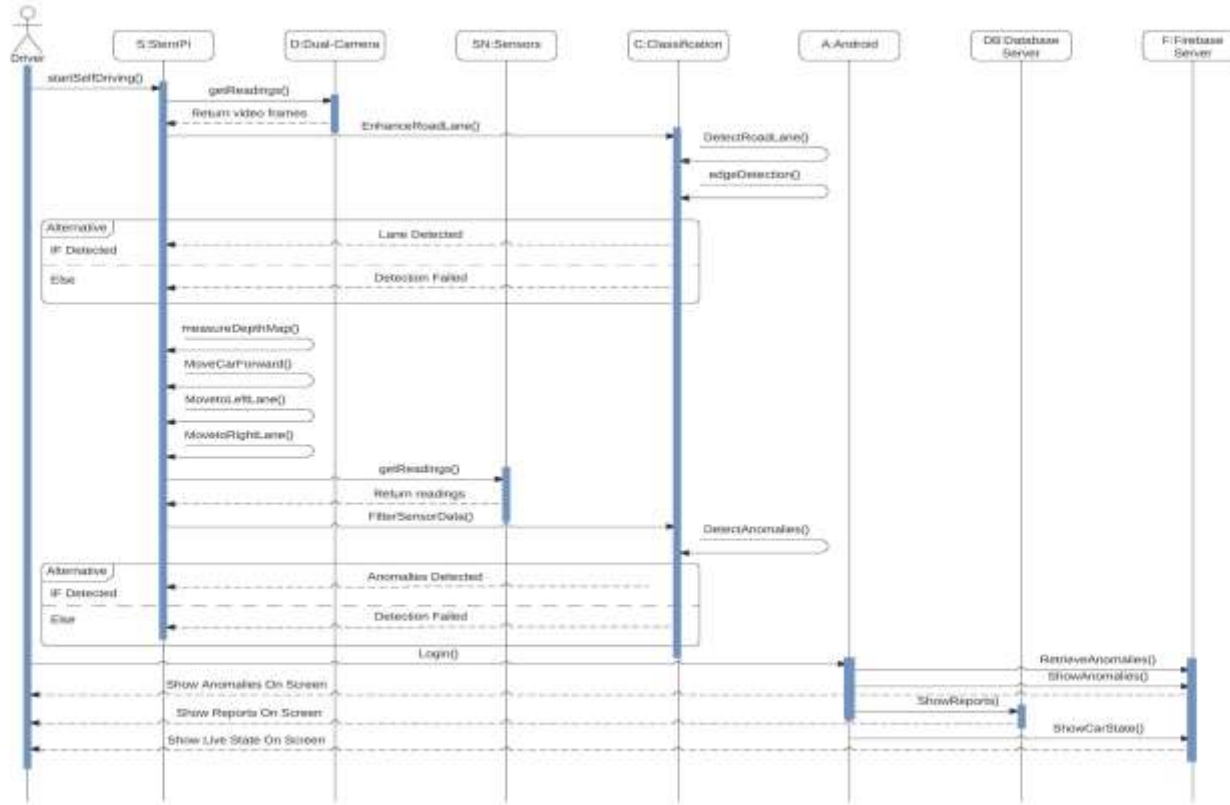
Problem Statement



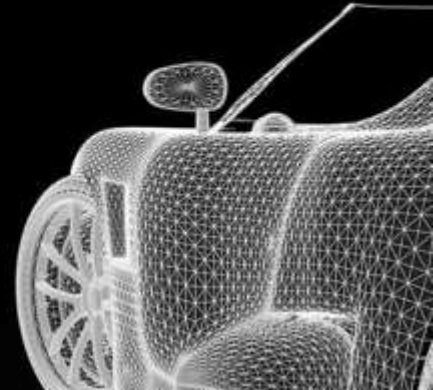
Self Driving cars are still not totally legal in lots of countries as they are still not safe enough to be relied on in public.



Main Sequence Diagram



Database and Firebase Schema

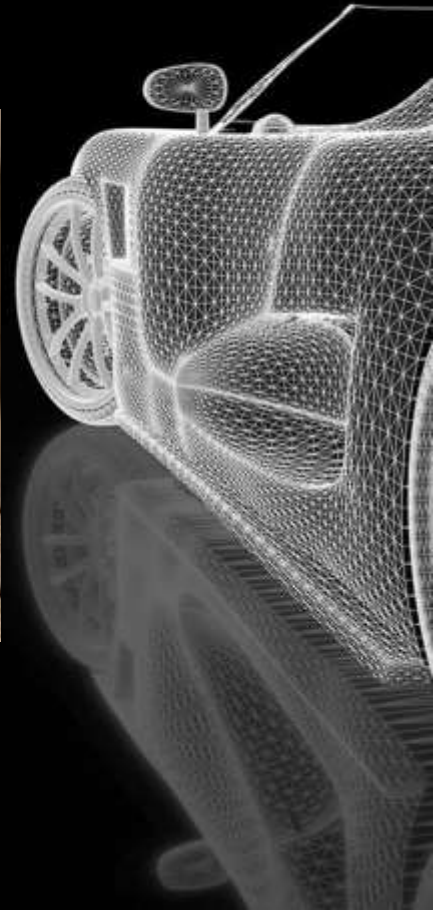
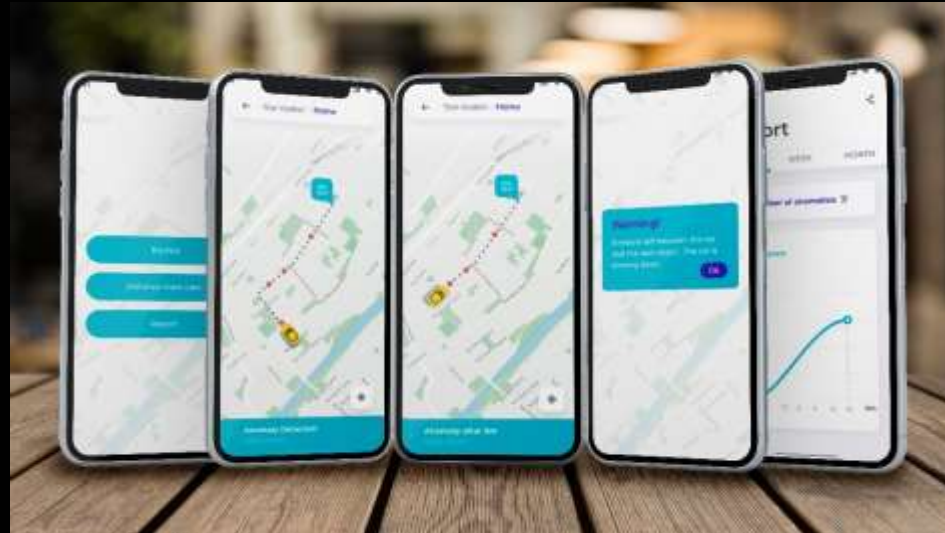
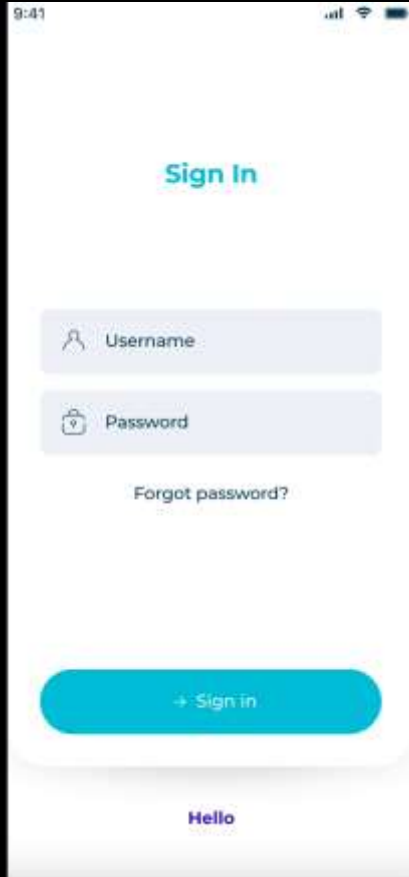


<https://selfdrivingcar-421e0.firebaseio.com/>

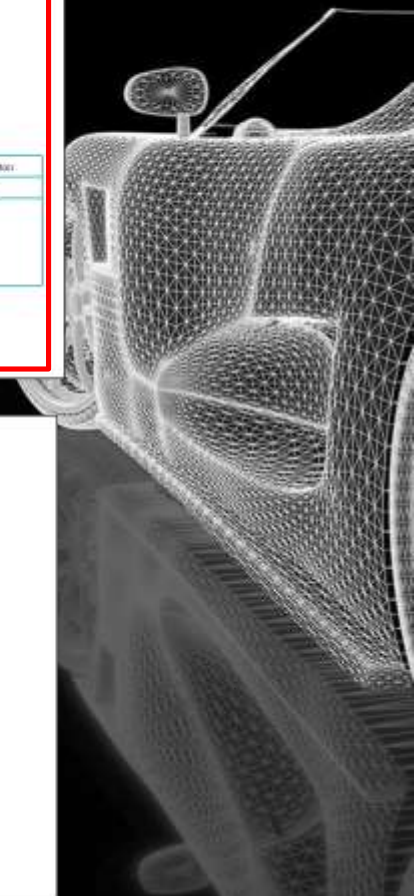
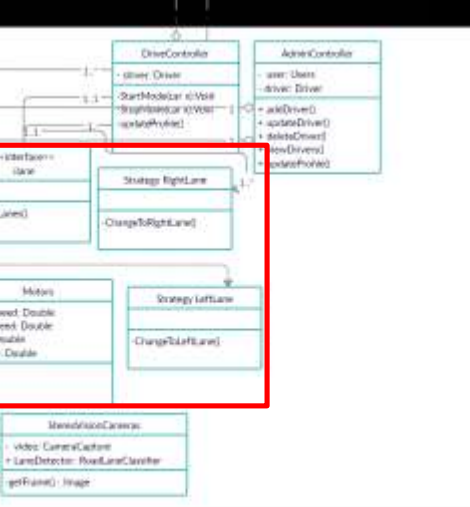
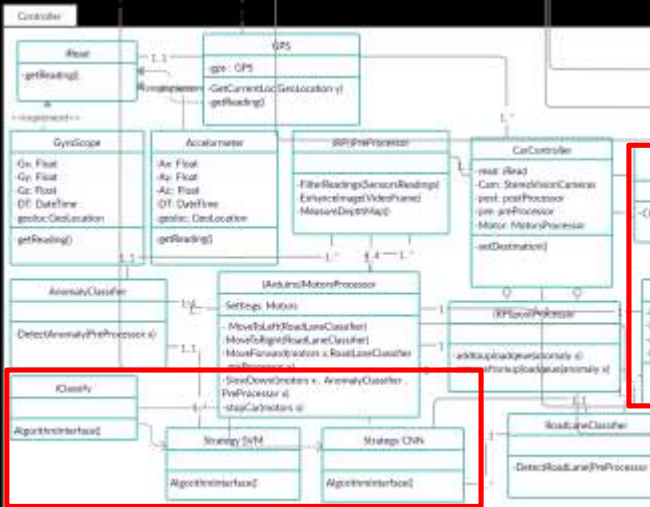
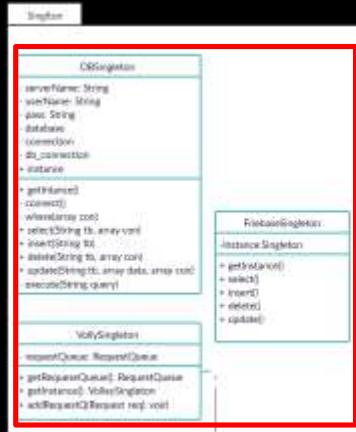
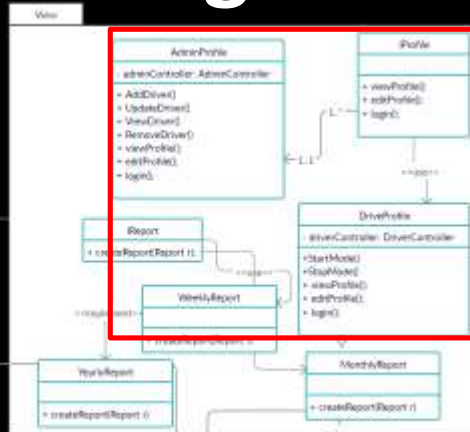
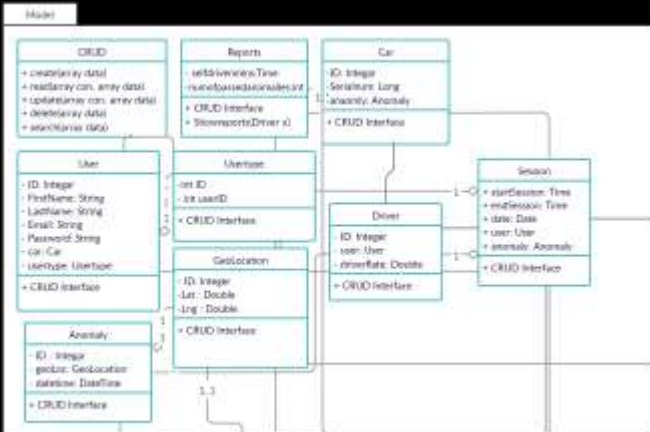
selfdrivingcar-421e0

- Users
 - 83493WUSDKSOSD
 - AnomaliesState: "AnomalyDetected"
 - carcurrentState: "CarStopping"
 - 8934SWIFKD84
 - AnomaliesState: "ClearRoad"
 - carcurrentState: "CarMovingForward"
 - 9k2328UOEL44820
 - AnomaliesState: "ClearRoad"
 - carcurrentState: "CarSlowingDown"

GUI Samples



Class Diagram

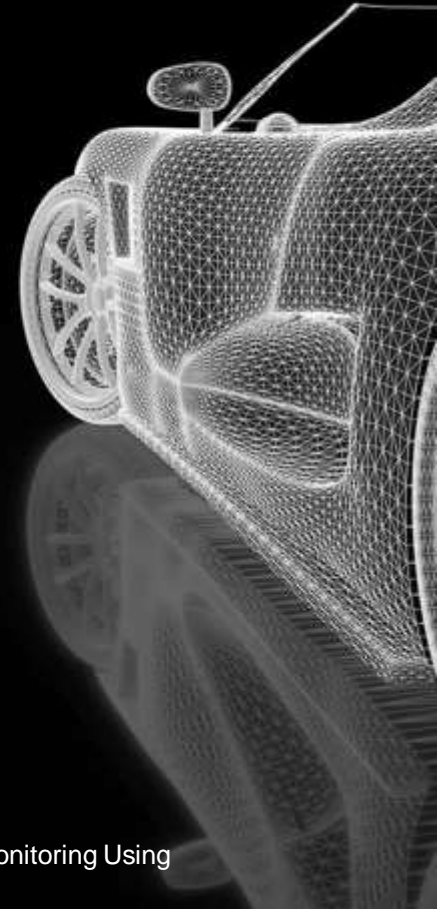


Algorithm Choice (1/2)

- According to this paper KNN results in driving a motorbike had 80% accuracy and 20% false detection is due to the confusion of driving with the resting and sitting action.

Table 1 The accuracy of kNN method (%)

	Downstairs	Driving	Sitting	On-table	Upstairs
Down-stairs	30	30	0	0	40
Driving	0	80	20	0	0
Sitting	0	0	100	0	0
On-table	0	0	0	100	0
Upstairs	40	0	0	0	60



Algorithm Choice (2/2)



Sensors used (gyroscope and accelerometer)

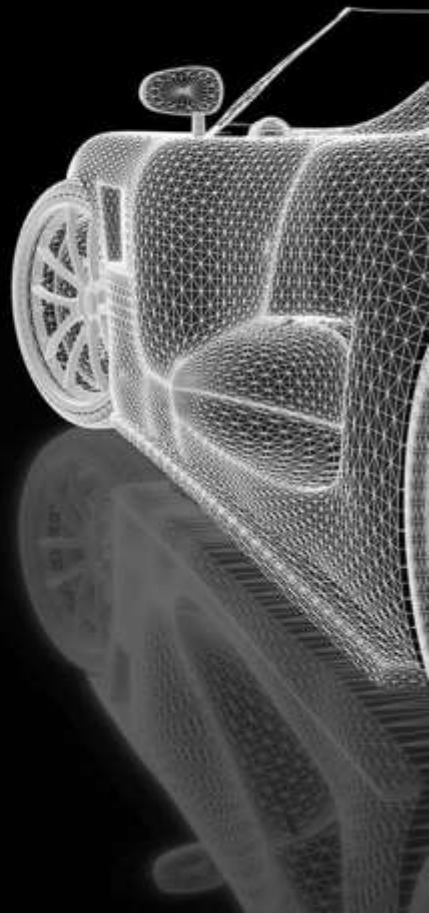
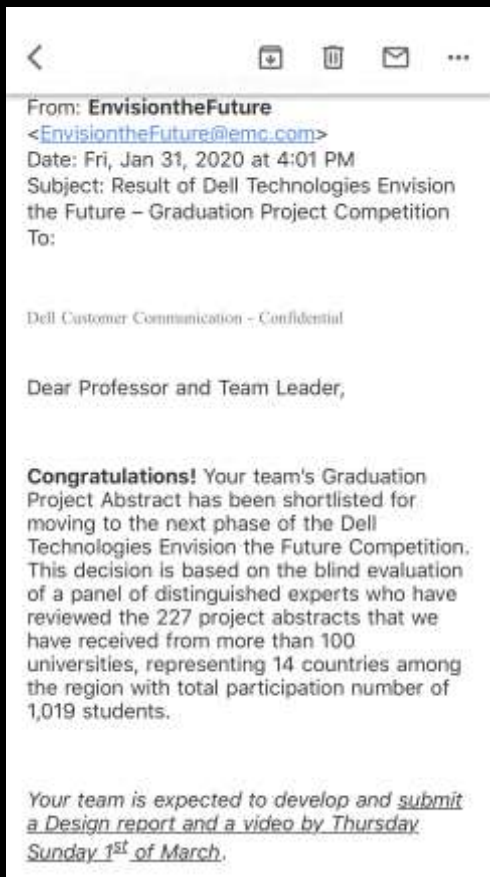
Machine learning method (SVM)

Accuracy **95.36%**

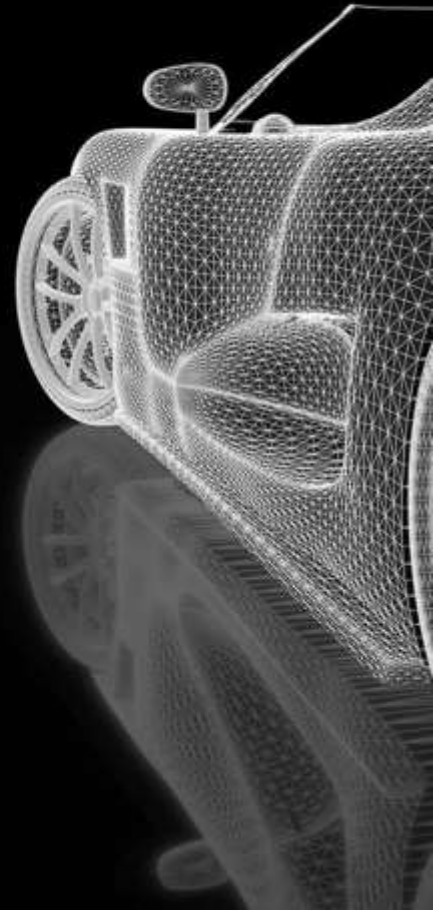
According to this paper SVM is shown to be useful with motion

TABLE III: Accuracy evaluation

Behavior	Accuracy(%)	Precision(%)	Recall(%)	FPR(%)
Normal	99.84	98.80	100.00	0.19
Abnormal	94.81	100.00	99.80	0.00
Weaving	98.43	92.55	87.87	0.63
Swerving	97.94	92.29	94.15	1.39
Sideslipping	98.60	87.96	71.43	0.37
Fast U-turn	98.49	85.71	76.00	0.54
Turning with a wide radius	98.68	89.30	92.72	0.86
Sudden braking	95.74	97.88	99.04	1.93



Car Environment



THANK YOU
Any Questions ?

