Ain Shams University
Faculty of Engineering
Engineering Physics and Mathematics Department

Modeling Vehicle Handling Dynamics to Support Advanced Driver Assisting Systems (ADAS)

A Thesis Submitted in Partial Fulfillment of the Requirement of the Degree of Master of Science in Engineering Mechanics

By

Mohamed Samir Ibrahim Elsayed

B.Sc. Electrical Engineering, Ain Shams University, 2012

Supervised by

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Cairo 2018

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STATEMENT

This thesis is submitted as partial fulfillment for the degree of Master of Science in Engineering Mechanics, Faculty of Engineering, Ain Shams University.

The author carried out the work included in this thesis, and no part of it has been submitted for a degree or qualification at any other scientific entity.

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THESIS SUMMARY

An accurate vehicle dynamics model is essential for representing the behavior of the vehicle in order to design control systems such as traction control, anti roll control, yaw control etc. The aim of this thesis is to develop and simulate an accurate vehicle dynamics model that can model vehicle behavior during different maneuvers. The model has the ability to run in real time and the ability of decreasing number of degrees of freedom with acceptable error.

A mathematical model has been derived. A SIMULINK model has been built, and different maneuvers have been tested .The model has been run on a RASPBERRY PI kit to examine its ability to run in real time.

The model's degrees of freedom have been decreased one by one from 14 DOF to 7 DOF and the effect of decreasing each degree of freedom has been studied .Finally a graphical user interface program has been developed to make it easier for the user to use the model.

Key Words:

Vehicle dynamics, modeling and real time simulation.

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LIST OF PUBLICATIONS

[1] K. El-kobbah, I. Conference, Mohamed S. Ibrahim, Mohamed Abdelaziz, Abdallah Elmarhoomy, and Maged Ghoniema, “A 14 DEGREES OF FREEDOM VEHICLE DYNAMICS MODEL TO PREDICT THE BEHAVIOR OF A GOLF CAR” pp. 3–5, 2018.

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