Declaration

I, Viplav Setia, born on 04.04.1995 in New Delhi, India, assure that I have done this work independently.All sources and references used for the completion of this thesis have been listed and cited accordingly. This thesis work was done in partial fulfillment of the requirements for the award of the degree of Master of Science in Mechatronics at Hochschule Ravensburg Weingarten and has not been used or submitted elsewhere for award of a degree, grade or in any publication.

Viplav Setia
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Abstract

The automotive industry is changing rapidly to new technologies like electromobility and autonomous driving. All major companies like Daimler, BMW, Tesla, Bosch, etc. are investing heavily to bring electric cars to the market and develop prototypes for autonomous driving. To support this change, middleware is required which is used as a means of data exchange between various sensors, control systems and actuators. The focus of this thesis is to test the new versions of the middleware Robot Operating System(ROS) which offer support for embedded and real time systems. To test the version micro-ROS, a demonstrator was built using a STM32 microcontroller with a Nuttx Real-Time Operating System(RTOS) installed to show the data transfer of a pressure sensor. To test the real-time performance for this version, an algorithm was created to test the delay in data transfer with different data sizes. To test the real-time performance of ROS2, an inverted pendulum demo was used and its simulation was visualised on a Linux system enabled with real-time capabilities. Finally, a model using the Gazebo robot simulator was developed to explore ADAS applications using a camera and a LIDAR sensor as an example to show the data transfer using ROS2 for the automotive industry.

List of abbreviations, formulas and indexes

ROS	Robot Operating System
RTOS	Real-Time Operating System

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Dummy Text

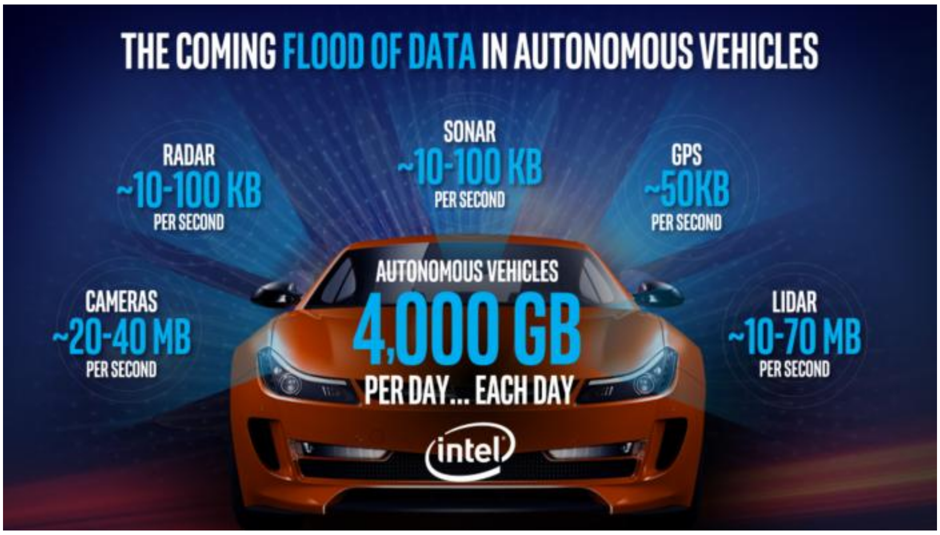

Figure 1.1: Data Stats in Autonomous Cars[1]

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Bibliography

[1] Brian Krzanich. Data is the new oil in the future of automated driving. https://newsroom.intel.com/editorials/krzanich-the-future-of-automated-driving/#gs.kvj5y2/, 2016.