

Grado de Ingeniería en Mecatrónica
**CONTROL SYSTEM OF THE
DRIVE SUBSYSTEM OF AN
ISR**



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Intelligent Service Robot (ISR)

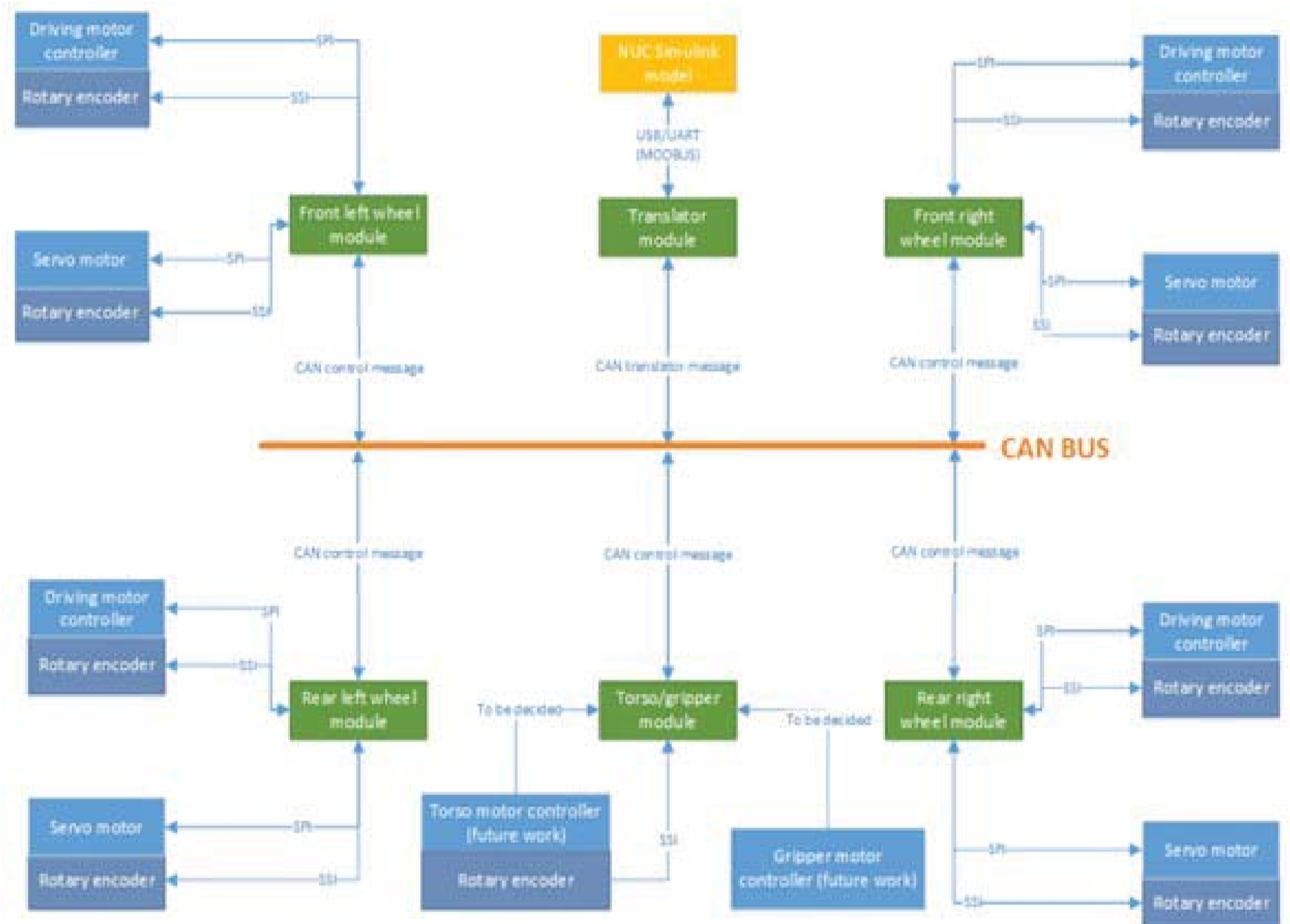
"Butler - MDH@Home" is a project realized at Mälardalens Högskola in collaboration with Volvo CE in Eskilstuna where the goal is to build an intelligent service robot (ISR). The project is divided into several work packages and will last for five years, where this is the initialization and the first year of the project.

Intelligent service robots is an increasing research topic and a fast growing area where researchers strive to develop robots to assist people in their everyday life. Engelberger describes in his paper the concept of an ISR and its functionality and the possible usage scenarios it could have in domestic environments.



Communication system

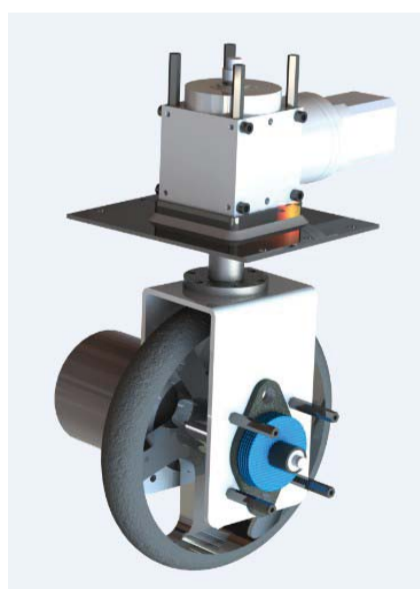
The goal of the present thesis is to make a one hundred percent reliable communication system, by analyzing the actual prototype communication system, testing if fulfilling stated requirements with found short-comings, develop and re-design of communication modules to meet requirements, and building sub-modules for function testing.



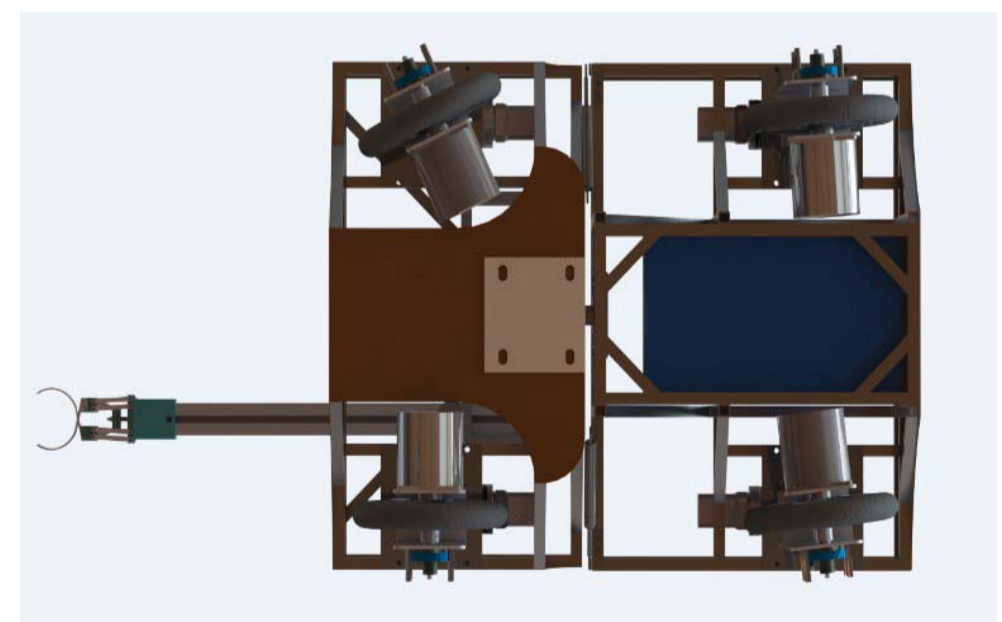
Method

This project will cover how the communication software between the computer and the robot is implemented on the NUC, how it works and the structure of the code. The software developed is originally developed just to carry out the communication tests. But after analyzing different options it was decided to be the final software, being part of a C++ application. Therefore, this software will be used as the serial interface between the C++ application and the remaining system in future work. Different tests have been developed in order to carry the communication system to the limit.

Wheel module



Drive subsystem: Butler's platform



Code structure

The tables below show the code structure. The serial interface is based in the GNU C Low-Level I/O functions.

Results & Conclusions

The first conclusion to highlight after finishing the thesis is that the original *Simulink* model has to be replaced by a C/C++ process, because *Simulink* is a SW platform just for simulations and its communication interface is useless on real-time systems. A lower level conclusion, regarding communication is that order commands from the computer (NUC) always have to be sent after receiving the last expected response from remaining sub-modules. In spite of the bi-directional communication protocol between the NUC and remaining system, loss of data can appear if the message is sent before receiving the last response. It is very important to keep this fact in mind during the SW development in the future.

main	The main file with the main loop
commands	Holds the structure and functions for handling all Butler's commands
response	Holds the structure composed by buffers for all Butler's responses
usbdrv	Contains customized Low-Level I/O functions for handling communication
numberConverter	Contains a hex to decimal <u>converter</u>