Summary

Nowadays ports are experiencing an enormous increase in logistic movements within their container terminals. In order to expand the capacity using the existing transport systems, it is necessary to introduce extra flexibility in assigning the existing equipment to a certain route. Already in use at many ports, the Automated Guided Vehicle is proved to be a very reliable, efficient and last but not least a very cost effective transport system. However, most of these systems are still working based on a fixed-routes principle. To add more flexibility to this system, a new controller for AGV-hardware has been developed in an emulation environment. The DEFT-controller is able to take the direct route instead of the fixed route, while evading obstacles and other AGV's. For this study, a link between the DEFT-controller in an emulation environment and the existing setup of the AGV lab at the 3mE faculty has to be designed. The goal is to control the mini-AGV's using the new DEFT operational controller and to determine if the new software is able to control the hardware.

The DEFT-controller is implemented into the existing AGV-manager software, and several tests have been conducted. The objectives of the implementation of the DEFT controller are as following. From [1] T. ter hoeven stated that the new controller proved to be stable for time steps up to 25 msec in an emulation environment. It is therefore necessary to determine if the hardware of the AGV-lab is capable of meeting this requirement for a stable controller. From the test results follows a remarkable conclusion. It is clear that the largest part of the iteration time is consumed by the Hardware Control Procedure. With a mean total iteration time of 59.12 msec we can conclude that the controller probably can't control the mini-AGV in a stable way, since it is more than twice the maximal value calculated by Ter Hoeven. This means that the controller will probably not be stable in the path following test. The relatively large time consumed to control the hardware can be caused by communication delays, which makes the DEFT-controller wait. Since the processor load stays at about 80%, this cannot be the bottleneck.

In addition to the first objective, the second objective involves the following of a path by the mini-AGV. The final goal is to show that the DEFT-controller is stable and is able to follow a path. Therefore the second objective will be stated as following. Since the first objective shows an iteration time larger than the time required for a stable controller, this test is done in order to confirm the presumption of an unstable controller. From the tests it is clear that the controller seems unstable after travelling about 0.5 meters. From this point on the mini-AGV seems very agitated and is constantly oversteering. During the first turn, the controller goes completely out-of-hand by steering the mini-AGV off the track. This is probably caused by the relatively high iteration times of the software, which is caused again by a relatively large duration of the transmission of the new steering and speed information to the mini-AGV's hardware.