

# Weekly report

## Week 4

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### 1 Summary

This is the first report that I intend to try to write each friday to report of the progress in the work of my master thesis.

This week's progress have been somewhat dampened by some problems regarding the move to the gumstix. Due to this, the milestones that were due today will have to be moved and hopefully completed in the middle of next week.

Until the internal communication has been properly set up on a LinkBoard, I regard the work to be in a "setup" phase of sorts, in which it is difficult to diverge from the main line of work - since everything is more or less dependent on getting the fundamental framework to work.

The turning in of an outline of the report structure has been deliberately moved to next week, when I will meet with Thomas to discuss a few details regarding this.

### 2 Problem of the week

There are two main reasons of this weeks delay in progress. The first was that I together with my tutors decided that it would benefit the LinkQuad as a project - and thereby my thesis - to develop a new C++-library for the serial port communication. The (yet untested) library is very promising and will contribute as expected, but was still an unplanned effort that I thought was more or less done in the previous implentation.

The second, less appealing delay was that the requirement of running LAPACK-/BLAS on the gumstix, which turned out to be previously untested, or at least undocumented, on the internet and the gumstix user mailing list. Failing to compile BLAS natively, I sat out on a detour to try to cross-compile it, until finally succeeding using the most basic (and inefficient) implementations of BLAS.

Having failed to set up a working cross-compilation environment, this time could of course in retrospect have been better spent, but I gave it an effort. Successfully, it would have provided a useful tool later, but i feel I can't spend more time on it now.

### 3 Successes of the week

Apart from creating a templated serial port communication library worthy of attention, I have finalized the work on implementing an UKF filter and an LQ-controller as well as connecting those in the ROS-alike framework I have created for the internal communication. Figure 1 contains a simulated control to bring a one-dimensional position to the origin, controlling the velocity and measuring the velocity as a normally distributed random variable.

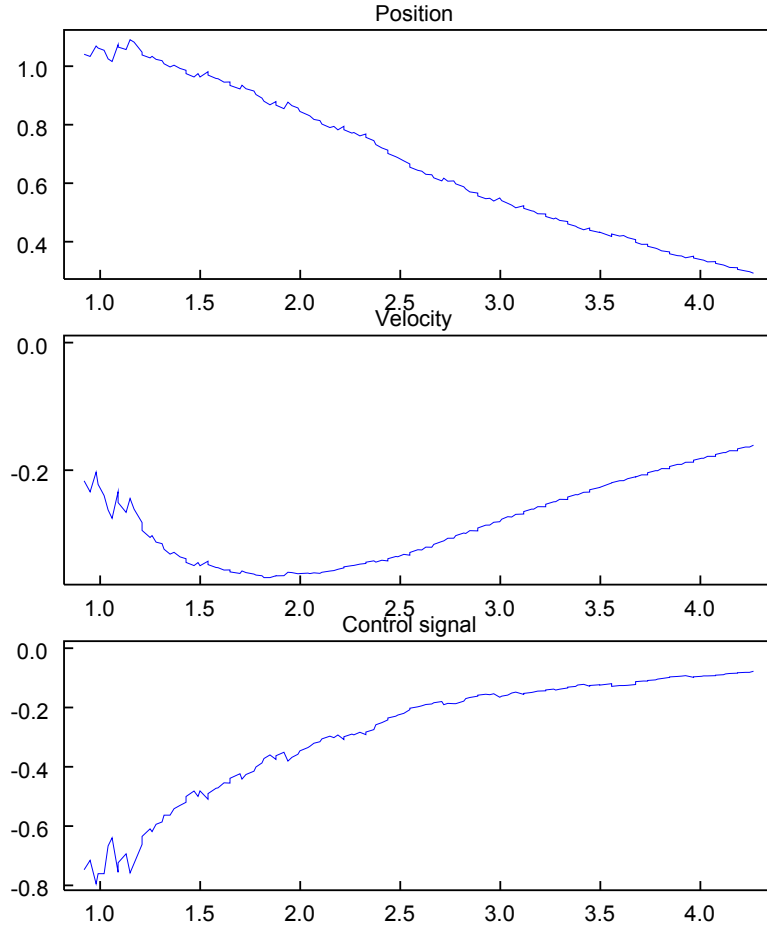


Figure 1: UKF-observed, LQ-controlled, 2-dimensional linear model. The velocity is measured as random noise  $v \sim \mathcal{N}(0, 1)$

The system developed and described above is, after this weeks effort, now compiling and running on the gumstix. The model is also easily extended with more sensors and more advanced models. This is indeed promising, and is the base for the continued thesis work.