EE5332 Project: Kalman Filter

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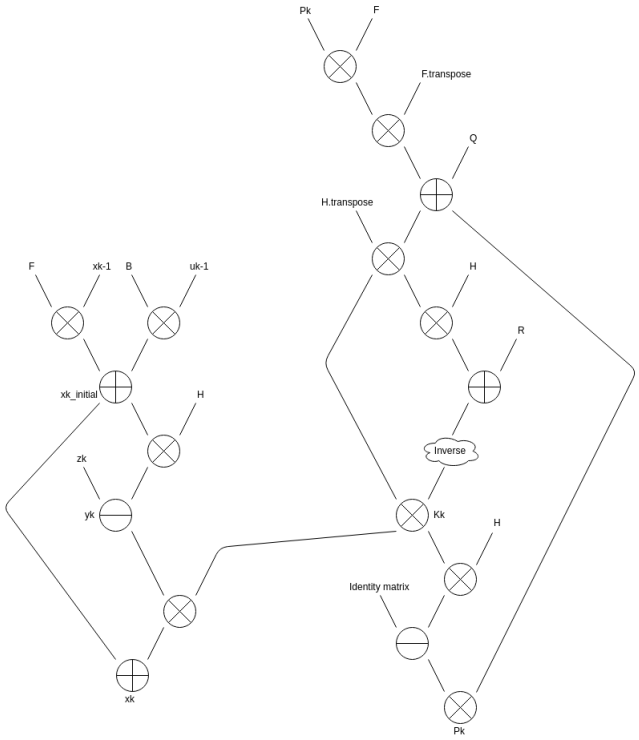
Project progress report by **Surya Prasad S**.

Project Aim:

To implement Kalman filter for real time applications.

Analysis:

I have analysed the Signal Flow Graph of the Kalman Filter and the SFG is attached below. The direction of control flow is downwards throughout.



The two outputs from the Filter is the state vector and its Covariance matrix. As it can be seen, the Covariance matrix for linear systems is independent of the state and the control input. This means we need to focus our optimizations on the resource utilisations of the Covariance matrix generation with a time constraint determined by the rate at which we get the state vector.

Progress:

In the software implementation, I have used OpenMP for dynamic parallelism where tasks are generated as and when certain computationally heavy parts of the code are encountered. Tasks are wonderful in terms of overheads involved and can also synchronise across each other through simple constructs. The more the number of dependencies are involved the higher the overheads are and our first implementation is basically splitting the graph into two tasks with one dependency that is the Kalman gain matrix.

The SFG is also useful for analysing the hardware model. Covariance matrix computation is resource bound and the state estimation computation is time bound as we need to get the output with minimum latency.