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MAX IV high precision self-positioning robot

A high precision robot has been built for the MAX IV laboratory in Lund, Sweden. The robot assists with marking 2D projections from CAD models onto floors. The second important function of the robot is floor scanning, which aids in 3D model correction in construction, production, and installation processes at large facilities. The positioning provided by the robot will ideally need to be accurate within a 100 micrometers for optimal installation of synchrotron equipment. The robot can communicate with external positioning systems and advanced measuring devices such as Lighthouse[1] and a laser tracker to pinpoint its position in a large facility. The goal of this publication is to investigate and present the results of combining suboptimal hardware with intelligent software design, which includes a nonlinear filtering algorithm. The filter in focus is the Extended Kalman Filter (EKF). The robot's precision improved more than 10-fold after the implementation of the filtering algorithm.

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