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## Development of target actuator system and cryo-control system of polarized fixed-target at Fermilab SpinQuest experiment using Delacor framework

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The main goal of the E1039 experiment at Fermilab, USA is to measure the single spin asymmetry of the Drell-Yan process on a transversely polarized target that can be used to determine the sign and magnitude of the Sivers Asymmetry. The nuclear instrumentation group at the Faculty of Technology, University of Colombo is collaborating with SpinQuest and responsible for developing target actuator and cryo-control systems for the experiment, using LabVIEW. In this study, status of developing above systems using a queued message handler design pattern in Delacor implementation will be presented. The Delacor Framework which is an add-on available for LabVIEW, has great message handling and continuous measurement logging capabilities. The key tasks of the system for target actuator are inserting and removing target material in and from the beam line and tracking its position. For these, two modules; one for high resolution stepper motor driver and another for ADC which is connected to the string potentiometer, were implemented. Command libraries were implemented separately for stepper motor driver and the string potentiometer. Each command library is a collection of separate LabVIEW programs of all necessary commands for an instrument such as initialization of communication with motor driver, moving the motor to a certain position, etc. A Helper Loop was introduced in addition to the main message handling loop, to monitor the ADC output value continuously to keep track of the position of the target. The code is hosted on a dedicated computer located in the SpinQuest experimental control room and communicates directly with the motor drivers via Ethernet.

**Keywords:** SpinQuest, Delacor Framework, helper loop, target actuator

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