

**Fermi National Accelerator Laboratory
LDRD Project Data Sheet - FY15**

Project ID: FNAL-LDRD-2015-020

Project title: Off-the-Shelf Data Acquisition System

Principal investigator: Ryan Rivera

Project description: (short description and explanation of cutting edge, high-risk, high-potential science or engineering)

Define and evaluate a low-cost, scalable data acquisition (DAQ) system architecture based on commercial technology being developed for the emerging “Internet of Things” (IoT). This approach connects intelligent front-end digitizers directly to a standard network which is used for data acquisition, event building, detector controls, online and offline data storage/processing, and control room interfaces. The system is scalable from a few MBytes/sec to hundreds of GBytes/sec using inexpensive commodity networking equipment and interface modules.

Tie to Mission: (explain the project’s relevance or anticipated benefits to Fermilab’s and DOE’s missions)

A wide range of experiments and test beam studies rely on data acquisition systems that in the past were often based upon relatively expensive and short-lived technologies. As experiments are reluctant to subsidize the development of niche standards, an off-the-shelf DAQ enabled by the IoT has the potential to satisfy the requirements of a large range of experiments and studies at a very modest cost.

Previous year’s accomplishments: (as applicable) FY15, not applicable

Work proposed for current fiscal year and anticipated / desired results:

The proposed work for the project for FY15 will be to survey the market for development boards with features suitable for low, mid, and high-end DAQ systems. Example boards will be procured and made operational on a teststand with required software and firmware being developed. A standard precision timing and synchronization system will be specified. A JavaScript graphical user interface will be developed for direct control of the DAQ using a web browser. If successful, a general-purpose front-end module will be commissioned as a demonstration platform for the proposed architecture.

Project funding profile: (costs, budgets, projected budgets, and total)

Prior year(s) costs	FY15	FY16	FY17	Total
N/A	265.93K	223.73K	100K	589.66K