ABSTRACT

In this research work, three prototypes of remotely accessible PC based DAQ systems have been designed, implemented and remotely accessed by using web applications. Two of the developed prototypes are used for monitoring and control of liquid volume and temperatures respectively, while the other one is used for controlling a robotic arm. In order to test the measurement systems, the hardware and software modules of the systems are installed at different locations of a Local Area Network (LAN) environment. Then, these hardware units are remotely accessed and controlled by using customized web applications developed for controlling the hardware modules. The response time of the web applications and resource consumption of server computers running the application are observed by using a standard performance testing tool. This research work has the following contributions to the existing body of the scientific knowledge, viz:

(i) A non-intrusive fiber optic sensor for liquid volume measurement has been developed. Novelty of the sensor is potential ability to measure volume for any type of liquid down to milliliter resolutions.
(ii) A 16-bit frequency to digital converter (FDC) has been implemented by using an 8-bit microcontroller (μC) for temperature measurement. This signal converter can be used in lieu of the commercially available universal frequency to digital converters.
(iii) A simple database based technique has been developed to prevent concurrent access of a particular web page. This technique has allowed authenticated users to access and control DAQ systems remotely through web applications on first-come-first-chance basis.

The present PhD thesis is divided into six chapters. Chapter-1 provides an introduction to remotely accessible DAQ system and review of related literatures. Chapter-2 presents objectives of the research work, its motivations and design methodology adopted.
Chapter-3 describes the design and implementation of a remotely accessible PC based DAQ systems for monitoring and control of liquid volume, temperature and robotic arm. Chapter-4 describes the integration of the DAQ systems and testing for their remote accessibility in LAN environment. Chapter-5 describes the load testing of the web applications developed for accessing and operating the DAQ systems. Chapter-6 presents the results and discussion, future direction and conclusion of the work.