**A DISSERTATION ON**

**IMPLEMENTATION OF VIRTUAL SCADA SYSTEM USING LabVIEW**

Submitted for the partial fulfillment of degree of

***M.TECH. IN CONTROL & INSTRUMENTATION***

**Submitted By**

**Uttam Kumar**

**(Roll No- 09/C&I/2010)**

Under the Guidance of

**Dr. Narendra Kumar**

**(Associate Professor, Electrical Engg. Dept., DTU)**

**&**

**Dr. Vinay Kumar Chandna**

**(Associate Professor, ITS Engg. College, Gr. Noida)**

****

**Delhi Technological University**

**Bawana Road, Delhi-110042**

**CERTIFICATE**

This is to certify that the project work that is being presented in this dissertation entitled **“Implementation of Virtual SCADA system using LabVIEW”** has been carried out by “**Uttam Kumar**” student of M.Tech (C&I), Delhi Technological University. This work was completed and carried out under my supervision and forms a part of M.Tech (Control & Instrumentation) course. He has completed his work with sincerity.

 **Dr. Narendra Kumar**

**ACKNOWLEDGMENT**

Our heartfelt thanks to our mentor and guide **Dr. Narendra Kumar,** Department of Electrical Engineering, Faculty of Technology, Delhi Technological University, and **Dr. Vinay Chandna**, ITS Engineering college, Noida who provided me an opportunity to work under his able guidance . His keen interest and suggestions were the source of inspiration for the successful completion of the project.

I would like to avail this opportunity to humbly thank and appreciate the contribution and support, which various individuals have provided for the successful completion of this dissertation, which includes Mr. Bharat Kashyap, Department of Electrical Engineering.

 **UTTAM KUMAR**

 Roll No. : 09/C&I/2010

 M.Tech. (control & instrumentation)

Delhi Technological University, Delhi

**ABSTRACT**

There are large numbers of SCADA applications in the industry. SCADA is a type of supervisory control and its different aspects and horizon are developing continuously so it is difficult to define what exactly it incorporates. To study the status of any system and control it we can use it. A virtual SCADA will help us to understand the working of a system.

In this thesis a realization method of Virtual SCADA system is suggested using LabVIEW.

**LIST OF ABBREVIATIONS**

LabVIEW Laboratory Virtual Instruments for Engineering Workbench

NI National Instruments

RMS Root Mean Square

VI Virtual Instruments

SCADA Supervisory Control And Data Acquisition

SVT Sound and Vibration Toolkit

**CONTENTS**

1. **Introduction 1**
2. **Literature Review 5**
3. **SCADA Systems 18**

3.1 Introduction **18**

3.2 What Does SCADA means? **19**

3.3 Architecture **20**

3.4 Communications **21**

3.5 Functionality **23**

3.6 Application Development **26**

3.7 Evolution **27**

3.8 Engineering **28**

3.9 Potential Benifits of SCADA **28**

**4. Power Flow in Power System 32**

 4.1 Introduction **32**

 4.2 Objectives of Load Flow Studies? **33**

 4.3 Bus Classification **33**

 4.4 Characteristics and Performance Of Power Transmission Lines **34**

 4.4.1 Short Transmission Line **35**

 4.4.2 Medium Transmission Line **36**

 4.4.3 Long Transmission Line **37**

 4.5 Power Flow Through a Transmission Line **39**

 4.6 Methods of Voltage Control **41**

 4.6.1 Reactive Power Injection **41**

 4.6.2 Rotating VAR Generator **42**

 4.6.3 Control By Transformer **42**

 4.7 Network Model Formulation **43**

**5. Simulation Of Virtual SCADA System Using LabVIEW 46**

 5.1 Introduction **46**

 5.1.1 LabVIEW 2011 **46**

 5.1.2 Multisim 12.0 **47**

 5.1.3 LabVIEW Multisim Connectivity Toolkit **48**

 5.1.4 Control Design and Simulation Toolkit **48**

 5.1.5 Sound and Vibration Toolkit **49**

 5.2 Multisim 12.0 Design of 4-bus System **49**

 5.3 LabVIEW 2011 Co-Simulation Design **53**

 5.3.1 RMS Measurement **57**

 5.3.2 Phase Measurement **61**

 5.3.3 Formulae Node **62**

**6. Calculations and Results 63**

**7. Conclusion and Future Scope of Work 65**

 **References/Bibliography 66**