OPC Based Client For Process Control

Major Project Report

Submitted in Partial Fulfillment of the Requirements for the Degree of

Master of Technology

In

(Control and Automation)

By

Urvi Choksi
(14MICC06)

Dept. of Instrumentation & Control Engineering
Institute of Technology
Nirma University
AHMEDABAD 382481

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Under the Guidence of

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AHMEDABAD 382481

MAY 2016

Declaration

This is to certify that

The thesis comprises my orignal work towards the degree of Master of Technology in Control and Automation at Nirma University and has been submitted elsewhere for a degree

Due acknowledgement has been made in the text to all other material used.

Urvi Choksi

Certificate

This is to certify that the Major Project Report entitled **" OPC Based Client For Process Control "** submitted by **Urvi Choksi (14MICC06)**, towards the partial fulfillment of the requirements for the award of degree in **Master of Technology (Instrumentation and Control Engineering)** in the field of **Control and Automation** of Nirma University is the record of work carried out by her under our supervision and guidance. The work submitted has reached a level required for being accepted for examination. The results embodied in this major project to the best of my knowledge have not been submitted to any other University or Institution for award of any degree or diploma.

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- Urvi Choksi

14MICC06

Abstract

OLE for Process Control (OPC), which stands for Object Linking and Embedding (OLE) for Process Control, is the original name for a standard specification developed in 1996. The standard specifies the communication of real-time plant data between control devices from different manufacturers. The OPC technology is based on the COM and DCOM technologies. COM and DCOM technologies are developed by Microsoft Windows Operating System.OPC technology defines objects, interfaces and methods to control process.It also serves manufacturing automation applications to facilitate interoperability. OPC Data Access is the most common OPC specification.OPC Data Access is used to read and write real-time data. OPC servers provide a method for many different software packages to access data from a process control device, such as a PLC (Programmable Logic Controller) or DCS (Distributed Control System). Traditionally, any time a package needed access to data from a device, a custom interface, or driver, had to be written. The purpose of OPC is to define a common interface that is written once and then reused by any business, SCADA, HMI, or custom software packages. Once an OPC server is written for a particular device, it can be reused by any application that is able to act as an OPC client. OPC servers use Microsofts OLE technology (also known as the Component Object Model, or COM) to communicate with clients. COM technology permits a standard for real-time information exchange between software applications and process hardware to be defined.

Contents

List of Figures

Chapter 1

INTRODUCTION

OPC includes client and server communication with each other. OPC makes design between industrial networks and proprietary PLC drivers. The OPC technology shows the behavior of their clients. The clients get the data from the interfaced devices or from the server which writes the data. Though, OPC client set up requires opc protocols to read the data. The OPC client protocol includes computer analysis and acquisition program. It also includes an industrial device driver.The device driver has an associated OPC interface.So that program can communicate with the industrial device driver. The industrial device driver also includes a protocol.It also includes application databases, online data access, alarm and event handeling. The industrial device driver has three divisions: Server Contains all the group objects. Group Maintains information about itself and the OPC items Item Contains a unique identifier held in the group. The identifier acts as a reference for the individual data source, value, quality, and timestamp information. The value is the data from the source which writes the data. The quality status gives information about the device. The timestamp is the time that the data was retrieved.

The opc gets the all items from opc group instead of opc item. The group has

its own specific update rate. The update rate tells the server to change the data available to the OPC client and its updation rate.The dead band tells the server to reject values.It should not be less than a specified dead band percentage.The OPC server provides alarm for event handling to the clients. The server is used for an abnormal condition to the clients. The condition is not associated with the the server and server state.The group and the item is with in the server.The data source value shows the real-world temperature of a mixer. The OPC server will send an alarm.Which shows the application will take care of the low temperature. Events do not occur that are important for the server and client.The system errors, system configuration changes, and operator actions takes place. OPC also includes historical data access. They are the ways to show the data stored by historical engines, including raw data storage servers and complex data storage and analysis servers. This feature of OPC allows interoperability of proprietary database systems. Using OPC in labview:- OPC includes client and server communication with each other. OPC makes design between industrial networks and proprietary PLC drivers. The OPC technology shows the behavior of their clients. The clients get the data from the interfaced devices or from the server which writes the data. Though, OPC client set up requires opc protocols to read the data. The OPC client protocol includes computer analysis and acquisition program. It also includes an industrial device driver.The device driver has an associated OPC interface.So that program can communicate with the industrial device driver. The industrial device driver also includes a protocol.It also includes application databases, online data access, alarm and event handeling.OPC also includes historical data access. They are the ways to show the data stored by historical engines, including raw data storage servers and complex data storage and analysis servers. This feature of OPC allows interoperability of proprietary database systems.

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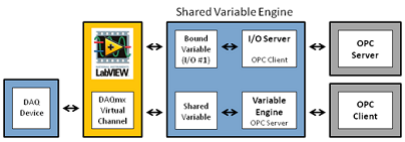

Figure 1.1: Shared Variable Engine as OPC Client or Server

data storage and analysis servers. This feature of OPC allows interoperability of proprietary database systems. Using labview as an OPC Client:- The DSC Module allows OPC Client I/O server communication.The server implemention of the OPC is based on OPC server interface. This allows labview to communicate with any PLC.Which provides interaction with an OPC Server. An OPC Client I/O server will l show all the OPC servers that are available and installedon on the network computer. Figure shows the relationship of the components involved in communication between labview and a PLC.

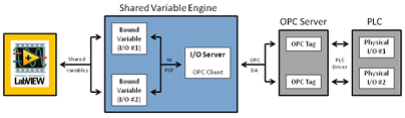

Figure 1.2: Labview as OPC Client

PLCs provides data into the network.The OPC Server uses the PLCs to create OPC tags for each physical input and output into the PLC. National Instruments gives the OPC Server advantage with NI OPC Servers. NI OPC Servers includes the list of drivers of the industrys PLCs. For a list of supported PLCs, refer to the NI Developer Zone article Supported Device Driver Plug-in List for NI-OPC Server. The OPC Client I/O servers provided with the DSC Module can connect to each OPC tag using the OPC DA standard. You can configure the multiple OPC Client I/O servers in the SVE with different update rates, dead band percentages, and reconnect poll rates. The SVE provides a PSP URL for each OPC tag that other Shared Variables can bind to by enabling aliasing. Using labview as an OPC Server:- The SVE can act as an OPC server. However, the SVE as an OPC server should not be confused with NI OPC Servers,

because the SVE does not contain essential proprietary PLC drivers. The SVE can take a network-published Shared Variable and create OPC tags that an OPC DA client can connect to. This allows labview VIs to easily communicate with other OPC client software. A common application for using the SVE as an OPC Server involves employing National Instruments Data Acquisition (DAQ) devices and an NI-DAQmx driver to set up a DAQmx Virtual Channel. This DAQmx Virtual Channel can then be referenced by an NI-PSP URL. Therefore, the SVE can bind a network-published Shared Variable to the values being read by the DAQ device. The SVE then uses OPC DA standards to create OPC tags for the Shared Variable. In this way, an OPC client can read and write to the DAQ device. For a step-by-step process on publishing a DAQ device I/O to an OPC client, refer to the NI Developer Zone article.

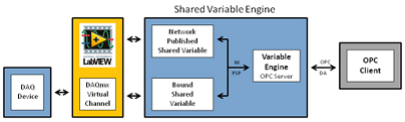

Figure 1.3: Labview as OPC Server

OPC provides the following advantages: OPC servers includes single API so the user can reuse the code forthe client and server application and communication It develops the client applications. The development environments shows advantage of COM and ActiveX, such as Microsoft Visual Basic, Visual C++, Excel, and Internet Explorer. It also provides the Browser.The user can select OPC items available to clients. An OPC item is a channel or variable in a real-world device (normally an I/O point) that a device server monitors or controls. Distributed and remote access through DCOM. You can access devices connected to other computers on the network.

1.1 OPC Server Simulation

OPC includes client and server communication with each other. OPC makes design between industrial networks and proprietary PLC drivers. The OPC technology shows the behavior of their clients. The clients get the data from the interfaced devices or from the server which writes the data. Though, OPC client set up requires opc protocols to read the data. The OPC client protocol includes computer analysis and acquisition program. It also includes an industrial device driver.The device driver has an associated OPC interface.So that program can communicate with the industrial device driver. The industrial device driver also includes a protocol. OPC servers includes single API so the user can reuse the code forthe client and server application and communication

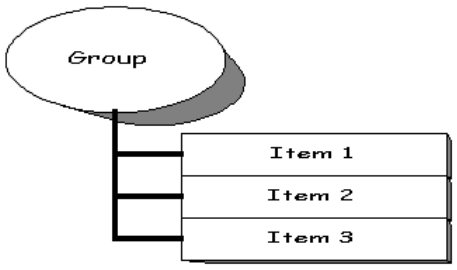

Figure 1.4: OPC Group and Item

The OPC Group gives the ways for clients to organize data.As example, the group may present the items in a particular operator manner for report. Data can be read and write to make the communication actively between client and server. The OPC Items provides the connections to the server and the client. OPC client set up requires opc protocols to read the data. The OPC client protocol includes computer analysis and acquisition program. It also includes an industrial device driver.The device driver has an associated OPC interface.So that program can communicate with the industrial device driver. The industrial device driver also includes a protocol. OPC servers includes single API so the

user can reuse the code forthe client and server application and communication. The SVE can act as an OPC server. However, the SVE as an OPC server should not be confused with NI OPC Servers, because the SVE does not contain essential proprietary PLC drivers. The SVE can take a network-published Shared Variable and create OPC tags that an OPC DA client can connect to. This allows labview VIs to easily communicate with other OPC client software. The OPC client protocol includes computer analysis and acquisition program. It also includes an industrial device driver.The device driver has an associated OPC interface.So that program can communicate with the industrial device driver. The industrial device driver also includes a protocol. OPC servers includes single API so the user can reuse the code forthe client and server application and communication.

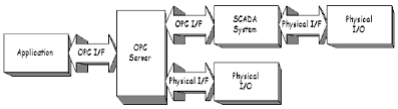

Figure 1.5: OPC System Architecture

Matrikon OPC Server for Simulation:- Matrikon OPC Server Simulation is free for non-production use. It can be distributed openly. Which is a fully functioning application without any of the restriction. Matrikon OPC Simulation Server is used to help test and troubleshoot OPC applications. Testing applications on live OPC server can result into the loss of actual production data. The Matrikon OPC Simulation Server provides the simulated environment. So that in the case of technical issues no real data can be lost. Matrikon OPC Explorer is an OPC Client application for testing and configuring OPC connections. Below we see the Matrikon OPC Server for Simulation.

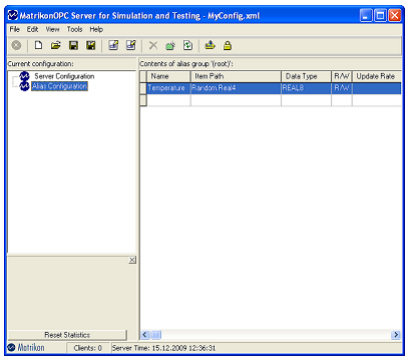

Figure 1.6: Matrikon OPC Server Simulation

1.2 Aliases Configuration

Matrikon OPC Servers, including this one, provide the ability to create user-defined aliases that can be used in place of regular OPC items. This feature is particularly useful when the item path for a given server is very complex or difficult to remember, for example: Com1.Radio1.Unit1.41.4.123. Servers can also be configured so that client applications have access to configured aliases only, rather than every available item. To insert a new alias, perform the following steps. 1. Open the Matrikon OPC Server for Simulation Configuration window. 2. Click on the Alias Configuration node in the Current Configuration panel to open the Alias Configuration panel. 3. Right-click your mouse and select the Insert New Alias option, or Press the Insert button on the keyboard, to launch the Insert New Alias window. 4. Fill in a name for the alias, and enter a valid item path. The item path can be found by browsing the servers address space (use the ellipsis button next to this field). 5. Save this alias when finished. It will now be visible to OPC clients under the Configured Aliases heading.

View Tags:

Open the Matrikon OPC Explorer where you browse for available Items (Tags).

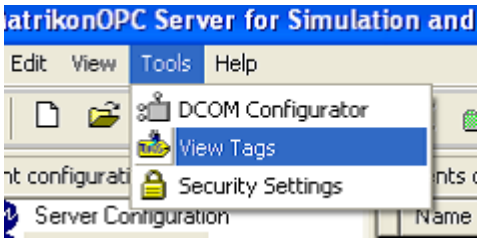

Figure 1.7: OPC ViewTags

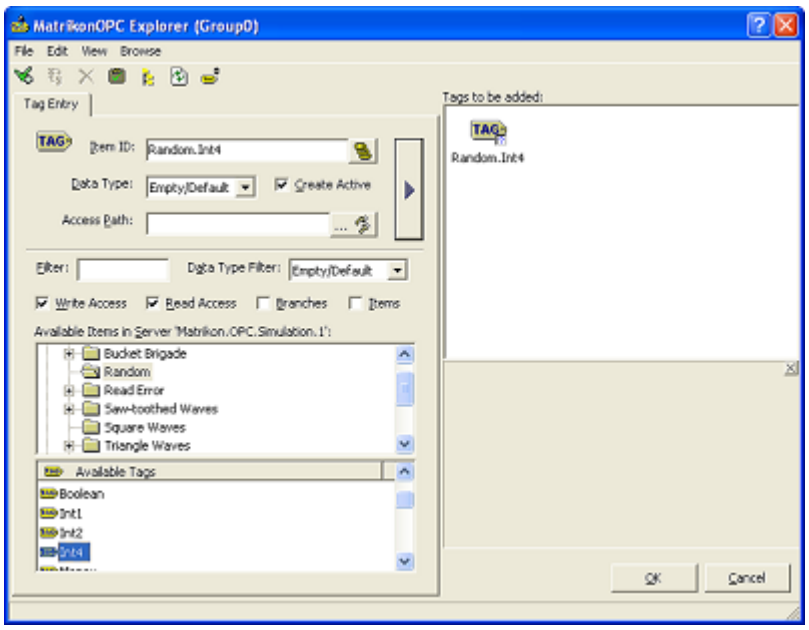

Figure 1.8: Matrikon OPC Explorer

1.3 OPC Protocol Implementation

Data Socket is a technology for sharing data between applications or different data sources. The Data Socket control provides a simple interface through which it can interact with OPC servers, such as National Instruments Field Point, from any ActiveX container, including Visual Basic and Visual C++. You can connect to an OPC server with Data Socket using an OPC URL, which is similar to the URLs used in a Web browser. URLs provide a standard mechanism for referring to locations. You already know how to use URLs to locate things on the Web, and you can locate OPC data items with Data Socket using a similar URL model. With Data Socket, you can share live data with one or more client applications on a network without worrying about data formats and network

protocols. The user will use the Labview applications that can easily share live data. It shares the data with a variety of clients. It also includes Visual Basic applications.The user will also allow Web browsers, Visual C++, Microsoft Excel, Lab and Windows/CVI. Using this Data Socket technology the user can provide and get the data from the many applications in the same way.It also gives the power to attach the reverse applications easily. There are so many instrumentation solutions which involve the single local computer applications for the Data acquisition, Data logging, Data analysis, and Data presentation. Therefore, Due to rise in the fame of the Internet and the company intranets requires to get the remotely monitor.The user can control the data acquisition. The user may frequently require the exchange live data around the world. Data Socket protocol helps the Labview to simplify the live data transfer. This data transfer is between the different applications which is based on one computer or between no. of computers connected with into the network.

The Data Socket palette in Labview:

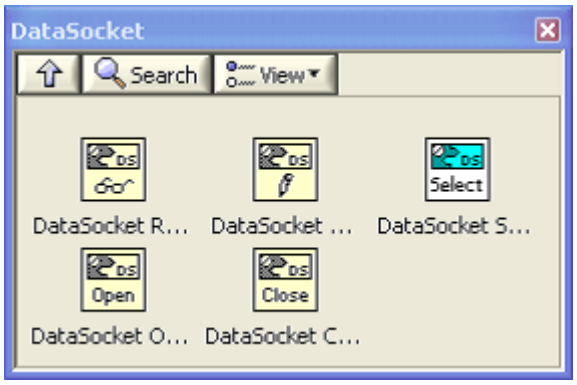

Figure 1.9: DataSocket Palette

The Data Socket Select URL shows the dialog box for their users for selecting the data source.It gives back to the URL to that given data in to the data socket URL. Data Socket Open is used to open the data connection which user specifies into the particular URL. Data Socket Read is used to queue the upcoming

data values from the clients which gets the data from server. Buffer is also associated with the connection. The user specifies the connections into that and returns the value to the particular data. Data Socket Write is used to Write the data into the connection which is specified by the user. Data Socket Close is used to Close the data into the connection which is specified by the connection id. Though, the variety of different technologies of protocol available now a days to share data. It includes the TCP/IP protocols and the Dynamic Data Exchange. With Data Socket, you can share live data with one or more client applications on a network without worrying about data formats and network protocols. The user will use the Labview applications that can easily share live data. It shares the data with a variety of clients. It also includes Visual Basic applications.The user will also allow Web browsers, Visual C++, Microsoft Excel, Lab and Windows/CVI. Using this Data Socket technology the user can provide and get the data from the many applications in the same way.It also gives the power to attach the reverse applications easily. There are so many instrumentation solutions which involve the single local computer applications for the Data acquisition, Data logging, Data analysis, and Data presentation. Therefore, Due to rise in the fame of the Internet and the company intranets requires to get the remotely monitor.The user can control the data acquisition. The user may frequently require the exchange live data around the world. The user do not want to program with COM.The user can use the Data Socket control,the ActiveX control forexchanging data.Data can be exchanged between applications and devices. Data Socket provides the following advantages. It has the Simple API devices that are useful for the developers who could not do program with COM programming. It accesses the OPC server for the custom interface.It enables the user's applications to run more fast than the automation internal connections. Data Socket technology has no extra layer.Using this Data Socket technology the user can provide and get the data from the many applications in the same way.It also gives the power to attach the reverse applications easily.With Data Socket, you can share live data with one or more client applications on a network without worrying about data formats and network protocols.

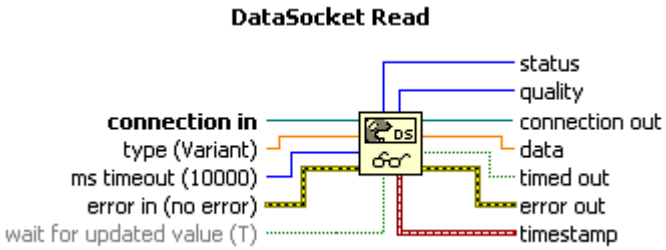

Figure 1.10: DataSocket Read

The user will use the Labview applications that can easily share live data. It shares the data with a variety of clients. It also includes Visual Basic applications.The user will also allow Web browsers, Visual C++, Microsoft Excel, Lab and Windows/CVI. Using this Data Socket technology the user can provide and get the data from the many applications in the same way.It also gives the power to attach the reverse applications easily. There are so many instrumentation solutions which involve the single local computer applications for the Data acquisition, Data logging, Data analysis, and Data presentation. Therefore, Due to rise in the fame of the Internet and the company intranets requires to get the remotely monitor.The user can control the data acquisition. The user may frequently require the exchange live data around the world. Data Socket protocol helps the Labview to simplify the live data transfer. This data transfer is between the different applications which is based on one computer or between no. of computers connected with into the network. Though, the variety of different technologies of protocol available now a days to share data. It includes the TCP/IP protocols and the Dynamic Data Exchange. With Data Socket, you can share live data with one or more client applications on a network without worrying about data formats and network protocols. The user will use the Labview applications that can easily share live data. It shares the data with a variety of clients. It also includes Visual Basic applications.The user will also allow Web browsers, Visual C++, Microsoft Excel, Lab and Windows/CVI. Using this Data Socket technology the user can provide and get the data from

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Chapter 2

Communication between Server Client

The Data Socket Select URL shows the dialog box for their users for selecting the data source.It gives back to the URL to that given data in to the data socket URL. Data Socket Open is used to open the data connection which user specifies into the particular URL. Data Socket Read is used to queue the upcoming data values from the clients which gets the data from server. Buffer is also associated with the connection. The user specifies the connections into that and returns the value to the particular data. Data Socket Write is used to Write the data into the connection which is specified by the user. Data Socket Close is used to Close the data into the connection which is specified by the connection id. The Data Socket technology has no extra layer.Using this Data Socket technology the user can provide and get the data from the many applications in the same way.It also gives the power to attach the reverse applications easily.With Data Socket, you can share live data with one or more client applications on a network without worrying about data formats and network protocols. The OPC server gives the user alarm and event handling to clients.In the server process,the alarm is an abnormal condition. This abnormal condition signifies to the client. This condition is probably associated with the state of the server, a group or an item within the server. For example, if a data source value that represents

the real-world temperature of a mixer drops below a certain temperature, the OPC server will send an alarm to the application, so that the application will properly handle the low temperature. Events are detectable occurrences that are important to the server and client, such as system errors, system configuration changes, and operator actions The basic concept in OPC is that we have an OPC Server and one or more OPC Clients that communicate with the server in order to write or read data. An OPC server has implemented a set of services, and the clients are using these services. At a high level, an OPC server is comprised of several objects: the server, the group, and the item. The OPC server object maintains information about the server and serves as a container for OPC group objects. The OPC group object maintains information about itself and provides the mechanism for containing and logically organizing OPC items. Matrikon OPC Simulation Server is a free utility used to help test and troubleshoot OPC applications (clients) and connections. Testing applications on live OPC servers may result in loss of actual production data. The Matrikon OPC Simulation Server creates a simulated environment so that in the event of a problem, no real process data is lost. Matrikon OPC Explorer is an OPC Client application for testing and configuring OPC connections.

2.1 Read OPC Data

We use Data Socket Read in order to get data from a specific Item in the OPC server.

Figure 2.1: Read OPC Data in Labview

The labview DSC Engine (Tag Engine) takes care of OPC for you. Because lab-

view Data logging and Supervisory Control is an OPC Client, it is much more efficient at OPC operations. If you are going to have more than 30 I/O points, you will sacrifice efficiency using data sockets. At 30 I/O points, you should consider using labview DSC and the Tag Engine. Because labview DSC is an OPC server, an OPC client can launch the Tag Engine. When an OPC client launches the Tag Engine, the Tag Engine loads the current .scf file. The Tag Engine can then load any servers that the tags in that .scf file require. However, an OPC client cannot specify which .scf file the Tag Engine should use. The Tag Engine will only use the current .scf file, so you must make sure the correct .scf file is set as the default if you want this. When you access data from the Tag Engine acting as an OPC server, the client software, such as Lookout or some other OPC client software sees the Tag Engine as an OPC server named National Instruments. OPC labview, while the tag names you set in the .scf file appear as the OPC item names.

2.2 Queue Operation

We will use the Queue Operations functions to create a queue for communicating data between sections of a block diagram or from another VI. The Queue Operations palette in LabVIEW:

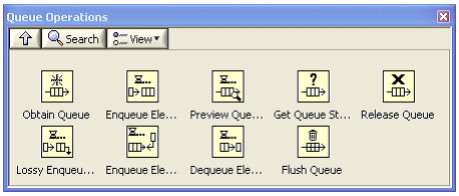

Figure 2.2: Queue Palette

You typically use the Queue VIs for exchange of messages. E.g., a Sender activity shall read letters from the keyboard and put them into the Queue. The Receiver activity shall read the letters from the Queue and display them on a

screen in a String indicator. The Sender and the Receiver activity could operate at different speed (delay). Below we see the LabVIEW code:

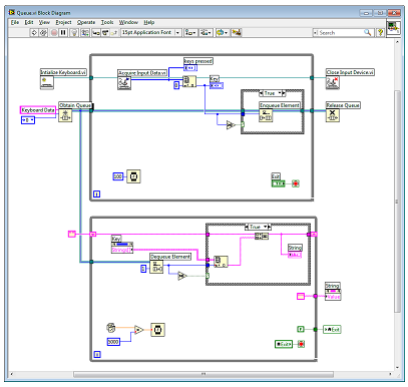

Figure 2.3: Labview BlockDiagram

We type in some letters using the keyboard. The Receiver is much slower, but to be sure to not miss any letters, we use a Queue to handle this. Below we see the Front Panel:

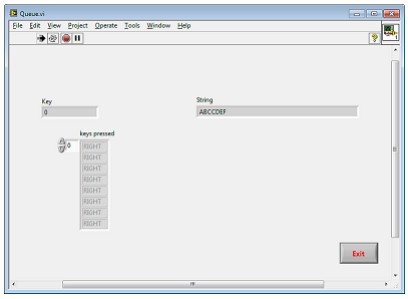

Figure 2.4: Labview FrontPanel

Chapter 3

OPC Client Setup Using PeakHMI

The user will create the interaction with machines using the interface between server and client.This paper provides the assumption with HMI which stands for the Human Machine Interaction or Human Machine Interface between the client and server.It provides the Man Machine Interface (MMI) and the Human Computer Interface (HCI).It has also the list of the data which got lost. Human Machine Interaction (HMI) is the most common one and the general definition. It shows how we should interact as human.They define the machine as the mechanical or electrical device that converts the modification of energy into the given data and its human tasks. This data will go to that point which has more on to the electrically devices. Fortunately no other single reviewer will cover the entire field of HMI without missing the device on it. Few things will cover the data but at least some overview should be possible. There is wide range of HMI devices. kitchen appliances, medically devices, manufacturing machinery, entertainment equipment, computer gadgets etc. The evolution has made the man to date back to the few millions years,just example as it started off as chimps. it is made evolved in the hunter area which will then finally added into the computer technology.Few computers will be punched into the holes for a piece of paper into input data. It was the mid-20th century. a new HMI devic now will be based on to the data which was the created in it. which led to the creation of the 1st computer keyboards. Computers are used to make

the text . There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. It includes the whole data of joysticks, graphics tablets, single handed keyboards, a whole range of joy pads and sticks. This data will go to that point which has more on to the electrically devices. Fortunately no other single reviewer will cover the entire field of HMI without missing the device on it. Few things will cover the data but at least some overview should be possible. There is wide range of HMI devices. kitchen appliances, medically devices, manufacturing machinery, entertainment equipment, computer gadgets etc. There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. It includes the whole data of joysticks, graphics tablets, single handed keyboards, a whole range of joy pads and sticks. It was the mid-20th century. a new HMI devic now will be based on to the data which was the created in it. which led to the creation of the 1st computer keyboards. Computers are used to make the text . There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. It includes the whole data of joysticks, graphics tablets, single handed keyboards, a whole range of joy pads and sticks. The user will create the interaction with machines using the interface between server and client.This paper provides the assumption with HMI which stands for the Human Machine Interaction or Human Machine Interface between the client and server.It provides the Man Machine Interface (MMI) and the Human Computer Interface (HCI).It has also the list of the data which got lost. Human Machine Interaction (HMI) is the most common one and the general definition. It shows how we should interact as human.They define the machine as the mechanical or electrical device that converts the modification of energy into the

given data and its human tasks. Computer based Vision is based on to the HMI.This object shows the detection and the tracking in it relates the gesture control.Though it would be determine the hand, arm, and leg or head motion. It also detects the intent from body language. Those are the criminal might portray before they committing a crime. Before a subside, this device for processing. There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. It includes the whole data of joysticks, graphics tablets, single handed keyboards, a whole range of joy pads and sticks. Another the way of interesting data given which area is of the acoustic HMI technology. It is acoustic myography, which is basically defined as the measuring of the acoustic properties into the biological muscles as they contract. The more a muscle contracts the greater the sound. To simply demonstrate this, put your fingers in your ears and then make a fist, you should just be able to hear a slight.Here is wide range of HMI devices. kitchen appliances, medically devices, manufacturing machinery, entertainment equipment, computer gadgets etc. There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. Bionics is considered as an impressive area and provides the lot of cutting edge technology. It is of those areas that are the inspired by the science friction given into the data. The last couple of decades has the really got in to come to the alive. , EEG was used to measure the brain for conditions such as sleep deprivation, insomnia etc EMG and EOG are used to check if the muscles and the nerves are working correctly, and of course ECG is used to measure the heart. All of them are still used in hospitals today. Bionics breaks down into 2 major categories: EEG based Brain Computer Interfacing(BCI) and EMG Myoelectric control, however there are smaller areas in Electrocardiogram(ECG) and Electrooculography (EOG), but we will focus on the newest technology such as the Brain Computer Interface, which

only really started showing potential in the last decade or so. Neuroscience, which is the study of the nervous system, including the spinal cord, nerves and of course the brain is thought to have started as far back as ancient Egypt. It is this discipline that created the necessary foundations for BCI to grow into what it has become today. Our brain is made up of billions of nerve cells which are called neurons. Neurons have the amazing ability to gather and transmit electrochemical signals. Electroencephalography (EEG) is the recording of this electrical activity and this is what is used in BCI. Every animal has a brain, but the human brain is unique, it gives us a sense of who we are and what we feel. It allows us to think, smell, taste, listen and plan. Generally there are two forms of BCI, invasive and non-invasive. Invasive BCI requires you to have electrodes (which facilitate acquiring the electrical signal) surgically implanted through the skull and onto the brain, in order to monitor the activity. Why do people do this? Well one Myoelectric (EMG) HMI is quite feasible as an interface, and consequently a number of applications have been developed. Most notably as a source of control for a prosthetic limb like an arm or a leg. There are also full bodied exoskeleton suits that can enhance a users strength, such the Human Assisted Limb (HAL) exoskeleton shown in Figure 8a. Just like Camera Gesture recognition there is also EMG Gesture recognition, which can be used as a rich source of input to control a hands free portable music player, it can be used to play guitar hero, control a simulated aero plane or prosthetic hand. Anything you can do with your muscles or your limbs could be converted into an electrically signal and used to control any electrical device. Electrooculography (EOG) - measures eye muscle movements, by placing electrodes above the eye. It can be used for eye tracking, in applications like an EOG-based remote-control TV. It is a very useful technology for providing support to those with disabilities which happen to restrict them from using other HMI devices. EOG can be 8 used to control a wheel chair, to help those who cannot walk, a virtual keyboard which would restore some communication to those who cannot speak, or it has potential applications as a un-obtrusive bionic eye interface, even military potential as a camera control interface on a

robot droid. The last thing to note about Biological signal technology is its not perfect. It is very difficult to get 100Computer based Vision is based on to the HMI.This object shows the detection and the tracking in it relates the gesture control.Though it would be determine the hand, arm, and leg or head motion. It also detects the intent from body language. Those are the criminal might portray before they committing a crime. Before a subside, this device for processing. There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. It includes the whole data of joysticks, graphics tablets, single handed keyboards, a whole range of joy pads and sticks. Another the way of interesting data given which area is of the acoustic HMI technology. It is acoustic myography, which is basically defined as the measuring of the acoustic properties into the biological muscles as they contract. The more a muscle contracts the greater the sound. To simply demonstrate this, put your fingers in your ears and then make a fist, you should just be able to hear a slight.Here is wide range of HMI devices. kitchen appliances, medically devices, manufacturing machinery, entertainment equipment, computer gadgets etc. There is no graphic user with the interface. It was assumed only that the computers made more graphical needs for the mouse arose. When we moved the computer technology, which was started in the 1980.The whole data of the new HMI devices will begin to appear. Motion technology includes all HMI that in some way can detect motion, gyroscopes and accelerometers are the main technologies used. However they are not often used alone, but mostly combined with other sensors. In theory all the previous technologies mentioned can detect some form of motion, and some versions of gyroscopes and accelerometers are actually light based, but in hope of keeping this section as simple as possible, we will define this section as any technology which requires you to physically move part of the hardware and whose primary purpose is in some way to detect motion.

Chapter 4

Tank System Simulation Using DSC Module

Work no. 1 :- New Project Library Creation :- In this work, we will learn creating new labview project. We will also learn creating project library. This project includes shared variables and project libraries. it also includse VI files.All are in same window. Labview project file includes VIs,shared variables,palette file,defiition types. Steps to create a labview project library:- In Getting Started Window, click on the empty project. It will show the Project Explorer Window. In the Project Explorer Window right click on My Computer.Select new library option. Select your file.And in File menu Save All. It will show Project dialogue box.Give the file name as 'Tank System'. Then press OK. It will show Project dialogue box.Give the file name as 'Tank System IO Server'. Then press OK.

Now,you have a project containing a project library. In Then next work, you will use the project library to create a periodic I/O server. Work no. 2 :- Periodic I/O Server Creation :- In this work, we will learn creating Periodic I/O Server. Server is an application which writes the data to the devices. It uses PLCs, input devices,output devices and Shared Variables. Steps to add the

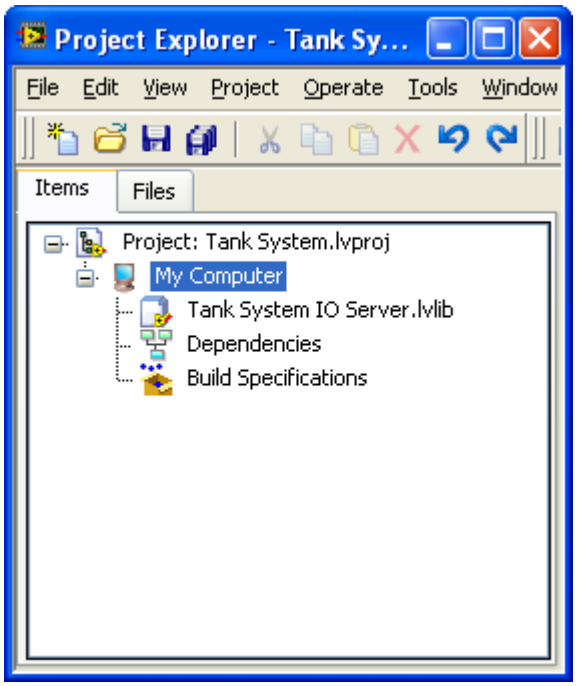

Figure 4.1: Tank System Project

periodic I/O server to the project:- In the Project Explorer window right-click on the Tank System IO Server.lvlib project library. Select new I/O Server from shortcut menu. It will show New I/O Server dialog box.

From the I/O Server Type list Select Custom VI Periodic. Click the Continue button. It will show the configure Custom VI Periodic I/O Server dialog box. Press New button to display the Custom VI-based Server Periodic Wizard. Choose DSC Tank Simulator.vi. Press the Next button in the Custom VI-based Server Periodic Wizard. Choose Controls and Indicators.

Here select Controls and Indicators to publish as shared variables. Remove the checkmark in Controls list. Publish the remaining controls and indicators. Click the Next button. Press the key Stop the following While Loops. Put a tick in the While Loop checkbox. Click the Next button. Now, Configure The

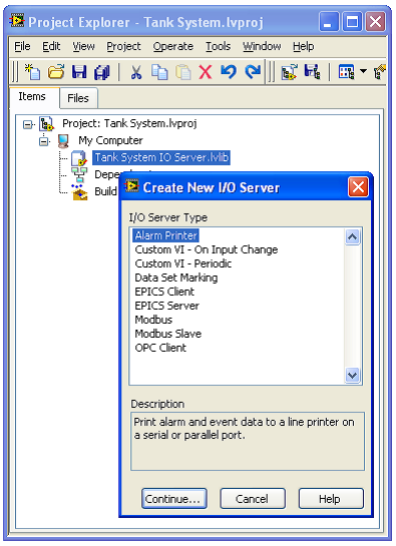

Figure 4.2: Tank System IØServer

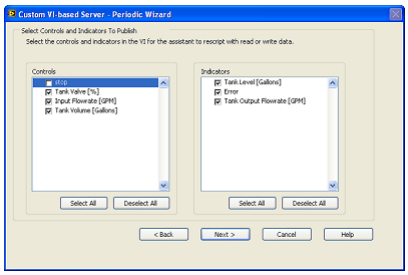

Figure 4.3: Tank System Periodic Wizard

Server Distribution Component step. Put default option. Click next. It will show the Server Distribution Component page. Now Custom VI-based Server Periodic Wizard will create. Press Build button. It will show the Build status dialog box. It makes a VI template file, a registration VI, and a support DLL and VIs.

Press Ok. Labview includes the periodic I/O server to the Tank System IO Server project library. Press the Custom VI Periodic1 item in the Project Explorer window. Press Rename. Name the periodic I/O server Tank1. It will show the Project Explorer window.

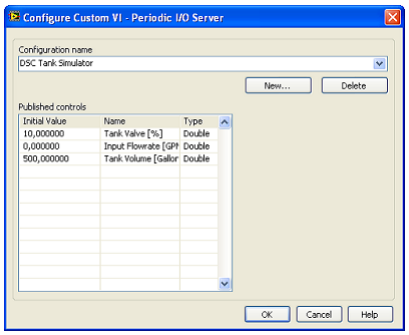

Figure 4.4: Tank System Periodic IØServer

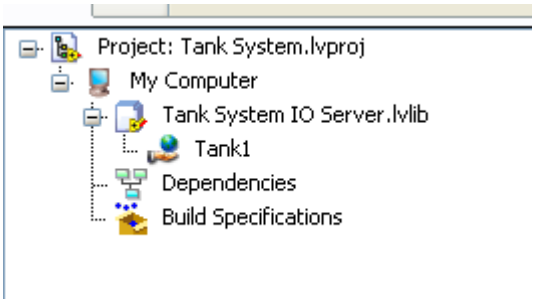

Figure 4.5: Tank System Project and Library

Work no. 3:- The Periodic I/O Server Deployment:- Now , the user can deploy the periodic I/O server. The data items in the Periodic I/O server are available from VIs. In this work user can deploy the periodic I/O server.The user can view the periodic I/O server data in the Shared Variable Monitor. The periodic I/O server runs continuously until the user undeploy. The Deployment library contains the I/O server. The following are the steps to deploy the periodic I/O server and view the real time data. Click on the Tank System IO Server.lvlib project library in the My Computer item. Choose Deploy All to deploy the project library. Press the Done button to close the Deploy dialog box when the deployment is complete. Select Tools button and choose Distributed System Manager option in that.

Expansion of the Tank System periodic IO Server and chooseTank1 in the left panel. Observe that the controls and indicators of the periodic I/O server appears. Now the user has deployed the project library. The PeriodicbI/O server

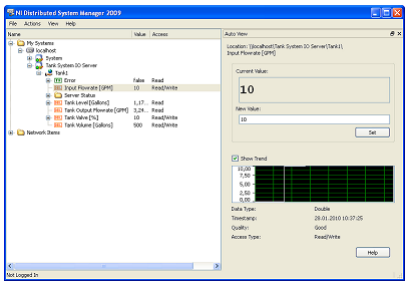

Figure 4.6: Tank System NI DSM

is running. Each and every control and indicator is assumed as I/O data item. Press the Tank1.Input Flow Rate [GPM] control. Press the value as 20.Press the OK button.Observe the values of Tank1.Tank Level [Gallons] and Tank1.Tank Output Flowrate [GPM] will start increasing. Now Close the Distributed System Manager. The periodic I/O server will run continuously. Work no. 4:- Shared Variables Creation :- In this work the user will add the shared variables. It represent the data items in the periodic I/O server from the Tank System Shared Variables. The following are the steps to add the Tank System Shared Variables into the Tank System project. Click on the My Computer in the Project Explorer window.Choose new option and then press library. Click on the new project library you have created. Choose Create Bound Variables from the menu which displays the Create Bound Variables dialog box on the screen. Choose Network Items. Make the Tank System IO Server expansion into the Tank1 in the Network tree. The shared variables will appear into the Tank1. Choose the shared variable with the data type DBL. Press the Add button to add each variable. Press the OK button. The Create Bound Variables dialog box closes. The shared variables will appear in the Multiple Variable Editor window. Press the Done button. Close the Multiple Variable Editor window. Choose File menu and select Save All in the Project Explorer. The Name will ask in the project library. Enter the name of library asTank System Shared Variables . Press OK button. Labview shows the shared variables in the Tank System Shared Variables project library.

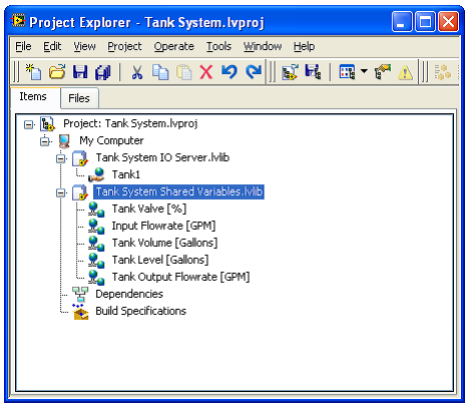

Figure 4.7: Tank System with Shared Variables

Work no. 5:- Data Logging configuration :- As the user adds the logging to the shared variable, the DSC Module will log the shared variable data.It also adds the shared variable value, and the quality of the value. The DSC Module will logs all the given data into the Citadel database. The following are the steps to add logging for the Tank Level [Gallons] shared variable. Press on to the Tank System Shared Variables.lvlib project library. Choose the Multiple Variable Editor option in that. Put the following values and check marks for the Tank Level [Gallons] shared variable into the Multiple Variable Editor:

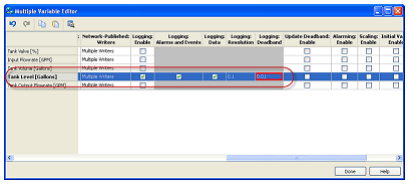

Figure 4.8: Tank System Data Logging Configuration

Work no. 6:- Alarm Configuration :- The alarm is consider as an abnormal condition on to the shared variable.It is the user-defined condition.The alarm happens if the shared variable value increases above the defined alarm limits.The shared variable has bad status. In this work the user will add an alarm for the Tank Level [Gallons] shared variable. Put the following values of the

Tank Level [Gallons] shared variable into the Multiple Variable Editor:

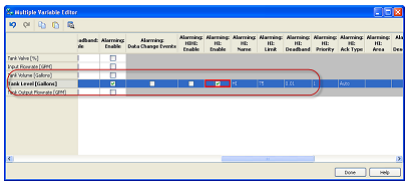

Figure 4.9: Tank System Alarm Configuration

Work no. 7:- Enable the Logging into the Tank System:- The following are the steps to enable the data logging.This work also adds the alarm and event logging for the Tank System Shared Variables into the given project library. Press the Tank System Shared Variables.lvlib project library in the Project Explorer window.Choose the option Properties from the given menu. It will show the the Project Library Properties dialog box. Choose the DSC Settings option in that. It will show the Database from the Category list. Observe that the options in the DSC Settings are the same as the Database page.

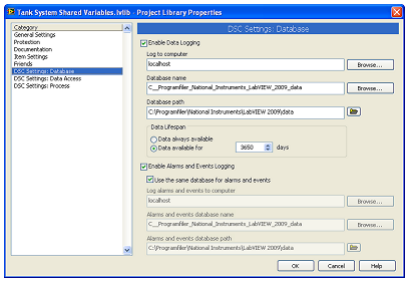

Figure 4.10: Tank System Enabling Logging

The user will turn on the Data Logging enabling into the project library. Local host will specify the local computer.The user will use the local host instead of the name of the computer.The local host reduces the changes that user must make in case of the user moves this project to the other computer. The Alarms

Enabling and Events Logging option turns on event logging for the project library. The Use the same database for alarms and events option ensures that the DSC Module logs alarms and events for this project library to the same database that it logs data. The user can change the Database name that appears on to the Project Library Properties dialog box to the specific name or descriptive name. Work no. 8:- Labview application Creation:- In this work the user will create a VI to display data on to the front panel. The user do not require to make the block diagram. The following are the steps to create a front panel and block diagram to display the data items in the periodic I/O server. Press My Computer in the Project Explorer window. Choose the New option and sub option VI from the displayed menu. A new VI front panel and block diagram window will appear. Choose the Tank Level [Gallons] shared variable from the Tank System Shared Variables.lvlib project library. The Project Explorer window will be drag on to the shared variable onto the front panel. The shared variable will appear as the numeric control. Observe that the triangle is appeared next to the control. The triangle will show that this control is already configured as the data binding. Press the Tank Level [Gallons] control. Make it Change to Indicator from the shortcut menu. Press the Tank Level [Gallons] indicator. Choose the option Replace in that. Then select DSC Module. Press theVessels option.And then press Open Tank from the given shortcut menu. Click on to the Tank Level [Gallons] indicator.Choose Properties from the shortcut menu.It will show the The Properties dialog box.Choose the Data Binding tab in the Properties dialog box. Put a checkmark in the Blink while Alarm is On checkbox to configure the control.It will blink when the water level reaches 75. The default alarm the user has set into the Configuration of Alarming section of this document. Input Flowrate [GPM] shared variable: Choose the Input Flowrate [GPM] shared variable from the Tank System Shared Variables.lvlib project library in the Project Explorer window. Then make it drag on to the shared variable onto the front panel. Then press the Input Flowrate [GPM] control. Then Replace it with Num Ctrls in that choose Pointer Slide option. Tank Valve [Choose the Tank Valve [Press the Tank Valve [Choose the

File menu and press Save As. The Name of the VI dialog box appears. Enter Tank System HMI in the File name text box. Click the OK button. Click the Run Continuously button to run the VI. The VI should function in the same way as the example you ran in the first exercise. Below we sew the final Project Explorer:

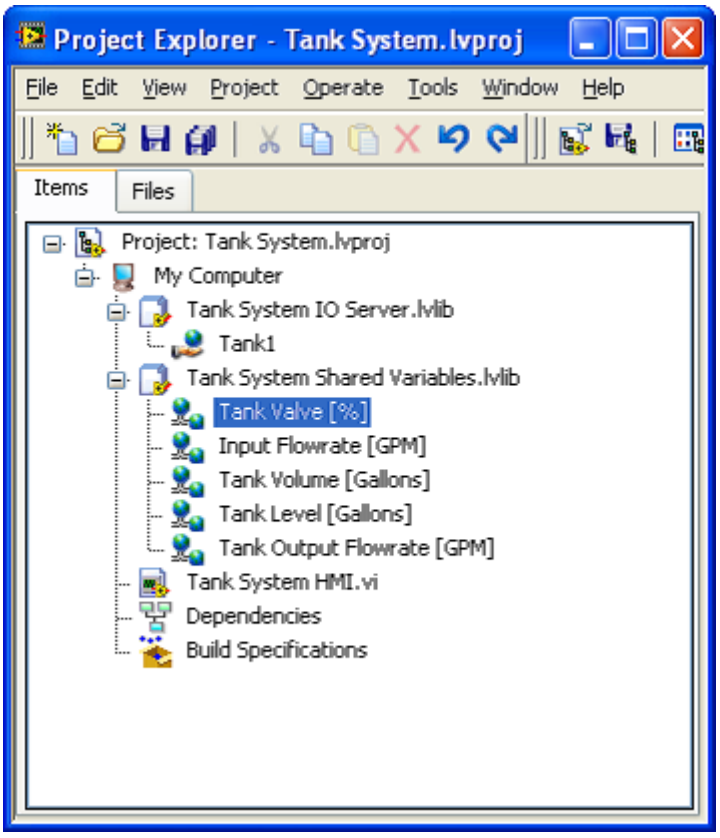

Figure 4.11: Tank System Final Project Explorer

Below we see the final application:

Work no. 9:- Historical Trace and Viewing Real-Time Data:-

Read Historical Data:

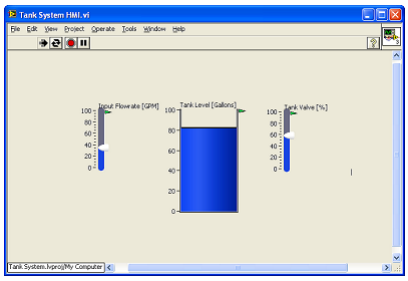

Figure 4.12: Tank System HMI.vi

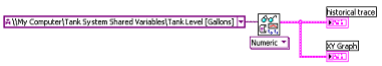

Figure 4.13: Tank System Historic Trace BlockDiagram

Put the waveform chart on to the front panel. Then connect the trend data output of the Real-Time Trend Express VI to the waveform chart on the block diagram. Put a While Loop around the waveform chart and Express Real-Time Trend control. Run the VI.

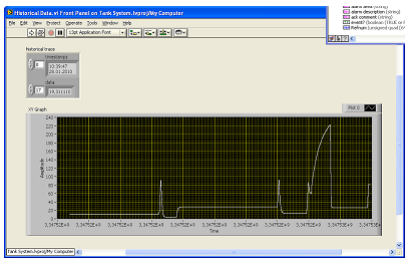

Figure 4.14: Tank System Historical Data.vi

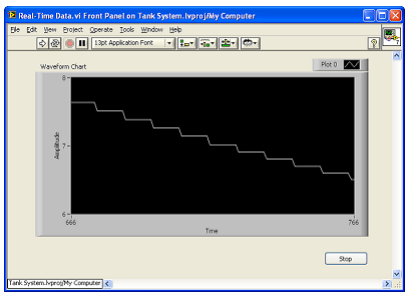

Figure 4.15: Tank System RealTimel Data.vi

Chapter 5

HARDWARE IMPLEMENTATION

5.1 Circuit Conections

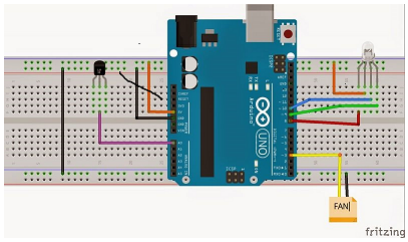

Figure 5.1: Circuit Diagram

The connections of LM-35 and RGB LED with the arduino board are shown in above figure. All the ground points are made common. And all the supplies are made common. The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a temperature sensor which is used to measure the precise temprature. The temprature is measured in degree celsius. The LM-35 sensor is sealed so that oxidation process and other environmental affects

do not take place.Using this sensor, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air. When you use RGB Color Changing LED Lights, you no longer have to decide which color to use. You can either allow the lights to cycle through a continuous color changing pattern, or stop the controller at any color you like. The possibilities are endless. Change your color scheme with the seasons, or simply at your whim with RGB Color Changing LED lights. RGB LED products contain red, blue and green LED's. As you can see in the image at left, blue and green combine to produce turquoise, green and red combine to produce yellow, red and blue combine to make violet, red, green and blue combine to make white. There are literally more than 16,000,000 possibilities with the more sophisticated controllers. Some RGB products, like our simple and easy to use color changing LED light bulb, do not require a controller. You use the remote control instead. See how the colors perform in an RGB color changing light bulb.

5.2 Temprature sensor LM-35 RGB LED

LM-35 Temperature Sensor:- The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air.

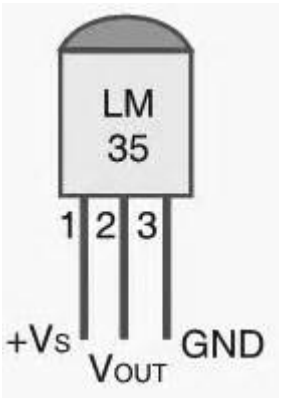

Figure 5.2: LM-35 Sensor

The operating temperature range is from -55C to 150C. The output voltage varies by 10mV in response to every oC rise/fall in ambient temperature; its scale factor is 0.01V/ oC.The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a temperature sensor which is used to measure the precise temprature. The temprature is measured in degree celsius. The LM-35 sensor is sealed so that oxidation process and other environmental affects do not take place.Using this sensor, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air. When you use RGB Color Changing LED Lights, you no longer have to decide which color to use. You can either allow the lights to cycle through a continuous color changing pattern, or stop the controller at any color you like. The possibilities are endless. Change your color scheme with the seasons, or simply at your whim with RGB Color Changing LED lights. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical

accuracies of 14C at room temperature and 34Cover a full 55 to +150C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35s low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 A from its supply, it has very low self-heating, less than 0.1C in still air. The LM35 is rated to operate over a 55 to +150C temperature range, while the LM35C is rated for a 40 to +110C range (10 with improved accuracy). The LM35 series is available pack aged in hermetic TO-46 transistor packages, while the LM35C, LM35CA, and LM35D are also available in the plastic TO-92 transistor package. The LM35D is also available in an 8-lead surface mount small outline package and a plastic TO-220 package. The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to it. The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a precision IC temperature sensor with its output proportional to the temperature (in oC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air. The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a temperature sensor which is used to measure the precise temprature. The temprature is measured in degree celsius. The LM-35 sensor is sealed so that oxidation

process and other environmental affects do not take place.Using this sensor, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air. When you use RGB Color Changing LED Lights, you no longer have to decide which color to use. You can either allow the lights to cycle through a continuous color changing pattern, or stop the controller at any color you like. The possibilities are endless. Change your color scheme with the seasons, or simply at your whim with RGB Color Changing LED lights. The connections of LM-35 and RGB LED with the arduino board are shown in above figure. All the ground points are made common. And all the supplies are made common. The LM35 is a sensor that varies its output voltage proportionally to the temperature and its specially designed for the Celsius scale. The limits of what it can sense are from -55C to 150C. LM35 is a temperature sensor which is used to measure the precise temprature. The temprature is measured in degree celsius. The LM-35 sensor is sealed so that oxidation process and other environmental affects do not take place.Using this sensor, temperature can be measured more accurately than with a thermistor. It also possess low self-heating and does not cause more than 0.1 oC temperature rise in still air. When you use RGB Color Changing LED Lights, you no longer have to decide which color to use. You can either allow the lights to cycle through a continuous color changing pattern, or stop the controller at any color you like. The possibilities are endless. Change your color scheme with the seasons, or simply at your whim with RGB Color Changing LED lights. RGB LED products contain red, blue and green LED's. As you can see in the image at left, blue and green combine to produce turquoise, green and red combine to produce yellow, red and blue combine to make violet, red, green and blue combine to make white. There are literally more than 16,000,000 possibilities with the more sophisticated controllers. Some RGB products, like our simple and easy to use color changing LED light bulb, do not require a controller. You use the remote control instead. See

how the colors perform in an RGB color changing light bulb. Features:- Suitable for Remote Applications Calibrated directly in Celsius (Centigrade) Linear + 10.0 mV/C scale factor 0.5C accuracy guarantee able (at +25C) Rated for full 55 to +150C range Suitable for remote applications Low cost due to wafer-level trimming n Operates from 4 to 30 volts Less than 60 A current drain Low self-heating, 0.08C in still air Nonlinearity only 14C typical Low impedance output, 0.1 for 1 mA load.

RGB LED:- A light-emitting diode (LED) is a two-lead semiconductor light source. It is a pn junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. An LED is often small in area (less than 1 mm2) and integrated optical components may be used to shape its radiation pattern. LEDs have allowed new text, video displays, and sensors to be developed, while their high switching rates are also used in advanced communications technology. The LED consists of a chip of semiconducting material doped with impurities to create a p-n junction. As in other diodes, current flows easily from the p-side, or anode, to the n-side, or cathode, but not in the reverse direction. Charge-carrierselectrons and holesflow into the junction from electrodes with different voltages. When an electron meets a hole, it falls into a lower energy level and releases energy in the form of a photon. Most materials used for LED production have very high refractive indices. This means that much of the light will be reflected back into the material at the material/air surface interface. Thus, light extraction in LEDs is an important aspect of LED production, subject to much research and development. White light can be formed by mixing differently colored lights; the most common method is to use red, green, and blue (RGB). Hence the

method is called multi-color white LEDs (sometimes referred to as RGB LEDs). Because these need electronic circuits to control the blending and diffusion of different colors, and because the individual color LEDs typically have slightly different emission patterns (leading to variation of the color depending on direction) even if they are made as a single unit, these are seldom used to produce white lighting. Nonetheless, this method has many applications because of the flexibility of mixing different colors and in principle; this mechanism also has higher quantum efficiency in producing white light. Multi-color LEDs offer not merely another means to form white light but a new means to form light of different colors. Most perceivable can be formed by mixing different amounts of three primary colors. This allows precise dynamic color control. As more effort is devoted to investigating this method, multi-color LEDs should have profound influence on the fundamental method that we use to produce and control light color. However, before this type of LED can play a role on the market, several technical problems must be solved. These include that this type of LED's emission power decays exponentially with rising temperature, resulting in a substantial change in color stability. Such problems inhibit and may preclude industrial use. Thus, many new package designs aimed at solving this problem have been proposed and their results are now being reproduced by researchers and scientists. RGB LED products contain red, blue and green LED's. As you can see in the image at left, blue and green combine to produce turquoise, green and red combine to produce yellow, red and blue combine to make violet, red, green and blue combine to make white. There are literally more than 16,000,000 possibilities with the more sophisticated controllers. Some RGB products, like our simple and easy to use color changing LED light bulb, do not require a controller. You use the remote control instead. See how the colors perform in an RGB color changing light bulb. RGB LED products contain red, blue and green LED's. As you can see in the image at left, blue and green combine to produce turquoise, green and red combine to produce yellow, red and blue

combine to make violet, red, green and blue combine to make white. There are literally more than 16,000,000 possibilities with the more sophisticated controllers. Some RGB products, like our simple and easy to use color changing LED light bulb, do not require a controller. You use the remote control instead. See how the colors perform in an RGB color changing light bulb.

Figure 5.3: RGB LED

When you use RGB Color Changing LED Lights, you no longer have to decide which color to use. You can either allow the lights to cycle through a continuous color changing pattern, or stop the controller at any color you like. The possibilities are endless. Change your color scheme with the seasons, or simply at your whim with RGB Color Changing LED lights. RGB LED products contain red, blue and green LED's. As you can see in the image at left, blue and green combine to produce turquoise, green and red combine to produce yellow, red and blue combine to make violet, red, green and blue combine to make white. There are literally more than 16,000,000 possibilities with the more sophisticated controllers. Some RGB products, like our simple and easy to use color changing LED light bulb, do not require a controller. You use the remote control instead. See how the colors perform in an RGB color changing light bulb.

5.3 Labview Code

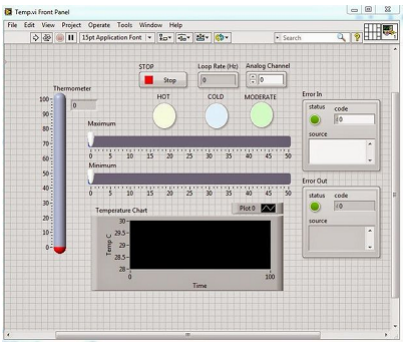

Figure 5.4: Labview FrontPanel

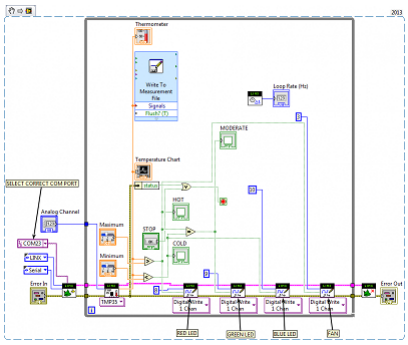

Figure 5.5: Labview BlockDiagram

5.4 ARDUINO Code

Float tempC; Int tempPin = 0; Int redPin= 8; Int greenPin= 9; Int bluePin= 10; Int blueTemp= 0; Int greenTemp= 0; Int redTemp= 0; Void setup () Serial.begin (9600); Void loop () TempC = analogRead (tempPin); TempC = (5.0 * tempC * 100.0)/1024.0; Serial.println ((byte) tempC); If (tempC¡0) AnalogWrite (bluePin, 255); Else if (tempC¿0tempC¡=45) BlueTemp= map (tempC, 0, 45, 255, 0); AnalogWrite (bluePin, blueTemp); Else if (tempC¿45) AnalogWrite (bluePin, 0); If (tempC¡15) Analog-Write (greenPin, 0); Else if (tempC¿15tempC¡=35) GreenTemp = map (tempC, 15, 35, 1, 254); AnalogWrite (greenPin, greenTemp); Else if

(tempC¿35tempC¡=75) GreenTemp = map (tempC, 35, 75, 255, 0); Analog-Write (greenPin, greenTemp); Else if (tempC¿75) AnalogWrite (green-Pin, 0); If (tempC¡45) AnalogWrite (redPin, 0); Else if (tempC¿=45) RedTemp= map (tempC, 45, 90, 1, 255); AnalogWrite (redPin, redTemp); Else if (tempC¿90) AnalogWrite (redPin, 255); Delay (200);

5.5 OUTPUT

The blue led will be at maximum brightness if the temperatures drop below 0C, and will gradually decrease in intensity from 0C to 45C. The green led will increase its brightness from 15C to 35C and then will gradually decrease until 75C. The red led will increase its brightness from 45C to 90C, and will stay lit after 90C.

Chapter 6

CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

OPC is a technology in which we use Robust Modern communication. Robust Modern communication is an open and reliable communication which is free from the technical and commercial restrictions.Opc technology requires the set up of data socket and its control lists.Opc technology also requires ease of use of opc failures list.This paper shows the data socket usage in opc technology.Opc technology is available on each and every application.The opc technology can be interfaced with the SCADA,HMI and custom software packages.Opc server write to the particular device and Opc client read from the particular device.Opc technology is based on Microsoft technology to communicate between server and client.COM technology allows the real time data exchanging between software and hardware.

6.2 FUTURE WORK

The OPC is an United Architecture which combines XML-web services should solve performance issue, like large size of its messages and the real time application usages,which will replace the COM technology as well as DCOM technology in near future.It provides to control the process from bottom line to business line.It will solve the Computer Maintenance Management Systems (CMMS).It will improve the Enterprise Resource Planning (ERP). And Enterprise Asset Management (EAM) issue will be solved. The beginning problems are Security and Redundancy considered.The current OPC technology when combines with new research,it will bring the highest potential in the area of OPC technology.

Chapter 7

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