Perspectives in Communication, Embedded-Systems and Signal-Processing (PiCES) – An International Journal
ISSN: 2566-932X, Vol. 1, Issue 11, February 2018
Proceedings of National Conference on Emerging Trends in VLSI, Embedded and Networking (NC-EVEN 17), May 2017

Test System Development Using Visual Basics 06 For Metering Products

Manjula G
Associate Professor, Department of TCE, GSSSIETW, Mysuru

Arpitha D R, Ashwini B, Kruthika Narayan, Tejaswini P
Student, BE, Department of TCE, GSSSIETW, Mysuru

Abstract: System testing of software or hardware is conducted on a complete integrated system to evaluate the system's compliance with its specified requirements. The key factors to consider when designing a test system are choosing the level of automated control and planning for future needs. Here software is developed into different modules and each module is unit tested and which in turn integrated for integration testing. By considering the test system cost as driving factor it is important to make sure that a new system can use an existing software. This project is mainly working with Microsoft visual studio.net.

Keywords: Metering Products; Visual Basics

I. INTRODUCTION

An electricity meter or energy meter is a device that measures the amount of electric energy consumed by residents, business, or an electrically powered devices. Electricity meters are typically calibrated in billing units, the most common one being the kWh. Periodic readings of electricity meters establish billing cycles and energy used during the cycle. There are 3 types of meter that are currently in the market -

1) Electromechanical meters

2) Electronic meters

3) Smart meters

Fig 1. Electronic meter

Test system is developed using visual studio 2015 in order to provide a testing environment where the meter is tested for its performance and units consumed. Accordingly the tariff is calculated. Choosing the test system software helps us to choose the direction for software based on the application. It explores the entire software development process, from gathering and documenting software requirements through design reuse considerations.

In test system development the first step is to develop a system test plan which varies from organization to organization and depends upon on the test strategy. System test plan includes goals, objectives, scope, roles and responsibilities. Secondly is to create test cases. Test data is created and then test is executed. There are certain system testing approaches:

a) Unit Testing: When code is written for project modules, it is tested at the unit level. Since this testing requires knowledge of code therefore it is known as white box testing and usually carried out by the developer.

b) Integration Testing: Unit tested modules are integrated to form a system, in this testing compatibility of modules are tested i.e. whether they are working as expected when integrated together or not.

c) System Testing: System testing is also known as black box Testing and it is conducted to test the functionality of the system that it is behaving as expected.

d) Acceptance Testing: Once system is ready, it undergoes testing by end user or client to verify it meet the user expectations and all desired functionalities.

Textual software generally provides an effective programming environment for manufacturing test, as it enables the engineer to extract the highest throughput from the test system. The choice of programming languages may be based primarily on the experience of the programmer. Some find graphical languages such as Agilent VEE or LabVIEW easy to use. Others believe that textual languages such as C++, MATLAB or Visual Basic are easier to use, especially for complex test programs. If it is important to use existing textual test code, then a multi-language development environment like Microsoft visual stutio.NET is definite advantage. Visual studio.NET is a software package designed to full fill the current requirements of the modern meter testing environment. By considering the test system cost as

driving factor, it is important to make sure that a new system can use existing software.

Although test-system development is a complex task that can include many aspects of electronic and mechanical design, following a systematic approach and partnering with quality test equipment manufacturers will enable you to enhance your success while lowering the cost and time it takes to create the test system.

Fig 2. Electric meter

II. LITERATURE SURVEY

From the suppliers point of view the key stages for developing new products includes idea generation concept testing and development of marketing strategy and testing.

1) In the year 2006 "KOLTER"has created a "ZESA"billing section which creates a new product or system that had to pass these stages. The initial stage of the process are critical since they take into the consideration the conceptual issues of the product.

2) In the year 2007 "ADAIR" has invented a new process that successfully brings new ideas , ways of doing things or physical equipment. One such innovation has been introduction of the"pre-paid electricity billing system". At the first electricity customers were enthusiastic about this innovation. On the other hand , suppliers of meters were emphasizing the attractive benefits of installing such pre-paid meters.

3) In the year 2008 "DRANETZ" developed the" ANSI" metering. ANSI stands for "AMERICAN NATIONAL STANDARDS INSTITUTE". ANSI metering standards define the accuracy of the combined meter and transducers among many other items. It consists of two types:

   a) ANSI C12-1-2008 specifies a maximum derivation of 1% to 2% depending on the current being measured and the power factor. A low power factor that allows for a higher derivation from the reference as does a low or high current being measured within the current measurement range.

   b) ANSI C12-2-2010 is more stringent and defines accuracy classes of class 0.2 and class 0.5. class 0.2 meters are allowed up to derivation of+/- 0.2% and class 0.5 meters allowed up to derivation of +/- 0.5%.

4) In the year 2009 "SUBHASIS MAITRA " proposed a new concept of energy meter where maximum demand of energy of a consumers will be indicated in the meter which is used by the customer. After exceeding the maximum demand, the meter and hence the connection will automatically be disconnected by an embedded system inserted in the meter itself.

5) In the year 2010 "JOBBER" adopted different categories of pre-paid meters which includes innovators early adopters ,early majority ,late majority and laggards. The advantages of these adopted innovators benefit much and in case the product is useful of weakness and laggards will be safe.

6) In the year 2012 "PURNIMA,S.R.N. REDDY " proposed the concept of GSM Bluetooth based remote control and monitoring system with automatic system. It has advantage of both GSM and Bluetooth technology and the sensors and devices are controlled by both by using Bluetooth within a limited range.

7) In the year 2013 "P.RAKESH MALHOTRA ,DR. R SEETHALAKSHMI " has proposed a paper which deals with automatic meter reading and theft control system in energy meter. Current transformer is used to measure the total power consumption for house or industrial purpose. This recorded reading is transmitted to the electricity board for every 60 days once by using GSM system. Energy meter is a device that calculates the cost of electricity consumed by a home, business, or electrically powered device. In this project our meter box made of current transformer, IR sensor and magnetic reed switch. According to the energy meter calculates the reading with the help of the current transformer [2] [1] . IR sensor and magnetic reed switch are used to detect the theft in energy meter.

8) In the year 2014 "E MONI SILVIYA ,K MEENA VINODHINI" has proposed a system which measure the current consumption unit through IR sensor unit using a GSM technology. This technology used in Industrial control, Medical systems, Access control, Point-of-sale, Communication gateway, Embedded soft modem, General purpose applications.

   For measuring the usage of the consumption of energy electronic meter or electromechanical meter is fixed in existing system. Currently the meters take the recording kWh units. There are many AMR systems which are based on GPRS, Bluetooth, and GSM technology.

9) In the year 2015 "R.E OKONIGENE" examines the inadequacies involved in the manual method of record keeping and computation of grading point average (GPA) and proposes a solution by developing a software system using MIRCOSOFT(MS) and VISUAL BASICS 06 (VB). This software was developed and tested with respect to the peculiar situations.

10) In the year 2011, International online measurement and management of energy meter through advanced wireless network: Author Tannoy Maity and Partha Sarathi Das used an energy chip to develop a improved energy meter solution, where automating the progression of measurement through digital wireless communication technique was adopted to get the above benefits along with smooth control. It calculates total average active power.

11) In the year 2012, Development of embedded software for flaw station metering using VB.net : F.K Opara and GN Olrorafor presented a case study of converting an old pneumatic metering system of a flaw station to a new system for digital display on a large screen. An analysis of the existing instrumentation system was carried out and appropriate hardware and software platforms were selected. The system software was developed with MS. The software system was tested and the result was successful and satisfactory.

12) In the year 2015, Grade processing system using visual basic 6.0: Kansham and Ningthajam Sanjith presented how to develop software for grading system in Microsoft VB 6.0 programming language. This paper uses Microsoft access as back-end and graphical user interface design in VB as front-end.

13) In the year 2013, Big data, smart energy and predictive analystics: Rosaria Silipa and Philip Winters presented the concept of big data as the availability of massive time-based or telemetry data. With the appearance of low cost capture and storage devices it has now become possible to get detailed data to be used for further analysis. Nowadays time streaming data can be recorded from almost any device calling for interpretation to know more about underlying system.

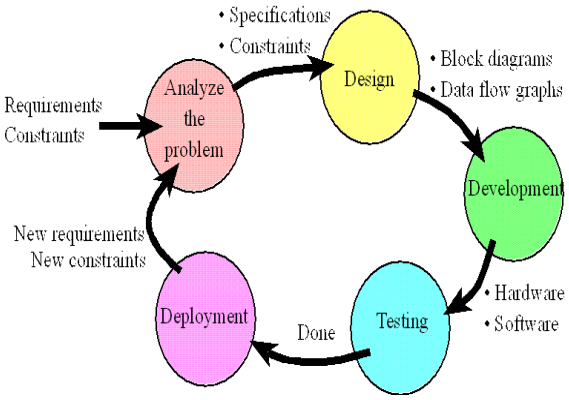
14) In the year 2011, A high accuracy standard for electricity meters by Lance. A Irwin: Increasing price of energy and public pressure to reduce Carbon emissions had lead utilities to increase energy efficiency efforts. Accuracy is perhaps the most important attribute for high-end metering.

15) In the year 2011, smart meters and smart meter systems by Ellery. E from Edison Electric Institute: Smart meters are electronic measurement devices used by utilities to communicate information for billing and operating their electric system. For over fifteen years electric meters have been used effectively by utilities' in delivering accurate billing data for at least a portion of their customers. Initially the use of this technology was applied to commercial and industrial customers due to need for more sophisticated rates and more granular billing data requirements.

16) In the year 2012, Dynamic Testing by Raymond. J and Jim. H. Smith and Nicol. L. Gailey: Dynamic testing is an important step in the manufacturing of ultrasonic meters for custody transfer and other high accuracy petroleum applications. By utilizing a multiple product, high accuracy test system and a proper test program a meter's performance can be simulated over a wide flow and viscosity operating range.

Visual studio is the existing test code and preferable for complex test code. It has more advantages when compared to other languages.

III. PROPOSED WORK



Considering the development of the test system there are 5 steps. First is to analyze the problem based on required constraints. Secondly design is done through block diagrams and flow charts. Software selection is done. Test system development involves both hardware and software. The testing and deployment is done. Based on the new constraints and requirements again the test system cycle repeats.

Microsoft Visual Studio is an integrated development environment (IDE) from Microsoft. It is used to develop computer programs for Microsoft words, as well as web sites, web apps, web service and mobile apps. Visual Studio uses Microsoft software development platforms such as windows apps, windows forms. It can produce both native code and managed code.

Visual Studio includes a code editor supporting intelligence as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a code profiler, forms designer for building GUI applications, web designer, class designer, and database schema designer. It accepts plug-ins that enhance the functionality at almost every level—including adding support for source control systems and adding new toolsets like editors and visual designers for domain-

specific languages or toolsets for other aspects of the software development cycles.

Like the BASIC programming language, Visual Basic was designed to accommodate a steep learning curve. Programmers can create both simple and complex GUI applications. Programming in VB is a combination of visually arranging components or controls on a form, specifying attributes and actions for those components, and writing additional lines of code for more functionality. Since VB defines default attributes and actions for the components, a programmer can develop a simple program without writing much code. Programs built with earlier versions suffered performance problems, but faster computers and native code compilation has made this less of an issue. Though VB programs can be compiled into native code executables from version 5, they still require the presence of around 1 MB of runtime libraries. Core runtime libraries are included by default in windows 2000 and later, but extended runtime components still have to be installed. Earlier versions of Windows (95/98/NT), require that the runtime libraries be distributed with the executable.

IV. RESULT

Meter is tested by using anomaly, data statics, current voltage, frequency status .After testing these parameters we came to know whether the meter is working or not.

V. CONCLUSION

Before the meter was tested by using manual testing method in which it consumes more time and the efficiency is less. In our project we are using visual studio which is an automated or semi-automated testing in which it consumes less time and the efficiency is more. Parallel execution is done in visual studio.

REFERENCES

[1] Amin S. Mehmood, T. Choudhry, M.A. Hanif, "A Reviewing the Technical Issues for the Effective Construction of Automatic Meter Reading System" in International Conference on Microelectronics, 2005 IEEE.

[2] Abdollahi, A. Dehghani, M. Zamanzadeh,"SMS-based Reconfigurable Automatic Meter Reading System" in Control Applications, 2007.

[3] Bharath, P.; Ananth, N.; Vijetha, S.; Prakash, K.V.J.; "Wireless Automated Digital Energy Meter" in Sustainable Energy Technologies, ICSET 2008.

[4] Vinu V Das, "Wireless Communication System for Energy Meter Reading" in International Conference on Advances in Recent Technologies in Communication and Computing, 2009.

[5] Dr. Mohd Yunus B Nayan1, Aryo Handoko Primicanta "Hybrid System Automatic Meter Reading" in Proceeding of the International Conference on Computer Technology and Development, 2009.

[6] Syed Shahbaz Ali, Madiha Maroof, Sidrah Hanif "Smart Energy Meter for Energy Conservation and Minimizing Errors" in International Conference on Power Electronics, 2010.

[7] Xiujie Dong, Yan Yang, You Zhou "The Design of Wireless Automatic Meter Reading System Based on SOPC" in WASE International conference on Information Engineering, 2010 IEEE.

[8] Young Hoon Lim, Moon Suk Chain, Jong Mock Baek, Sang-Yeom Lee "An An Efficient Home Energy Management System Based on Automatic Meter Reading" in IEEE International Symposium on Power Line Communication, 2011.

[9] S. Arun; Dr, Sidappa Naidu, "Design and Implementation of Automatic Meter Reading System Using GSM, ZIGBEE through GPRS" in international journal of advanced research in computer science software engineering , 2012.

[10] Abhinandan Jain, Dilip Kumar, Jyoti Kedia, ''Design and Development of GSM based Energy Meter'' in IJERT, 2012.