PROFILE OF AUTOMATION OF ELECTRICITY DISTRIBUTION SYSTEM BHAYANGKARA UNIVERSITY SURABAYA

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ABSTRACT

Electrical Power Transmission is the process of distributing electricity from the power plant to the electricity distribution channel (substation distribution) so that it can be distributed to consumers who use electricity. Human Machine Interface (HMI) is a system that connects humans and machines. HMI can be in the form of controlling and visualizing status, either manually or through computer visualization that is real time. .Microsoft Visual Basic .NET is a tool for developing and building applications that run on top of the .NET Framework system. Arduino is a microcontroller that has been developed. Serial communication is one of the methods of data communication in which only one bit of data is transmitted over a strand of cable at a time.

Keywords: *Electrical power transmission, HMI, Visual Basic .Net, Arduino, Serial Communication*

1. INTRODUCTION

In this growing industrial world Power transmission is the most important component. This power transmission is used for distribution of electric power to the distribution panel and then distributed to consumers and HMI (Human Machine Interface) is needed for the process of controlling and monitoring a system or tool. Supporting tools also vary, such as Arduino microcontrollers and PLC (Programable Logic Controller) with serial communication, which can be controlled easily and the process of sending data quickly.

There are many ways to create software, one of which is using Visual Basic Net. With Net Framework-based software, it makes it easy for users to build software with a very good GUI and software reliability.

There are various ways to connect a software with hardware, one of which is using serial communication. Serial communication is very popular and mostly in the industrial world.

2. LITERATURE REVIEW

2.1 Electric Power Transmission

Is the process of distributing electricity from the Power Plant to the substation distribution so that it can be distributed to consumers who use electricity. In the context of this discussion, what is meant by transmission is the distribution of electrical energy so that it has electricity, the purpose of the process and how to distribute electrical energy from one place to another, for example: From power plants to main substation. From one main substation to another. From main substation to medium voltage grid and distribution main substation.

Basic Provisions of Electric Power System. Provide at all times, electric power for consumer needs.

Maintain the stability of the voltage value, which is not more than ±10% tolerance.

Maintain frequency stability, which is no more than ±0 1Hz tolerance.

The price is not expensive (Efficient).

Safety standards.

Respect for the environment.

2.2 Visual Basic Net

Microsoft Visual Basic .NET is a tool for developing and building applications that run on the .NET Framework system, using the BASIC language. Using this tool, programmers can build Windows Forms applications, ASP.NET-based web applications, as well as command-line applications. This tool can be obtained separately from some other products (such as Microsoft Visual C++, Visual C#, or Visual J#), or it can also be obtained integrated in Microsoft Visual Studio .NET. .NET itself adheres to an object-oriented programming language paradigm that can be seen as an evolution of the previous version of Microsoft Visual Basic which was implemented on top of the .NET Framework. Its release caused controversy, considering the many changes made by Microsoft, and this new version is not compatible with the previous version.

2.3 Advance Installer

Advanced installer is the latest software to create installer files easily. This software is perfect for friends who like to create programs or software, but the program can only be run portable. Besides being able to create Installers, this Advanced Installer software can also be used to create Java, Update Patches, Add Ins, Merge Modules, and others.

Figure 2.1 Software Advance Installer

2.4 Microsoft Office Access

Microsoft Access (or Microsoft Office Access) is a relational computer database application program intended for homes and small to medium-sized companies. This application is a member of several Microsoft Office applications, besides of Microsoft Word, Microsoft Excel, and Microsoft PowerPoint. This application uses the Microsoft Jet Database Engine, and also uses an intuitive graphical interface to make it easier for users.

Microsoft Access can use data stored in Microsoft Access, Microsoft Jet Database Engine, Microsoft SQL Server, Oracle Database, or any database container that supports the ODBC standard. Proficient users/programmers can use it to develop complex application software, meanwhile less proficient programmers can use it to develop simple application software. Access also supports object-oriented programming techniques, but cannot be classified as object-oriented programming tools.

2.5 Arduino Uno

Arduino is an open-source single-board micro controller, derived from the Wiring platform, designed to facilitate the use of electronics in various fields. The hardware has an Atmel AVR processor and the software has its own programming language.

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Arduino Uno is an ATmega328 based microcontroller board. The Uno has 14 digital input/output pins (which 6 pins can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. The Uno builds on what it takes to support a microcontroller, power source can be via USB power (if connected to a computer with a USB cable) and also with an adapter or battery.

The Arduino Uno differs from all previous boards in that it does not use the FTDI USB-to-serial driver chip. Otherwise, the Atmega16U2 (Atmega8U2 until version R2) is programmed as a USB-to-serial converter. Revision 2 of the Uno has a resistor pulling the 8U2 HWB connected to Ground, making it easier to use DFU mode.

Figure 2.2 Arduino Uno Microcontroller

Arduino Uno Specifications

Microcontroller	ATmega328
Operating Voltage	5 Volt
Voltage Input	7-11 Volts recommended
Input Limit Voltage	6-20 Volts
Digital I/O Pins	14 (6 can be for PWM)
DC current per pin I/O	50mA
Analog Pins	6
DC current when 3.3V	50mA
Flash Memory	32 KB (ATmega328) and 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 Mhz

2.6 USB 2.0 Type A/B Cable

This cable is used to supply voltage, input the program into the Arduino, and for serial communication.

Figure 2.3 USB2.0 type A/B

2.7 Led

A Light Emitting Diode (LED) is a semiconductor that emits incoherent monochromatic light when a forward voltage is applied. This LED is used as the output media in this mockup software.

Figure 2.4 Led

3. RESEARCH METHODS

In the manufacture of this package, the transmission used is using the ground line. In making this software is using Visual Basic Net. For security, this software uses a login system which is distinguished by 2 accesses, namely access as admin and access as a user who uses Microsoft Office Access with its feature, namely Microsoft Jet Engine, which is accessed by software made by Visual Basic Net.

At the initial stage, designing Login Forms and Forms for controllers and monitoring that exist in Visual Basic Net with Skins so that the GUI Form looks better.

(a)

(b)

Figure 3.1 (a) Login Form (b) Control and monitoring form

After that, making the database using Microsoft office access as security for the software to be made. In making this database, it is equipped with a password to open Microsoft Office Access files.

Figure 3.2 Microsoft Office Access Database

After the database creation is complete, then proceed with writing code on Visual Basic Net. In making this software using parsing data as monitoring and for controlling sending data in the form of strings. To make it easy to communicate with the Arduino microcontroller.

Writing Arduino programming coding with logic reading output pins for monitoring pins that are active and pins that are not active with leds as outputs and logic when the software receives data in the form of strings. Then sent logical data and received data in the form of strings on the software that has been made by debugging on Visual Basic Net for software testing.

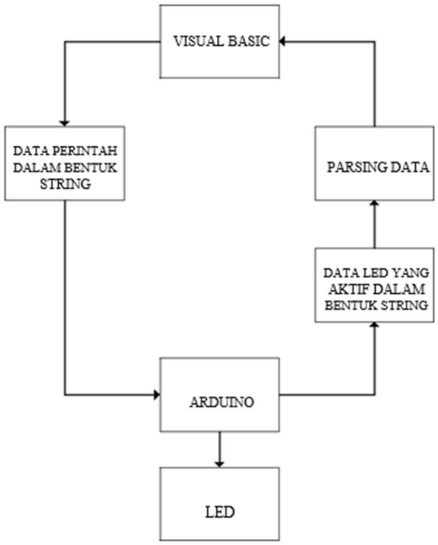

Figure 3.3 Logic Block Diagram

Making installers is very necessary in making software, so that the software can be run by a PC or Laptop. Making this installer using the Advance Installer software and then it will be in the form of an installer with the ".exe" file.

4. RESULTS AND DISCUSSION

The results of making software are required to install software that has been formed by the Software Advance Installer. Control of UPHARA Building Mockups based on MDP (Main Distribution Panel) with LED output as lighting for the building.

For transmission used underground ducting wiring. In this packaging, the wiring is done under the multiplex to make it more efficient.

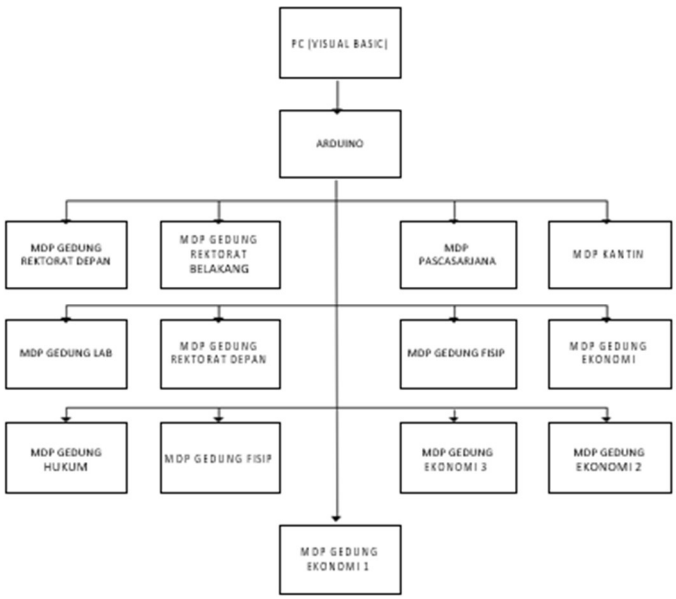

Figure 3.4 Transmission Block Diagram

Figure 4.1 UBHARA Mockup Building

If one of the toggles in the software is pressed, it will turn on the LED according to the toggle that is activated.

Figure 4.2 Controller Toggle

When in the control tab the toggle is activated, it will turn yellow when active and in the monitoring tab in the software it will turn on the text that was previously gray to green when active. To make it easier for users to do monitoring and controlling.

(a)

(b)

Figure 4.3 (a) Control tab when Toggle is active (b) Monitoring tab when the LED on Arduino Microcontroller is active

Adding users, editing users and deleting users can be done in software that has been integrated with Microsoft Office Access. So that the user does not need to open the database file in Microsoft Office Access.

Figure 4.4 User Tab

The information tab section contains information on how to use the software functions of each tab, and for the Coding tab section there is a coding listing for Arduino to anticipate if the Arduino is damaged and requires a new Arduino. Users can use the code.

Figure 4.5 Information Tab

Figure 4.6 Coding Tab

5. CONCLUSIONS AND SUGGESTIONS

In making software, it is necessary to parse data from Arduino to the software created and send data from Software to Arduino via cable for serial communication. Parsing data is used to find out which leds are active and which are not.

Control and monitoring required security on the software. so that, not everyone can control and monitor. So that only certain people or users can use this software.

Suggestions for making the next HMI software is that it can be controlled without using a usb cable as serial communication or can use wireless as a substitute for communication.

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