Industrial Automation with Visual Studio and Arduino

1Ebtihal Omar AL-Riyami, 2Safaa Abdullah AL-Muharbi
3Safaa Zahir AL-Alawi, 4Samia Ali AL-Shaqsi, 5Dr. Subhra Debdas
College of Technology, Sultanate of Oman

Abstract. This paper aims to achieve automation using widely used visual studio programming with real time interfacing with Arduino Mega. The Arduino code created with Visual Basic can be shared with the Windows, Linux and Mac Arduino community. In this paper Visual Studio based HMI system has been proposed to control real time process controller in any automated industry. Visual Studio has been used as a front end HMI and Arduino Mega as a back end process controller.

Keyword. Visual Studio, Arduino Mega, HMI, Process controller,

INTRODUCTION

The primary goal of a human-machine interfacing (HMI) is to assist the operator in running a machine and managing a process. A good HMI will increase the productivity of the operator and machine, increase uptime, and assist in providing consistent product quality. The required functionality of an HMI will vary based upon the type and complexity of product produced, the type of machine used, the skills of the operator, and the degree of automation of the machinery. The purpose project to achieving automation using the widely used program Visual studio. Visual Basic is a free plugin for Microsoft Visual Studio that creates Arduino compatible cross-platform programs. Visual Basic adheres to the standards created by the various hardware manufacturers, this means that newly released hardware can be programmed in Visual Basic without need for a software update from Visual Basic. Visual Basic even uses the same configuration as the Arduino IDE.

In this paper visual studio based visual basic is applied as a front end programming for operator use as HMI control and Arduino Mega is applied as a backend programming for system controls in remote or hazardous places. One fruit-juice mixer plant has been considered for total juice processing. Where two inlet valves are operating for incoming ingredients, one fan for juice mixing and one or two valves for outlets. All this process can be operated from remote control panel based on visual basic.

METHODOLOGY

Fig.1 shows the basic process where Arduino acting as a sandwich mode of operation with visual studio and main high voltage valves and machines operations. Visual Basic generates the codes as per operator requirement through HMI panel and that will be transferred through Universal Serial Bus (USB-COM PORT) to Arduino program channel. Then Arduino as per requirement operate the relay arranges for high voltage processes. Through visual studio one code has been developed to synchronized HMI operations with visual studio and Arduino Mega.
PROGRAMMING

This program directly links with Arduino Mega board through serial communications USB (fig.2). Here in Arduino Mega digital output pins 12 to 8 are connected with relay to make the switches ON/OFF so that operator can select any valve to make ON/OFF. As per requirements operator schedules the time of operation and quantity of production.

Figure 1. Flow diagram of fruit juice plant.
RESULTS AND DISCUSSION

Front end HMI panel shown in figure 3 based on visual studio13, which contain start stop button for stating or stopping of any operation. In this panel three valves controllers are there and one fan operation for mixing juice.
Figure 5. Interfacing hardware.

Figure 4 shows the system hardware for total process. Where HMI with visual studio has been operated through laptop and COM3 port (USB) connected with Arduino mega for final controlling operations of relay co-ordination.

CONCLUSION

This HMI device gives the ultimate accuracy for any process control plant. By utilizing Visual Basic built in functionality for user interfacing design and database connectivity and adding off the shelf plug in object or Active X controls for graphics, training, PLC communications, and alarming, developers, OEMs, integrators, and user can create industrial HMI applications. These applications have the flexibility to be designed in any way the user desire and highly cost effective. The desired application has been developed and tested, and the prototype model is ready to display for demonstration.

REFERENCES