Electronic Letters on Science & Engineering 11(1) (2015)
Available online at www.e-lse.org

3-AXIS PLOTTER MACHINE CONTROL USING BZK.SAU.FPGA UC ARCHITECTURE

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Abstract: The use of FPGAs has an important place in Computers and Electrical and Electronics engineering. Especially in academic studies that provide important easily related to the development kits leads to an increase of technological developments. In this study control of 3-axis a plotter machines with BZK.SAU.FPG microcomputer architecture will be described. Microcomputer architecture design of the study has been developed with Altera Cyclone III development kit. Thus the plotter was controlled BZK.SAU.FPG microcomputer architecture machine.

BZK.SAU.FPGA UC MİMARİSİ KULLANILARAK 3 EKSENLİ ÇİZİCİ MAKİNE KONTROLÜ

Özet: FPGA kullanımı Bilgisayar ve Elektrik-Elektronik Mühendisliği gibi alanlarda önemli bir yer tutmaktadır. Özellikle akademik çalışmalarda geliştirme kitlerinin kolay kullanımı ve geliştirilebilir özelliği nedeniyle önem kazanmaktadır. Bu çalışmada BZK.SAU.FPGA.UC mimarisi kullanılarak 3 eksenli bir çizici tasarımı gerçekleştirildi. Çizici üzerindeki adım motor kontrolü Altera Cyclone III FPGA kartı kullanılarak sağlanmıştır.

Anahtar Kelimeler: Mikrobilgisayar Mimarisi, Alanda programlnabilir kapı dizileri(FPGA), adım motor kontrolör

Reference to this paper should be made as follows (bu makaleye aşağıdaki şekilde atıfta bulunulmalı):
H.Oztekin, A. Bolukbasi, '3-Axis Plotter Machine Control Using BZK.SAu.FPGA.UC Architecture', Elec Lett Sci Eng ,vol. 5(1) , (2009), 1-8

1. Introduction

In literature, there are some examples that control stepper motor with FPGA. But they don't support an educational anxiety. Now let's view those ones. The paper stepper motor is controlled via wireless system. The implementation is accomplished by Spartan 3E FPGA. This work made for industrial automation system. As shown there is no concern of the system educational. The paper LABVIEW is used to design GUI for analyze control parameter to the wireless connected stepper motor. Also the paper propounds Pulse Width Modulation Technique (PWM) for stepper motor control, thus is specified very high precision. In this way, especially for large industrial systems, which provide great torque values are indicated.

The paper on FPGA stepper motor is designed for implement multi-subdividing drive system. With this method the circuit structure is quite simple stepper motor subdivision control that are made without external digital to analog convertor. The paper points to this method has high control precision and good effect much better than the micro control unit method. Combining all of high sensitivity of this method is said to be simple.

In the paper it is said that the output power produced by high-concentration solar thermal and photovoltaic systems is directly related to the amount of solar energy acquired by the system. So the paper that is pointed to track the sun's position with a high degree of accuracy. Also it is pointed out sun tracking generating power system designed and implemented in real time. The

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ISSN 1305-8614

paper this implementation is made on Spartan-3AN and it is said that the sun tracking system using fuzzy controller with FPGA technology.

In literature, stepper motors for use for educational purposes FPGA with more remote access platform is seen as combining the system. Thus, users just anywhere they have internet access and time, even at home even, system access is possible. So that everybody is like to have the opportunity to test their design and working in real operating environments. In addition, feedback from students or by the users of these studies will provide a significant contribution to improve themselves. When this approach is based on working with some of the remote desktop connection client-server architecture and is based on some of the others are created with web access platform client-server architecture is used.

Computer architecture and organization, computer engineering, electrical engineering and e-lab applications the basic concept of FPGAs. These areas processor, memory, input-output system, ALU and contains very basic concepts such as road design. Also included in the computer architecture and how to develop them with basic hardware units will be coordination between them [11]. So to increase the motivation for computer architecture issues with previous studies and BZK.SAU.FPGA10.1 BZK.SAU.FPGA10.0 microcontroller architecture has been designed. Thus, the process of simulation and interior as a unit processor hardware platform for students are provided with a better understanding.

BZK.SAU.FPGA10.1 a platform that provides access via the Internet to increase the use of micro-computer architecture design has been created. This platform is designed with Microsoft Visual Studio .NET installed on a host computer and visual programs, reservation service and virtual hosting environment consists of two main parts. Thus users can access these services via the internet environment.

2. The Overall Functioning Of The System

Operation 3-axis of the system is designed to be completely educational. Therefore students understand and couplings system without difficulty was anticipated. Figure 1 shows a general view of the system. In the system moving between axissess is achieved by 3 stepper motor. Separate 2 stepper motors provide of the system movement in horizontal and vertical planes. A third step motor is used in the system different from the other two motors. The task of this step motor is mounted to it by means of a writing tip given by the system command to write the desired data as a result is determined. Figure 3 shows the third step motor's visual state.

3. The BZK.SAU.FPGA uC Architecture

Computer architecture and organization to be explained theoretically in Computer and Electrical Engineering emerges as a general problem. Students from theory to application in terms of the course can be seen as an important step in. At this stage, BZK.SA microcomputer structure can help us. An educational purpose, which is made entirely of BZK.SA owned a hardware emulator enables students to complete on their own designs and can be supplied.

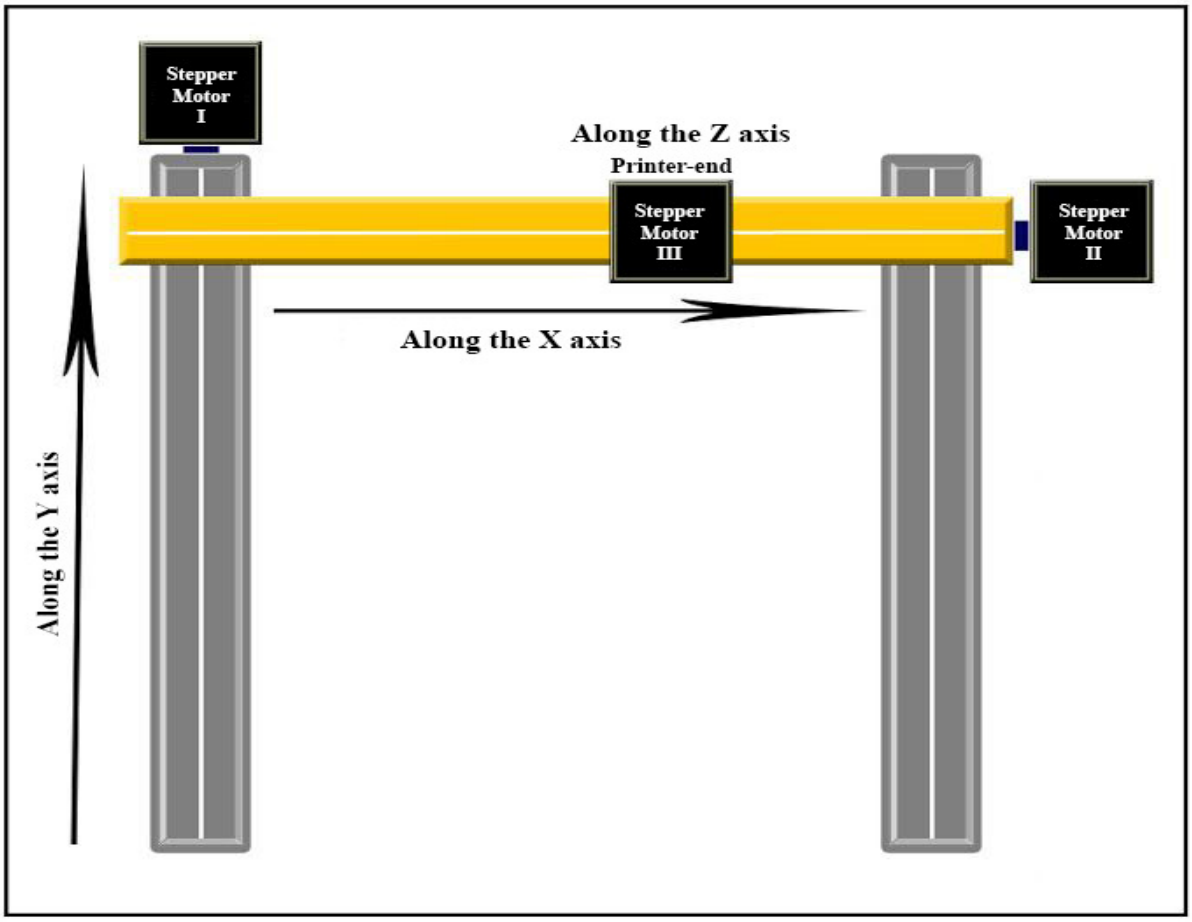

Fig 1. 3-axis plotter device system overview

4. Stepper Motor Control

First to talk about the working principle of stepper motor would be appropriate. As is known, stepping motors acts with the trigger certain degrees extent. This movement is necessary to ensure that being the particular value of frequency. There are various ways of achieving this. One of them the help of an electronic circuit needed the frequency value in is to trigger. Another is made by the system that will ensure that you move with the logical gate structure. The stepping motor used in this system to enable movement of the BZK.SAU.FPGA microcomputer architecture conceptual changes are added. A stepper motor for movement of the other process is to form the required electronic circuit. This electronic circuit is ensured thanks to the engines mobility.

Fig 4. BZK.SAU.FPGA uC login screen

5. Sample Application

This section will presents a simple application. First, our study is worth remembering how to do a drawing with. Through this study, an original system design and control is achieved. Now let's get to the implementation phase:

- Figure 2 BZK.SAU.uC logo appears on the screen. This phase of the command window to switch to overcome the "ESC" should be keyed
- New incoming message "C: \>" command line
- Now we can start writing our script. First "new" command type and "Enter" is dialed. In this way no longer essential commands can start typing to do the job.
- Now writing "draw" and the "Enter" key are pressed. Figure 3 shows images of command.
- Our command of "htl." and then "run" command. Both commands separately and then "Enter" is dialed. In this way we have run our application.

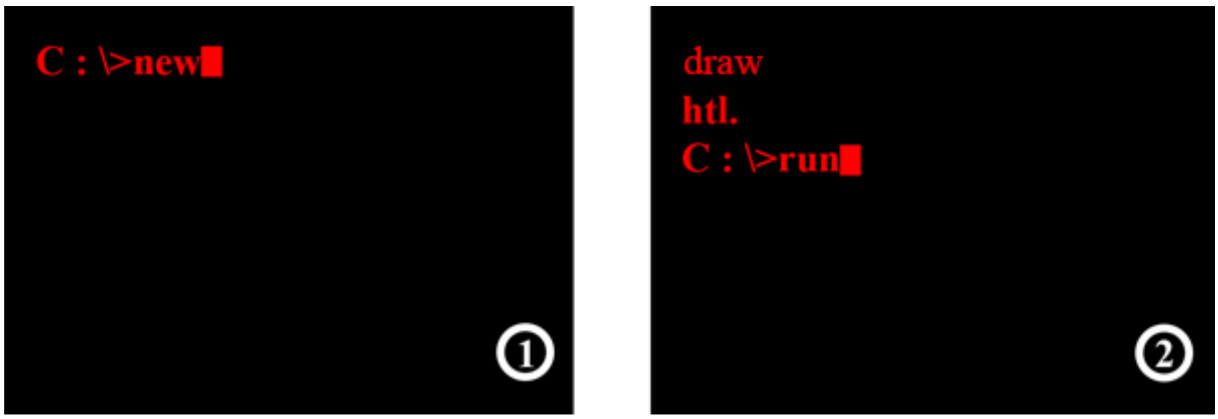

Fig 5. Example application command window

6. Results and Conclusion

This study is made stepper motor control using the product of a completely original work BZK.SAU.FPGA micro-computer architecture. As is known, for stepper motor control necessary developing an integrated circuit or conceptual work done or using the FPGA existing prepared structure in the form of the use of the method are followed. But this study FPGAs designed stepper motor control is provided with the help of BZK.SAU.FPGA micro computer architecture. Thus there are a plotter device control made which is a system conceptual the original BZK.SAU.FPGA uC is provided with a stepper motor movement. It should be noted again fully developed for educational work with this system, especially students in Computer and Electrical Engineering to create an instance of the main objectives is.

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