

Abstract

The ultimate goal of this project is the implementation of a device which will properly capture, process and transmit several voice commands to a central PC over a local Ethernet network. The PC, receiving these commands, will be able to control several devices using a purchased relay board and appropriately developed software including speech recognition.

In summary, this project consists of three main parts. The first part mostly deals with analog electronic, including the research on appropriate components required for the implementation of the analog circuit, such as a microphone, a pre-amplifier, an Analog-to-Digital Converter (ADC), etc. and their proper interconnection. This part also involves several techniques regarding noise cancelling, as this is of great significance in our system, and the design of the Printed Circuit Board (PCB) daughterboard.

The second part, mostly digital electronic, has as its main component a Field Programmable Gate Array (FPGA) board with a Cyclone chip of Altera. The PCB daughterboard will be interfaced to the FPGA board, whose chip will be programmed using Very-high-speed integrated circuit Hardware Description Language (VHDL). The voice samples, serially received from the analog circuit, will be digitally filtered, encapsulated into strictly structured UDP/IP packets and sent to the PC over a 10Base-T Ethernet connection.

The third part involves the development of the appropriate software to receive and recognize the commands, and finally drive the relay board as a result of this end-to-end communication. We are using Microsoft's C# Sharp, .NET Framework and the Speech Application Programming Interface (SAPI).