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Title	Penguin on a chip
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The project involves building an embedded system using the Xilinx FPGA board which is a part of the Xilinx University Programme. The Microblaze CPU and the associated peripherals are created on the programmable logic blocks in the FPGA chip. Petalinux which is a version of Linux ported onto the FPGA board is used as the operating system. The Embedded Development Kit (EDK) software from Xilinx provides the tools needed to create the embedded system.

The objective of the project is to interface a set of five pushbuttons, four LEDs and DIP switches with the Linux embedded system. A web server will be hosted by the system and the LEDs and DIP switches would be made controllable over the internet using HTTP protocol. The LEDs and switches acts as a model for any digital device that allows interfacing with on/off states. So the project establishes that digital devices can be interfaced with the Linux embedded system in place and can be controlled over the web (or any appropriate network) from a distant place. A potential use of the system is for surveillance.

The FPGA chip uses programmable logic blocks which give the flexibility to try out different components and to build the feasible peripherals onto the system according to the design requirements. Linux is used as the OS since FPGA ported versions are available. Linux is open source and resources for help are available over the internet.

Remote Surveillance System

The pushbuttons and DIP switches act as detectors placed in different surveillance locations. When a pushbutton is pressed an interrupt is generated. The Microblaze processor handles the interrupt and the Linux kernel is notified. The interrupt is then routed to the device driver of the pushbutton. The device driver passes the information to the LED control program which is listening. The LED control program triggers the alarm by turning on the corresponding LED and also writes the data onto an XML file. When the DIP switches change state, an interrupt is generated which would eventually be handled by the DIP control program and the information will be written onto another XML file.

A website which provides the real time surveillance information will be hosted by the Linux embedded system. The website can be monitored from any remote web client using the internet. When the web client requests the status information from the web server, a status HTML page is served out. As soon as the web page is loaded, behind the scene an AJAX request is initiated back to the web server. A CGI script running on the web server handles this AJAX request. The CGI script reads the XML files and forms an AJAX response. This is send back to the web client. The web client parses this XML file and updates the web page with the latest status information. In order to give the illusion of real time updates, every one second an AJAX request is generated by the web client.

