DESIGN AND DEVELOPMENT OF ENERGY MONITORING AND AUTOMATED CONTROL SYSTEM USING LABVIEW FOR ENERGY CONSERVATION

V. MOUNIKA¹, T. RAVI THEJA²


Abstract- The excess usage of energy in a building is identified and it is controlled and conserved using Laboratory Virtual Instrumentation Engineering Workbench. The unnecessary usage of energy for appliances in human absence is detected and the appliance is switched off, using ARM controller, embedded LPC2148, by continuous monitoring of appliance status. ACS712 is the power meter module capable of reading the power information as voltage. The fan and light are automatically controlled by monitoring the human emplacement in the environment using the web cam. The human intervention information are traced. The system modeled provides the efficient energy conservation strategy.

I. Introduction

Many home automation systems are considered mission-critical, in the sense that the malfunctioning can bring about catastrophic consequences in terms of loss of human life or property. Therefore extraordinary care must be exercised during their design to make them flawless. In spite of that, elaborate mechanisms are often deployed to ensure that any unforeseen circumstances can also be handled in a predictable manner. The motivation is mainly to facilitate the users to automate their Industrials having universal access. The system is based on wireless technology using GSM. This system provides ideal solution to the problems faced by Industrialist in day to day life. GSM module is a bridge responsible for enabling/disabling of SMS capability. The system is capable enough to send feedback to user about the condition of the home appliance according to the user’s needs and requirements. The home appliances monitoring and control system with an affordable cost was thought to be built that should be mobile providing remote access to the appliances. The ease of deployment is due to wireless mode of communication. GSM technology provides the benefit that the system is accessible in remote areas as well. A prototype of the controller is implemented, and the experiment results show that the FPGA can easily and flexibly control the Industrial appliances. A processing unit that was microcontroller and a communication module that used GSM module or cell, phone. The ease of deployment is due to wireless mode of communication. GSM technology provides the benefit that the system is accessible in remote areas as well. The low cost remote monitoring system can be implemented using programmable logic devices (PLDs). PLDs allow fast development of prototypes and the design of complex hardware system using FPGA. The system contains low cost components easily available which cuts down the overall system cost. The technology and processes associated with manufacturing have undergone a major change during the last few decades for being able to compete
in today’s economy, the time-to-market has to be reduced while at the same time, mass production with high quality standards is required. While these aspects are true for products in almost any domain, the notable ones are automotive and aerospace, having a high rate of production involving operations like cutting, shaping, molding, welding, polishing and assembly operations and in the large processing industries such as chemical industries, where time- or process critical and hazardous operations are involved. Thus, the demand for high production rate coupled with strict-quality norms can be achieved with less and less direct human interaction and an increasing degree of automation. A GSM, Internet and Speech Controlled Wireless Interactive Industrial Automation System [1] shows the design and realization of a Industrial automation system where communication technologies GSM (Global System for Mobile Communication), Internet, and speech recognition, Bluetooth have been used. All these techniques are successfully compound in a single wireless home automation system.

II. Hardware system

**Micro controller:** This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

**ARM7TDMI:** ARM is the abbreviation of Advanced RISC Machines, it is the name of a class of processors, and is the name of a kind technology too. The RISC instruction set, and related decode mechanism are much simpler than those of Complex Instruction Set Computer (CISC) designs.

**Liquid-crystal display (LCD)** is a flat panel display, electronic visual display that uses the light modulation properties of liquid crystals. Liquid crystals do not emit light directly. LCDs are available to display arbitrary images or fixed images which can be displayed or hidden, such as preset words, digits, and 7-segment displays as in a digital clock.

**Fig 1: Block diagram**

We can overcome above disadvantage by using our proposed system. It is having face recognition of person by using camera interface. We can overcome above disadvantage by using our proposed system. An efficient and accurate embedded access control system based on face recognition is very important for wide range of commercial and security application. The proposed system is a wireless access control system designed and developed for smart home environment. The system identifies the visitor’s presence capture and transfers the identified name through an alert SMS via GSM network automatically to home owner to recognize the visitors. It has a variety of features such as energy efficient, intelligence, low cost, portability and high performance.
III. Board Hardware Features

GSM:

Global System for Mobile Communication (GSM) is a set of ETSI standards specifying the infrastructure for a digital cellular service.

The network is structured into a number of discrete sections:

- Base Station Subsystem – the base stations and their controllers explained
- Network and Switching Subsystem – the part of the network most similar to a fixed network, sometimes just called the "core network"
- GPRS Core Network – the optional part which allows packet-based Internet connections
- Operations support system (OSS) – network maintenance

SM was intended to be a secure wireless system. It has considered the user authentication using a pre-shared key and challenge-response, and over-the-air encryption. However, GSM is vulnerable to different classes of attacks, each of them aiming a different part of the network.

DC Motor:

A DC motor relies on the fact that like magnet poles repels and unlike magnetic poles attracts each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.

Motor driver:

DC motors are typically controlled by using a transistor configuration called an "H-bridge". This consists of a minimum of four mechanical or solid-state switches, such as two NPN and two PNP transistors. One NPN and one PNP transistor are activated at a time. Both NPN and PNP transistors can be activated to cause a short across the motor terminals, which can be useful for slowing down the motor from the back EMF it creates. H-bridge. Sometimes called a "full bridge" the H-bridge is so named because it has four switching elements at the "corners" of the H and the motor forms the cross bar. The switches are turned on in pairs, either high left and lower right, or lower left and high right, but never both switches on the same "side" of the bridge. If both switches on one side of a bridge are turned on it creates a short circuit between the battery plus and battery minus terminals. If the bridge is sufficiently
powerful it will absorb that load and your batteries will simply drain quickly. Usually however the switches in question melt.

<table>
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<th>High Side Left</th>
<th>High Side Right</th>
<th>Low Side Left</th>
<th>Low Side Right</th>
<th>Quadrant Description</th>
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Table: operation of H-Bridge

WEBCAM

"Webcam" refers to the technology generally; the first part of the term ("web-") is often replaced with a word describing what can be viewed with the camera, such as a net cam or street cam. Webcams are video capturing devices connected to computers or computer networks, often using USB or, if they connect to networks, Ethernet or Wi-Fi. They are well-known for low manufacturing costs and flexible applications. Video capture is the process of converting an analog video signal—such as that produced by a video camera or DVD player—to digital form. The resulting digital data are referred to as a digital video stream, or more often, simply video stream. This is in contrast with screen casting, in which previously digitized video is captured while displayed on a digital monitor.

Webcams typically include a lens, an image sensor, and some support electronics. Various lenses are available, the most common being a plastic lens that can be screwed in and out to set the camera’s focus. Fixed focus lenses, which have no provision for adjustment, are also available. Image sensors can be CMOS or CCD, the former being dominant for low-cost cameras, but CCD cameras do not necessarily outperform CMOS-based cameras in the low cost price range. Consumer webcams are usually VGA resolution with a frame rate of 30 frames per second. Higher resolutions, in mega pixels, are available and higher frame rates are starting to appear.

Fig 4: Webcam

The video capture process involves several processing steps. First the analog video signal is digitized by an analog-to-digital converter to produce a raw, digital data stream. In the case of composite video, the luminance and chrominance are then separated. Next, the chrominance is demodulated to produce color difference video data. At this point, the data may be modified so as to adjust brightness, contrast, saturation and hue. Finally, the data is transformed by a color space converter to generate data in conformance with any of several color space standards, such as RGB and YCbCr. Together, these steps constituted video decoding, because they "decode" an analog video format such as NTSC or PAL.
Support electronics are present to read the image from the sensor and transmit it to the host computer. The camera pictured to the right, for example, uses a Sonix SN9C101 to transmit its image over USB. Some cameras - such as mobile phone cameras - use a CMOS sensor with supporting electronics.

FEATURES:
- Smallest wireless video & audio camera
- Wireless transmission and reception
- High sensitivity
- Easy installation & operation
- Easy to conceal
- Light weight
- Low power consumption
- Small size

SPECIFICATIONS:
- Output frequency: 900MHZ 1200MHZ
- Output power: 50mW 200mW
- Power supply: DC +6~12v
- Distance covered: 10m

IV. CONCLUSION

Energy Efficient Automation through central FPGA controller introduces design for home Automation using different task scheduling. In this paper, we propose home automation system which consists of face detection, GSM module and a controller module. Experiment results prove that this proposed system works well, and can be use for future application. There are many advantages of FPGA compared to microcontroller in terms of maximum no of input and output port which is present in FPGA. Using on board LCD display, it minimize wiring and power consumption And reduces use of driver circuit. The system is suitable for real time monitoring and controlling of various appliances.

V. REFERENCES


