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Design and Implementation New Saving Energy System by Using Human Motion Sensor

Abdulkadom Alyasiri, Jameel K Abed, Mohannad J Mnati

Abstract*— This work presents the design of a new electronic system to save electrical energy. In this design is to focus on the use of low power digital IR motion sensors to perform human motion to voltage conversion .PIC16F84A microcontroller have been used to control the entire system. Three electrical devices (Televisions, Fan and Lump) was controller by this system. PROTEUS 8 professional software was used for simulating the designed system, and MikroC software from MikroElektronika was used to programing the pic16F84A microcontroller. Results of the system design showed how to saving electrical energy by using human motion sensor and PIC16F84A microcontroller.

Index Terms*— saving energy, PIC16f84A and human motion sensor.

I. INTRODUCTION

Energy-saving issue attracts everyone's attention. Thus the products that focus on energy conservation get more recognition [1]. This work presents details of the development of a microcontroller retrofit to replace [2] normal electrical switch system by using new smart system. This system is a one of smart home applications. Today, smart homes are turning more and more intellectualized and cost-effective with continued progress and cost reduction in electronics [3]. Through this system, all home application can be controlled [4] easily and safely to save power. With the Proteus powerful simulation capabilities and extensive resource libraries, the design process of hardware circuit can be effectively simplified [5].

The hardware components involved in the physical control [6] of the save energy system are ; human motion sensor, microcontroller, relays as electronic switches, power supply unit .A sensor node has one or more sensors attached that are connected to the physical world [7], At this system we used the motion sensor additional board features a sensor AMN11112 detecting infrared (heat) emission of bodies [8] then sending data to PIC16f84A microcontroller, PIC64F84A perfectly fits many uses, from automotive industries and controlling home appliances to industrial instruments, remote sensors, electrical door locks and safety devices. It is also ideal for smart cards as well as for battery supplied devices because of its low consumption [6]. In this system the pic16F84A is controlling three electrical devices in the room (Television, Fan and Lump) through electrical relay circuit .the time off for specific device can be establish firstly then we can use the system.

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*Correspondence Author(s)
Dr. Abdulkadom alyasiri, Chairman of the foundation of Technical Education, Baghdad, Iraq.
Dr. Jameel K Abed, Head of Mechatronic Engineering Department, Baghdad, Iraq.
Mohannad J Mnati, Electronic Technique Dept. Institute of Technology, Baghdad, Iraq.

The remainder of this paper is organized as follows [3]: Section 2 describes the architecture and programing of the PIC16F84A microcontroller. Section 3 specification of simulation software (Proteus 8). Section 4 presents the results of simulation designed. Section 5 presents the headwear system. Section 6 concludes of this paper.

II. PIC MICROCONTROLER ARTETECHURE AND POGRAMING

A. PIC16F84A ARTETECHURS.

PIC16F84 has been one of the most popular PIC microcontrollers for a very long time. This is an 18-pin device and it offers 1024 _ 14 flash program memory, 36 bytes of data RAM, 64 bytes of nonvolatile EEPROM data memory, 13 I/O pins, a timer, a watchdog, and internal and external interrupt sources. The timer is 8 bits wide but can be programmed to generate internal interrupts for timing purposes. PIC16F84 can be operated from a crystal or a resonator for accurate timing. A resistor-capacitor can also be used as a timing device for applications where accurate timing is not required. Figure (1) shows the pin configuration of this microcontroller. The pin descriptions are given in Table (1) [9, 10].

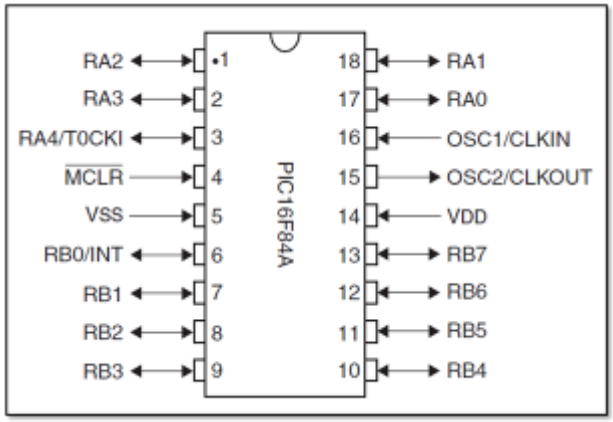

Figure (1) PIC16F84 Microcontroller Pin Configuration

Table (1): PIC16F84 Microcontroller Pin Descriptions

Pin	Description	Pin	Description
1	RA2—PORTA bit 2	10	RB4—PORTB bit 4
2	RA3—PORTA bit 3	11	RB5—PORTB bit 5
3	RA4/T0CK1—PORTA bit 4/Counter clk	12	RB6—PORTB bit 6
4	MCLR—Master clear	13	RB7—PORTB bit 7
5	Vss—Gnd	14	Vdd—+V supply
6	RB0/INT—PORTB bit 0	15	OSC2
7	RB1—PORTB bit 1	16	OSC1
8	RB2—PORTB bit 2	17	RA0—PORTA bit 0
9	RB3—PORTB bit 3	18	RA1—PORTA bit 1

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B. PIC16F84A PROGRAMING.

Each pin of the PIC16F84A microcontroller can be programming by using MikroC PRO for PIC from microelectronic [12]. Figure (2) is the main function flowchart for the system designed.

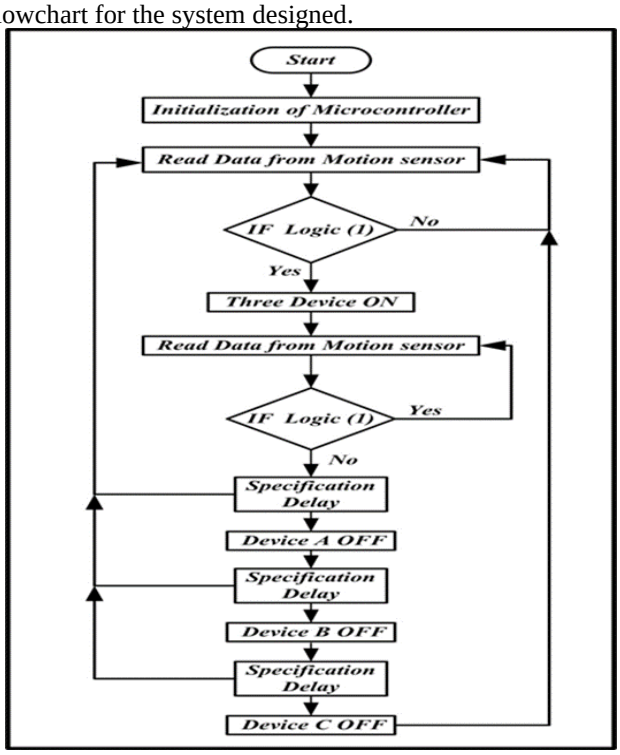

Figure (2) main function flowchart

III. SPECIFICATION OF PROTEUS SIMULATION

The Final simulation system was implemented as shown in Figure (3) is designed by using ISIS Proteus 8 Professional software program [13].

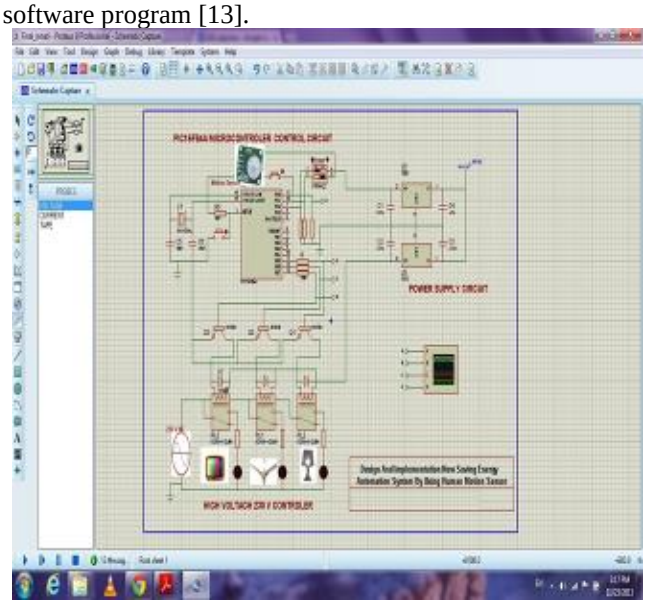

Figure (3) Final System Simulation

A. IR MOTION SENSOR UNIT.

The motion sensor board in Figure (4) has a range up to 10 m which enables power consumption reduction. When some change are detected the microcontroller's pin is fed logic one(1).for connecting the additional board to development system or a device containing a microcontroller it is necessary to use pads [8].

Figure (4) IR Motion sensor unit

B. POWER SOPPLY DISCRIPTION.

The LM78XX in the Figure (5) series of three-terminal positive regulators is available in the TO-220 package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut-down, and safe operating area protection. If adequate heat sinking is provided, they can deliver over 1 A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components for adjustable voltages and currents [11].

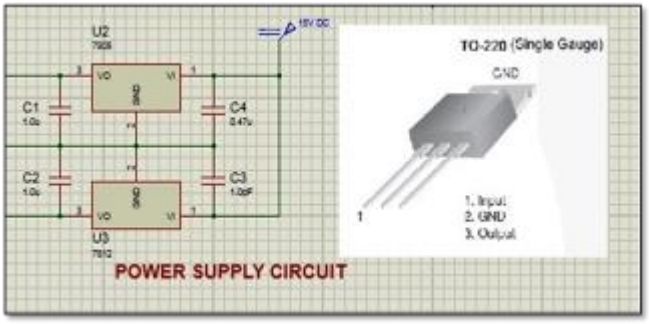

Figure (5) IR Power Supply unit

C. PIC MICROCONTROLER UNIT.

The IR motion sensor was connect to pic16F84A throw pin (RA0), when changes are detected RA0 pin fed logic one (1) then the pin's AB7,AB6 AND AB5 logic (1) and all electrical devices is ON, if RA0 pin fed logic (0) then the electrical device turn OFF sequentially over a period of time to be setting at the beginning of the system work. The pic microcontroller unit as shown in Figure (6)

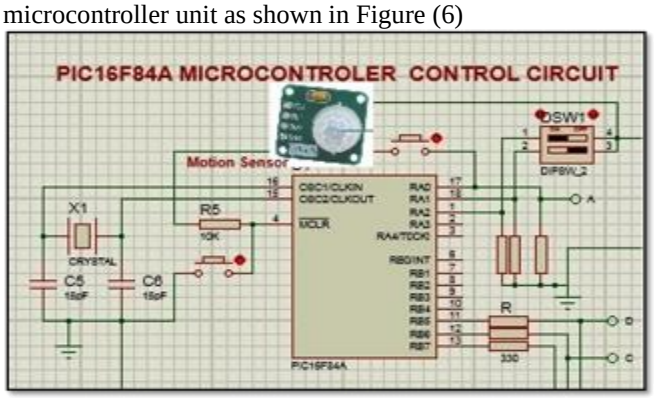

Figure (6) Pic Microcontroller unit

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D. AC POWER DRIVER UNIT..

Relay Driver circuit shown in Figure (7) can be control 3 different electrically operated home appliances. Relay contacts are normally open and therefore devices are not working at the beginning [3]. The order (on / off with delay) has been come from pic16F84A throw RB7, RB6 and RB5.

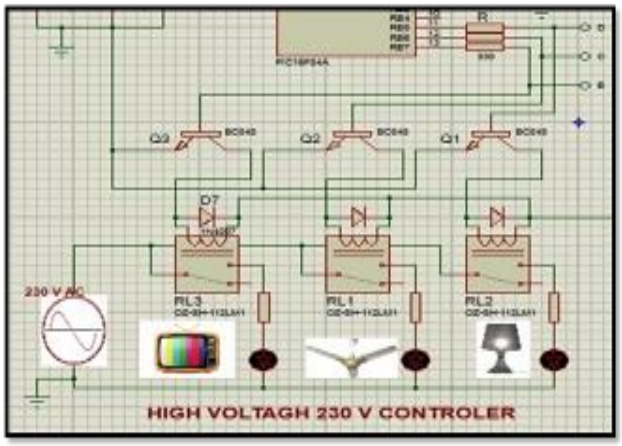

Figure (7) AC Power Driver unit

IV. THE SIMULATION RESULTS

Case (1): When IR motion sensor detected, RA0 pin for PIC16F84A fed logic one (1) then the three electrical devices are ON in the same time .the result of case (1) shown in Figure (8) .

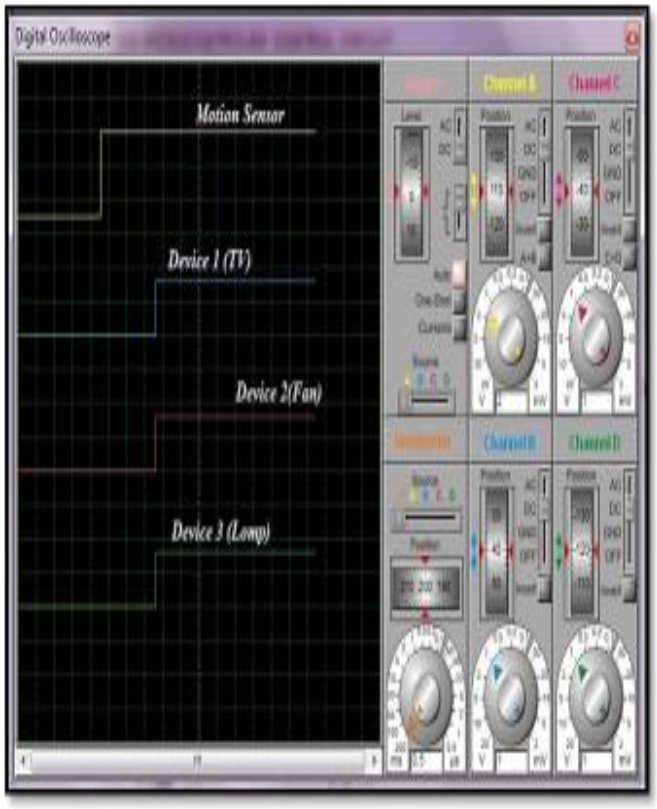

Figure (8) Case (1) Simulation Results

Case(2): When some change are detected the microcontroller's pin is fed logic zero (0).and then the electrical device turn OFF sequentially, the result of case (2) is shown in Figure (9).

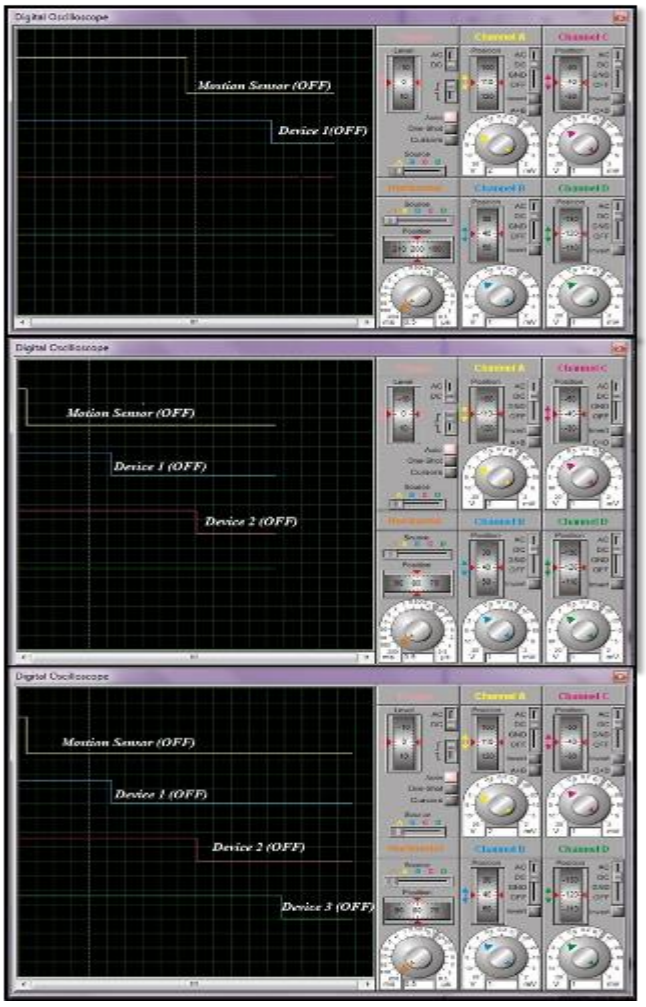

Figure (9) Simulation Results

V. PHYSICAL HARDWARE SYSTEM

Figure (10) is shown the final physical hardware circuit design for the system.

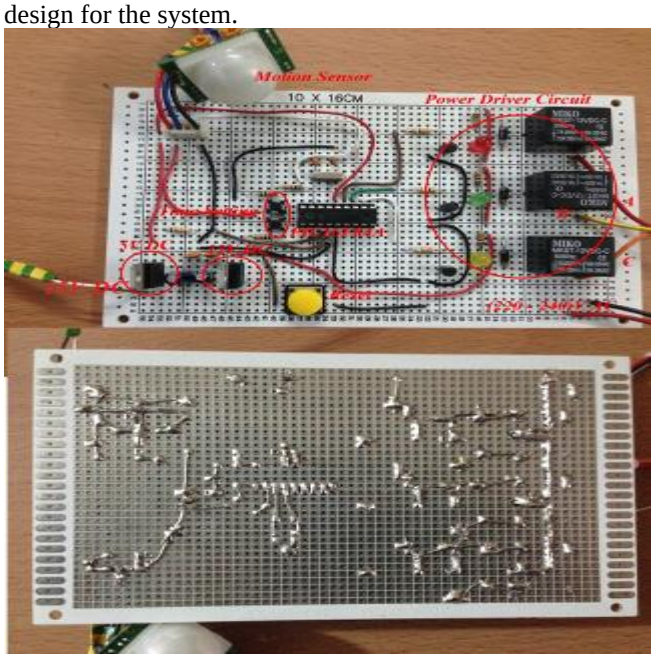

Figure (10) Physical Hardware System

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VI. CONCLUSION

This control system introduces the principle of the PIC16F84A and IR human sensor board which controls three electrical devices .it may seem to be simple in design but it is very importance in every daily life to save power and it has wide area of applications. The System has been programming through language MikroC, Proteus 8 professional as simulation software environment, this system can be developed to be able to control eight devise by using two IR motion sensors.

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AUTHOR PROFILE

Dr. Abdulkadom alyasiri Received his B.Sc. in Electrical and Electronics from the Faculty of Electrical Engineering, University of Baghdad, Baghdad Iraq in 1981 M.Sc. degree from University of Technology Baghdad, Iraq in 1993. and received the PHD degree from University of Technology Baghdad, Iraq in 2000, Higher Diploma in Human Resource Management, London in 2008 , Currently he is Chairman of the foundation of Technical Education

Dr. Jameel Kadom Abed Al- Jashami Received his BSC in Electrical Engineering / College of military Engineering Iraq.(1974-1978)/Iraq, MSC In Electrical Engineering / College of Engineering / in power and machine/Baghdad university.(1982-1984)/Iraq. and received the PHD in Electrical Engineering / Department of Electrical and Electronic Engineering / in Power Electronic Engineering/ University of Technology.(2000-2003)/Iraq, Currently he is a Head of Mechatronic Engineering Department, Baghdad, Iraq

Assist Lecturer Eng. Mohannad J Mnati Received his B.Sc. in Electrical and Electronics from the Faculty of Electrical Engineering, University of Technology Baghdad, Iraq in 2000, and received the M.Sc. degree in Electronic engineering from Faculty of Electrical Engineering, University of Technology Baghdad, Iraq in 2005. Currently he is Assist Lecturer, Researcher and training supervisor, Dep. of Electronic in Institute of Technology Baghdad. His research interests include Micro strip antenna, Electronic circuit design, Wired& Wireless Network Administration.

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