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Water, Power and Gas Saving System Using With Microcontroller

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Abstract

Managing water consumption is vital for life preservation. Knowing water and power consumption at homes can have a great impact water saving. This project presents an innovative home security control system, based on controlling door with power and water resource while increasing the added values for security applications. When we in front of the door the IR sensor sense the position and lock the door using key, automatically signal send to the microcontroller. It acts as a brain of the system. After receiving signal switch ON the relay circuit, OFF the power supply, shut off water line using solenoid valve. This would make the security process more efficient and convenient for house owners.

Key words: Water, Power, IR sensor, Microcontroller, Home security control system

1. Introduction

Our prime objective is to assist human being especially elderly, blind & physically challenged people rendering the scope of leading a better life and also securing the future by saving our precious energy. This paper is given a basic idea of how various household appliances can be controlled automatically and providing security from unauthorized person. Water resources saving are very important of aim of our project. It's very potentially needful of earth. A usage of water includes household, agricultural, industrial and environmental activities and etc. So we are tried to reduce the water, power and Gas consumptions for household applications. It's more benefit to our society. We are using the below papers are our base papers, using this technology to our project works.

Shen MINGXIA4 College of Engineering, Nanjing Agricultural University, Nanjing 210095, P.R.China; 2 College of Computer Science and Technology, Nanjing Agricultural University, Nanjing 210095, P.R.China; Cedric Sean OKINDA1,Innocent NYALALA2, Zhang CHI3, China[1-8] is addressing an intelligent energy saving system in these papers, which is of utmost importance in areas where lighting and air conditioning are key. This paper discusses the specifics of a robust voltage variance phenomenon by auto-Phase angle. Zero Crossing Detection (ZCD) lighting power, accuracy in temperature regulation and detection. The Human Presence Detector Sensor, Light Based Resistor (LDR) and a temperature sensor are used. These devices are powered by a micro controller, the output of which is controlled by the actuators. Monika Lakra1, Kappala Vinod

Kiran, Suchismita Chinara Department of Computer Science and Engineering Department of Electronics and Communication National Institute of Technology, Rourkela, India.[2] The method of power saving now plays a major role in the world and other works are used to save energy. In the conventional method, the manual operation of university electrical equipment is not observed, leading to maximum power wastage. In order to fix this problem, We developed a "smart and

intelligent power saving system for Indian Universities," all classrooms are fixed with occupancy responsive passive infrared sensor (PIR) add the corresponding devices are automatically turned on / off. The centralized base station monitors and manages the entire system. Network of wireless sensors; passive infrared sensor; at-mega.

Pranita A. Bhosale, Prof. V. V. Dixit[3] The calculation of various parameters is used in the weather monitoring system and irrigation controllers. This project discusses the low cost micro controller based irrigation scheduler that performs functions and output commands specified by the users to derive suitable actuators (relay, solenoid valves, motor).New indigenous irrigation controllers need to be established to increase farm productivity and the quality of water and other nutrients for input use. This framework introduces the design and development of the PIC16F877A microcontroller built Irrigation Controller

System. The machine consists of microcontrollers, RTC, LCD and driver circuit relay peripherals to turn a motor on / off.

2. Components Details

2.1 8051 Microcontroller

Intel produced the 8051 microcontroller in 1981. It is a microcontroller with 8 bits. It is constructed with 40 DIP pins (dual inline package), 4 kb of ROM storage, 128 bytes of RAM, 2 16bit timers. It consists of four parallel 8bit ports, which, as needed, are both programmable and addressable. An on chip crystal oscillator with a crystal frequency of 12 MHz is built into the microcontroller.

2.2 Arduino UNO

The Arduino Uno R3 is a microcontroller board built on the ATmega328 AVR microcontroller’s removable, dual-inline package (DIP). It has 20 digital pins (of which 6 can be used as PWM outputs and 6 can be used as analogue inputs) for input / output. Programs from the easy-to use

Arduino computer programme can be loaded on to it. The Arduino has an extensive support community, which makes working with embedded electronics a very simple way to get started. The R3 is the third, and most recent, Arduino revision.

2.3 LCD Display

LCD's are often used as numerical indicators, espe cially in digital watches where battery life is exten ded by theirmuch smaller current needs than LED displays (microamperes compared to mill amperes) Organic (carbon) compounds that possess both soli d and liquid properties are liquid crystals. When a voltage is applied through the electrodes, a 'cell' with transparent metallic conductors called electro des, on opposite daces, containing a liquid crystal, and onwhich light falls, goes 'black',Within the liq uid crystal, the effect is due to molecular rearrange ment.

2.4 IR Transmitter

This kit consists of two units which are different. One is an infrared transmitter that uses audio information to modulate the chopping frequency of an infrared beam emitted by a series of LEDs (30 to 250 KHz). Depending on the configuration, the transmitter is capable of driving up to 50 to 60 LEDs (250-300 mA maximum total, usually 8 sets of seven series of linked IR LEDs). This technique is much superior to ordinary AM techniques where the amplitude modulated IR beam is less sensitive to stray "noise" from 60 Hz ACoperated lamps. From 12 volt supplies, the transmitter and receiver can be controlled so that eight AA cells can be used as a simple power source, as only 50 ma is required. Two IR LEDs are in the transmitter pack, which is appropriate for many applications [9-15]

2.5.The Transmitter:

The transmitter is normally a handset powered by batteries. It should use as little power as possible, and to reach an Appropriate control distance, the IR signal should also be as high as possible. It should ideally be shock proof as well. In order to be used as IR transmitters, many chips are made. Just one of the many protocols which were invented was dedicated to the older chips. Micro controllers with very low power are still used in IR transmitters for the simple reason that they are more flexible to use. They are in a very low power sleep mode, when no button is pressed, in which hardly any current is absorbed. Only when a key is pressed does the processor wake up to send the necessary IR instruction. In such handsets, quartz crystals are rarely used. They are very weak and when the handset is dropped, they appear to split quickly. Ceramic resonators, since they can

withstand greater physical shocks, are far more suitable here. Not significant is the fact that they are a little less precise. The current will vary from 100mA to well over 1A through the LED (or LEDs). The LED currents have to be as high as possible in order to get an acceptable control reach. Between LED parameters, battery lifetime and maximum control distance, a trade off should be made. Since the pulses driving the LEDs are very small, LED currents may be that strong. The LED's average power dissipation does, however, not surpass the maximum value. You can also ensure that the LED 's overall peak current is not surpassed. You will find all these parameters in the data sheet of the LED. For driving the LED, a simple transistor circuit can be used. For this reason, a transistor with an acceptable HFE and switching speed should be selected. By using Ohm's law, the resistor values can simply be determined. Note that approximately 1.1V is the nominal voltage drop over an IR LED. There is one downside to the regular driver, mentioned above. As the voltage of the battery decreases, so will the current through the LED decrease. This would result in a shorter control distance that can be shielded to prevent this in the emitter follower circuit. The series of 2 diodes would limit the pulses to 1.2V at the base of the transistor. The transistor's base emitter voltage subtracts 0.6V from that, resulting in a constant 0.6V amplitude at the emitter. Present pulses of a constant magnitude result in this constant amplitude over a constant resistor. Calculating the current through the LED is simply once again applying the rule of Ohm.Only the AC signal is sent to the Band Pass Filter, as you can see. The Band Pass Filter is tuned to the handset unit's modulation frequency. In consumer electronics, typical frequencies range from 30 kHz to 60kHz. A detector, integrator and comparator are the next steps. These three blocks are intended to detect the presence of the frequency of modulation. The output of the comparator will be pulled down if this modulation frequency is present.

2.6 IR Receiver

The receiver unit consists of an IR sensitive photodiode detector and a 30 to 250 kHz nominal frequency receiver with a sensitivity of approximately one microvolt. The audio is recovered and fed to an audio power amplifier with 500 million watts of audio output by a phase locked loop (PLL) detector. The audio quality is exceptional. The range is up to 100 feet without optics, with simple lenses and suitable optics such as parabolic mirrors and telescopes a few hundred feet,A range of up to a couple of miles is probable. The kit includes PC boards and all the components needed for the completion of one transmitter and one receiver. Two can be used if there is a need for two stereo channels. Applications include wireless audio connexions, TV and radio private listening systems IR networking links, infrared and optical fibre optic and infrared experiments. No FCC licensing is required, as no radio signals are involved.

2.7 The Receiver:

The received IR signal is picked up by the IR detection diode on the left side of the diagram. This signal is amplified and limited by the first 2 stages. The limiter acts as an AGC circuit to get a constant pulse level, regard less of the distance to the handset.

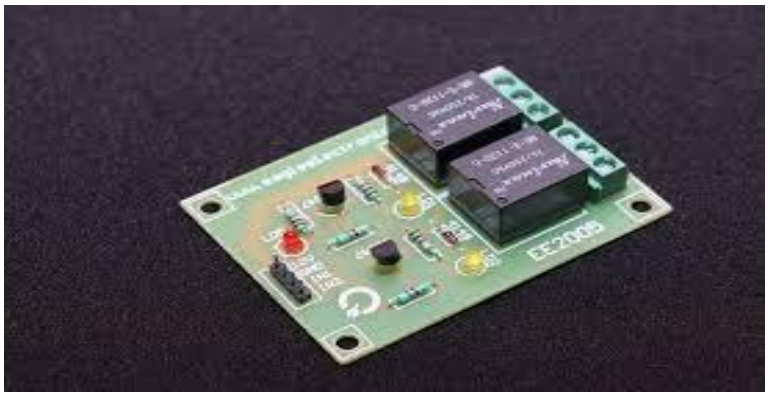

Fig.1 Diagram of relay and transistor

2.8 Relay Switch

Relay is an electromagnetic system that is used to electrically separate two circuits and magnetically link them. They are very helpful devices that allow one circuit to switch to another one while they are completely different. They are also used to connect an electronic circuit to an electrical circuit operating at a very high voltage (working at a low voltage). For example, a relay can transform a 230V AC mains circuit into a 5V DC battery circuit. Thus, for example, a fan or an electric bulb may drive a small sensor circuit. It is possible to split a relay switch into two parts: input and output. When a small voltage from an electrical circuit is applied to it, the input portion has a coil that produces a magnetic field. The working voltage is called this voltage. Commonly used relays are available in various operating voltage configurations, such as 6V, 9V, 12V, 24V, etc. The output portion consists of contactors that mechanically link or detach. There are three contactors in the simple relay: typically open (NO), normally closed (NC) and typical (COM) contactors. The COM is linked to NC when there is no input state. The relay coil gets energized when the operating voltage is applied and the COM changes contact to NO. There are various relay configurations available, such as SPST, SPDT, DPDT, etc., which have different contact switching numbers. The electrical circuit can be turned on and off by using the necessary combination of contactors. Get internal info about the configuration of a relay switch.[16-20]

2.9 Water & Gas Controller Sensor

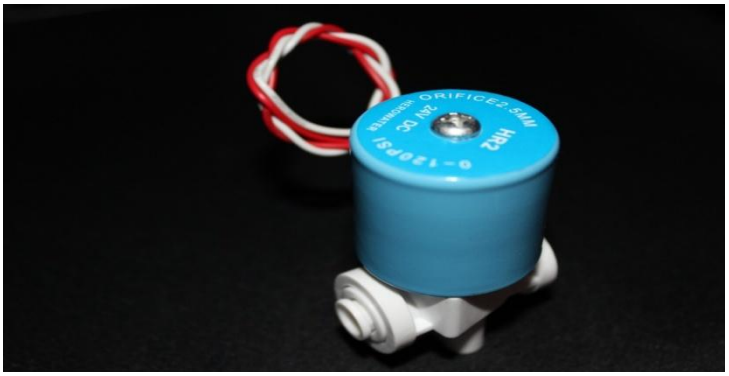

Fig.2 Water & Gas controller sensor

A magnetic field is generated by an electric current through the coil. A force is exerted on the plunger by the magnetic field. As a consequence, the plunger is pushed toward the coil centre so that the orifice opens. This is the underlying concept used to open and shut solenoid valves. When the ignition switch is turned on, a small electric current is sent through the starter solenoid. This causes the starter solenoid to close a pair of heavy contacts, thus relaying a large electric current through the starter motor, which in turn sets the engine in motion. Water taps and shower is automated using electric solenoid valve, IR sensor and relay. IR sensor is placed just below the water outlet so that it can sense our hand below the tap and switch the valve to flow water. Solenoid is the generic term for a coil of wire used as an electromagnet. It also refers to any device that converts electrical energy to mechanical energy using a solenoid. The device creates a magnetic field from electric current and uses the magnetic field to create linear motion. Solenoids are most commonly used as electromagnets, and all the examples so far are that kind of solenoid. But there are some other uses. They can be used to slow the flow of electricity in a circuit, making them an example of an inductor, or an impedance device. We used two conduction sensors to sense the water level in the tank. One of the sensors placed at upper level point after which water will overflow and other one placed at lower level point after which we need to refill the tank. When to sensors are open water pump starts through a relay and when both the sensors are sorted due to the presence of water, the pump switched off and prevent overflow of water as well as water loss.

3. Structural Layout Diagram of the System

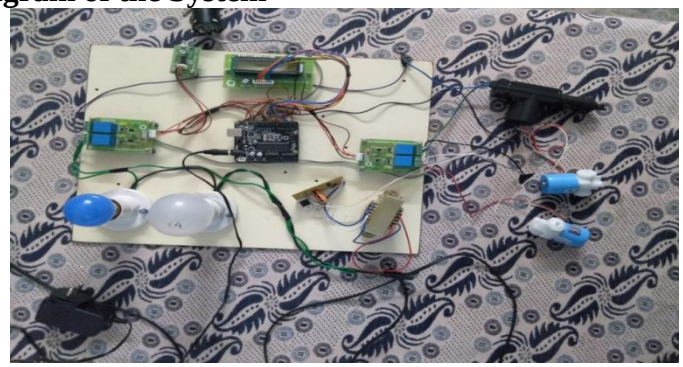

Fig.3 Structural Layout Diagram of the System

3.1 Construction and Working Principle:

Let us discuss about the working method of water and power savings system using 8051 microcontroller, In this we are already known about this, in big hotel's, lodges, etc use power savings system with the help of key and keychain card ones the door open and insert the keychain card on their slot the power supply will ON over the room, then we went out of the room the keychain card Will be removed for closing the door, the power supply will be automatically OFF. Thus the same procedure like that ,we can apply over the home - use to control or saving both water and power supply and also gas supply will be saving by this method. Is there common ,when come out of the home the door will be locked and then go In that area ,on the time the door will be locked we put one IR sensor connect to lock and key of the door, once the door will be locked the IR sensor will be activated it senses the signals. The IR sensor will be connected to basic type 8051 microcontroller for our comfortable. The IR sensor signals send to 8051 microcontroller. The microcontroller works they need 12V power supply, so we connect it. The microcontroller will be programmed by their uses. Then the microcontroller has two out. The two out will be connected to two relays (relay 1 and relay 2) respectively. Then the relay 1 will be connected to direct power supply, on their way the power supply will be divided into two categories, one as primary and another as secondary. The primary supply as essential source because it will be connected to refrigerator, medical items, etc necessary need only. Then secondary supply as other sources like TV, fan, light, etc. Now the microcontroller will send the signal to relay 1.So we can cut off the power supply on secondary source only. The power supply will be saved on home by this method. Then the relay 2 will be connected to two solenoids- solenoid 1and solenoid 2 respectively. The solenoid 1 will be connected to water supply on main tank for sealing the water line. And solenoid 2 will be connected to gas supply hose for sealing the gas line. Now the microcontroller send the signals to relay 2, the relay will send the signals to solenoids both 1and 2. The solenoids 1and 2 will be sealing the water line and gas line respectively. So we can save water and gas on home. Thus the working method of water and power saving system using 8051 microcontroller.[21-23].

3.2 Technology Stack:

While locking the door, the IR(Infra Red) sensor fixed behind the door, near the lock, receive the signal and send the information to micro controller. The Microcontroller process the signal and send the feedback information to all the associated devices like Solenoid valves in the water line, Gas line to close it, Relay to cut the secondary power supply.

3.3 Benefits:

Due to this process, the accidents due to Gas leakage, Water loss and Power loss and Accidents are avoided.

3.4 Advantages

•It reduce water and wastewater treatment costs and the amount of energy used to treat, pump, and heat water

•Saving water helps to preserve our environment.

•It reduces the energy required to process and deliver water, which helps in reducing pollution and in conserving fuel resources.

•If we save water now, we are helping to ensure a water supply adequate for future generations.

Saving water saves money.
•It save electricity for future generations
•It also reduce electricity bill
•It prevent gas leakages by sealing the valve
•It reduces the gas bills

Conclusions

It is an ongoing project. Simple technique to save water, power and gasoline in home. It definitely prevents the carelessness of human beings by wastage of water, power and gasoline. Cost less and easy to applicable on home door. The scope of leading a better life and also securing the future by saving our precious energy. This paper is intended to provide a basic idea of how various homes can be controlled automatically and providing security from unauthorized person

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