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Smart Power Saver Using Arduino

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ABSTRACT

In recent days we exploit lot of natural resources to generate electricity. But nowelectricvehiclesarenowreplacingtheconventionalvehiclesfortheirenvironmentalpollution. So we need a lot electricity. But more than 1 trillion kwh of electricity is wastedper year. If we reduce the wastage of power we can able to conserve our environment fromenvironmental damage, preserve our natural resources and we can develop ourself with weconserved capital from a spending to electricity bills. About 4.5lakhs of our Indian capitalis used to generate a 1kwh of power in nuclear power plant. Where it is consider as thecheapestsourcesforproducingelectricity.wearethehumanswehavethehabitofforgetting things and laziness to take about conserving power when there is no need. Toprevent that loss we use pic microcontroller and IR sensors to reduce the wastage of powerin our household home appliances. Where the specific IR signal is detected from theparticular remote by the microcontroller. We specifically program the microcontroller tocontrolmorethanoneappliancesinourhome.Inthisprojectaspecificvalueofhexadecimal is transmitted to the microcontroller from the remote so it is not interferedwith other IR signals from other remote controlled appliances. The main motto of thisprojectis toreducethewastageofunnoticedenergyfromour daytodaylife.

KEYWORDS

Loss of Electricity, Use of Microcontroller, IR Radiation, Control Appliances, Helps toPreventLoss ofElectricity.

Introduction

According to a survey in 2017 about electricity about 13% of world population doesnotreceiveelectricity.IncountrieslikesouthSudanabout268daysofblackoutofelectricity. And there are several countries in African continent people live more than 100days without electricity in ayear. Butwe have sufficient amount of electricity but we allof us waste without our knowledge.Whereseveral peoples does not take care aboutwastageelectricity.

Thereisalotof waysthatelectricityiswasted.Inthathouseholdwastageofelectricity stays in second position after the transportation wastage, we proposed this paperto control the wastage of electricity in home appliances. In our method we implement theArduino controller to reduce the wastage of electricity. This method is cost efficient andeasytoimplementinourdaytodaylife.

WiththehelpofArduinoideandsomeembeddedprogrammingalgorithmswedesigned the hardware and programmed the hardware in such a way that reduce wastingpower with the help of remote control. Where the microcontroller receive

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the hexadecimalcode from the remote according to the remote signal it will control the appliances in ourhome andreducethe wastageofpowerintheourdaytodaylife.

Literature Survey

In 2004, Benton H. Calhoun and Anantha P. Chandrakasan proposed to reduce thepower during the standby mode by decreasing both voltage and current. Analyzing flip-flop structures shows the voltage can scale before destroying state information. Energyconstrainedsystemsandcircuitswithlifetimerequirements,leakagereductionisespecially important during standby mode. use of canary flip flops enable closed loopstandbyvoltagescalingforachievingsavings nearthe optimum.

In 2013, Cheng-Hung Tsai and Ming-Bo Lin Senior Member IEEE, present a designwith implementation of module incorporates ultrasound to diminish the standby powerconsumption of a personal computer monitor.To design features a socket toplug-in thePC monitor, which enters standby status more efficiently, consuming 0.008W. Throughsocket power enables the display unit while consumer is noticed by ultrasound module;when the user leaves it turns the monitor off without using an idle timer, and the electricpower is cut off by the solid state relay (SSR) controlled by the micro control unit (MCU)toreducethestandbypower.

In 2015, Wonjae Lee,Yong-TaeLee,Min Choi proposed toreduce standby powerof settopboxes.Thisresearchincorporatesset-top boxes with energy savingsystemwhere passive standby modeis proposed toutilize passive standby mode.History ofTV/STB power on/off events is analysed and predict usage pattern. The system transfer aset-topboxtopassive standbymode andactivestandbymode.

In2016,HyunhoPark,SungwonByon,JunghakKim,Eui SukJungproposednetwork interworking for reducing standby power that set-top boxes consume in standbycondition. The network mechanism operates based on interactions between the set-topboxesandamode controlserverthatcancontroloperationmodes ofset-topboxes.

In 2016, Byoung-Hee Lee, Yeon-wooChoi andBong-Chul Kim were proposedwireless parallel resonance type resonator method to reduce Power. However, the powerconsumption in standby mode is rarely researched and reported in the literature. Since anumber of WPT system rapidly increases, itis necessary to develop a standby powerreduction technique for WPT system. This paper proposes a standby power reductionmethodforWPTsystemwithparallelresonancetyperesonator.

Working

The Home appliances are controlled with the help of Relay. The Relay can be turnedoff/on using the Arduino. When we press any button in IR transmitter (IR Remote) aunique Hexa-decimal code is generated.Old Televisions, Set-top boxes and Home theatersdon’t have STANDBY mode. Since, there is no STANDBY mode, power is wasted whenthey are not in use. Our Home appliances receives this Hexa-decimal code and returns thecorresponding response. For Example, if we press the turn off button in our IR remote itgenerate an unique Hexa-decimal code, which is detected by IR receiver in our applianceandinturnthe applianceis turnedoff.

WearereceivingthisuniqueHexa-decimalcodewiththehelpofIRreceiverconnected to the Arduino, when the IR receiver in the Arduino receives that particularHexa-decimal code, all the devices connected to Arduino using RELAY are turned off,similarlywhenwewanttoturnonallthedeviceaUniqueHexa-decimalcodeistransmitted to the IR Receiver in Arduino which will turn on all the appliances connectedtotheRelayintheArduino

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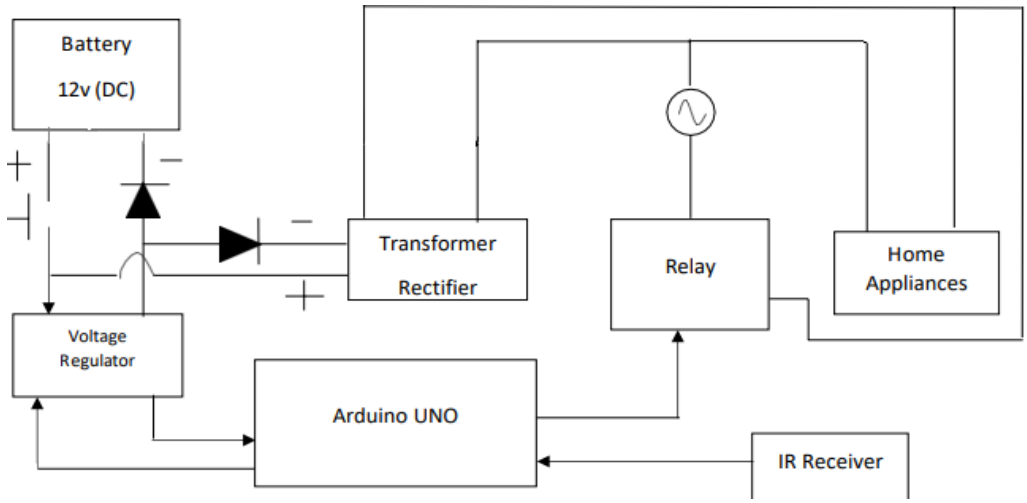
Block Diagram



Components

- **Arduino**

Arduino uno is a microcontroller and itis based on ATmega328.Arduino has 14 digital input output pins, 6 analog inputs, a 6mhz QuartzCrystal oscillator, a USB connection, a power jack, and a reset controlbutton mounted on it. The board will operate on an external supply inrange of (0-20) volts(DC). If we use more than 12 volts it may damagethe microcontroller the actual input voltage range of Arduino is (7-12).The Arduino has 32kb of flash memory, 2 KB of SRAM and 1KB ofEEPROM.

It gives the output of (0-5) v for both digital and analog pins. It has abuilt in analog to digital converter to convert analog signal in digitalsignal.

Arduino Uno

- **IR Receiver**

Aninfraredreceiverisathatsendsinformationfromaninfraredremote control to another device for specific function. An IRreceivercan receive and decode the infrared signal.The receiver outputs a

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codetouniquelyidentifytheinfraredsignalthatitreceivesandrespondaccordingtothatsignal.

IR Receiver

- **Transformer and Rectifier**

In transformer there are two types of transformer are there one is stepup transformer and another one is stepdown transformer. But in thisprojectweusestepdowntransformertoconvert230vacto12vac.Instepdowntransformerthenoofwindingsinprimarycoili salwaysgreaterthannoofwindingsinsecondarycoil.

Thentheoutputisfeedtorectifiercircuitwhichconvert12vacto12v.

- **`Relay**

A relay canbe definedas aswitch.Switchesare generally used toclose or open the circuitmanually. Relay is also a switch that connectsor disconnects two circuits. But instead of manual operation a relay isappliedwith electrical signal,whichinturn connects ordisconnectsanothercircuit.
In ourprojectwe are using Relay to Turn onor off theAC/HighVoltage appliances with the help of DC. Arduino controls the Relay andinturntheRelaycontrolstheACAppliances,weareusingSRD-05VDC-SL-CRelaytocontroltheAppliances.

- **Voltage Regulator**

Voltage regulator which convert pulsating DC signal from output ofthe rectifier to linear DC signal and allows only a particular voltage levelattheoutput. Example(IC7805,7812,7905).

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Voltage Regulator

Result and Discussion

WhenwepresspoweroffbuttoninIRremote,theapplianceconnectedtotheRelaygetsturnedoff**.**

WhenwepresspoweronbuttoninIRremote,theapplianceconnectedtotheRelaygetsturnedon.

Conclusion

Asimplesolutiontoaddstand-bymodetooldelectronicappliancesisdeveloped,Asa result the wastage of power is prevented in theold appliances. To prevent that loss,inthe proposed system pic microcontroller and IR sensors were used toreduce the wastageof power in our household home appliances. Where the specific IR signal is detected fromtheparticularremotebythemicrocontroller.

Proposed system controls the power using microcontroller to control more than oneappliances in our home. In this

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project a specific value of hexadecimal is transmitted to themicrocontrollerfromtheremotesoitisnotinterferedwithotherIRsignalsfromotherremotecontrolledappliances.Henceusingproposedsystemtheproposedsystemreducesthepowereffectively.

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