International Journal of Advanced Computer Research (ISSN (print): 2249-7277 ISSN (online): 2277-7970)
Volume-2 Number-4 Issue-6 December-2012

Wireless Switch for Saving Electricity

Santu Gharui[1], Writabrata Guha[2], Barnali Chakrabarty[3], Sk. Shaidul Islam[4]
Department of Electronics and Communication Engineering,
Siliguri Institute of Technology, Siliguri, India[1,2,3,4]

Abstract

We are going to represent an electrical switch that can change its behaviour through wireless. Realization of switch for saving electricity, we are interested to deal with such an implementation that can switch ON or OFF the electrical components on the basis of the status of the user. If the blood pressure goes below of a certain limit (fined by the programmer) the electrical components (light, fan etc.) will be off automatically. Graphical representation can also depict the sensitivity of heart. Briefly, as the ancillary tasks the architecture of wireless sensor and one of the new age technologies RFID are also introduced.

Keywords

Wireless communication, Wireless Sensor, RFID, Heart beat sensor.

1. Introduction

It is about the switching off the electrical components automatically just after sleeping. Here the diagrammatic overview of the project is sketched.
Firstly we are sensing the pulse rate through a heart rate/pulse sensor and the output will be feeding as the input of a RFID tag through an interface by the microcontroller. RFID tag will transmit the information wirelessly.
After the reader tracks the read/write data that are sent by the RFID tag through a contactless data link that interfaces with the computer database. This reader can be implemented which is a read/write analog front end attached with a microprocessor. Microprocessor output maybe the RS232 cable or USB data through which the reader can be interfaced with the computer. In the computer we are monitoring the sensed data by terminal software.
Miniature Circuit Breaker (MCB) - Automatic main that connects domestic lights, fans etc. through its individual switches. It has one basic feature, whenever there is any short circuit in the line the main is turned down instantly. Instead of MCB we can use **relay switch** also. Here the microcontroller plays the vital role because in the microcontroller we are setting the cut off and burn by its corresponding program which controls the short-circuit mechanism of the MCB i.e. the program depicts that whenever the terminal computer output is lower than cut-off the main switch will be off otherwise it will remain in the on condition.
Here we are given a theoretical approach to meet our destiny but some change may be occurred for practical implementation.

2. Literature Review

Here we are interested to deal with such an implementation that can switch on or off the electrical components on the basis of the status of the user. If the blood pressure goes to below of a certain limit (mostly in case of sleeping) we will further see the electrical components (light, fan etc) will be off. As the ancillary task the architecture of the intelligent wireless sensor and RFID also will be introduced.
The whole project can be sectioned in to three sections:-
Firstly sensing the pulse rate through a **Heart Rate/ Pulse sensor** and the output will be checked through light emitting diode (wireless) that will be receive by RFID Tag.
In the computer we are monitoring the sensed data by monitoring tool or any parameterized software. This will send the ultimate instruction (1/0) to microcontroller.1=OFF, 0=ON or vice-versa as code are implemented by the programmer.
The PC is acting like a decision making device that regulates the functionality of electrical components such as light, fan etc. That means, the switching off/On will depend on the 1/0 output of the microcontroller or any decision making program.
CUT-OFF: The pulse rate differ to awake and sleeping human being**,** as we know that the pulse rate is reduced after sleeping .By monitoring the pulse rate we will fix the cut-off.

A. Sensing the heart beat

A sensor is a device that measures a physical quantity and converts it to a signal which can be read by an observer or by an instrument

The easiest way to measure the heart rate is using heart rate sensor. Heart rate sensor monitors the light level transmitted through the vascular tissue of the fingertip and the corresponding variations in light intensities that occur as the blood volume change in the tissue. The ease of use makes it possible to measure everyone's heart rate even in larger classes. The heart rate sensor measures the heart rate 0 to 200 b.p.m.

Unlike an electrocardiograph (EKG) that monitors the electrical signal of heart, the heart rate sensor measures the heart rate by monitoring the change in infrared transmittance through the blood vessels. The amount of blood changes with time and corresponding variation in light intensities change. By comparing the heart rate of different individuals we can plot the signal from where heart rate can be determined.

Technical notes:-

1. Best measures are done on a fingertip.
2. Reposition the heart rate clip until you see a smooth heart rate pattern is inhibited.
3. Remain calm during this period.
4. Don't use sensor at a very light surrounding.

B . Wireless Transfer using RFID

Radio frequency identification (RFID) is a technology that uses communication through the use of radio waves to exchange data between a reader and an electronic tag attached to it.

It is possible that in the nearest future RFID technology will continue to proliferate in our daily lives the way that barcode technology did over the forty years leading up to the turn of 21st century bringing unconstructive and remarkable change when it was new.

Components of RFID

(i) One or more RF tags
(ii) Two or more antennas
(iii) One or more interrogators
(iv) One or more host computer
(v) Appropriate software

The antenna emits radio signals to activate the tag and to read and write data to it. The reader emits radio waves in ranges of anywhere from 1 inch to 100ft or more, depending upon its power output and the radio frequency used. When an RFID tag passes through the electromagnetic zone, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit (silicon chip) and the data is passed to the host computer for processing. A semi active tag has a small battery which keeps the microchip alert which makes the tag 13 respond faster. This type of tag can be used on vehicle for road toll payment. The semi active tag is powered by an internal battery to run the microchip's circuitry and to broadcast a signal to the reader. The principle of semi passive and semi active tags were similar.

Wireless connection based intelligent sensor combine sensing, computation into a single small device. Because sensor carries its own wireless data transmitter, the time and the cost for installation and maintenance.

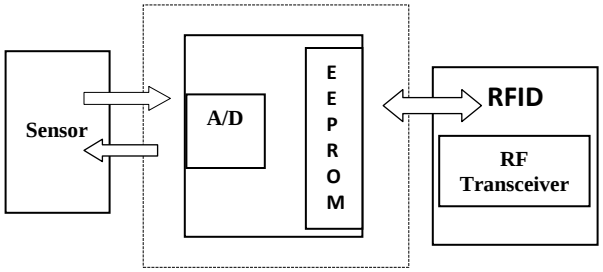

Fig 1: Sensor RFID interfacing

C. Receiving Through RFID Reader

Wirelessly transmitted data are received by the RFID reader. It contains an antenna packaged with a transceiver and decoder. It emits a signal that can activate the RFID tag and decodes the data in it. The output of the reader is connected to the pc by application program software

D. Interfacing of Tag & Pesonal Computer (PC)

We have come through the RFID and now are dealing with the matter to transmit the data from RFID reader to the computer.

Here we can implement a RFID reader to transmit the data from RFID tag to reader completely wirelessly.

Here we can implement a RFID tag having resonating frequency 125 KHz. Now if we give such a specification to the RFID reader so that it also can pursue resonating frequency of 125 KHz we can transmit the data wirelessly in an efficient manner due to coupling them.

Now RFID reader can be connected to personal computer using software called application program interface (API) software.

So, in this way we can interface the hardware and software part.

E. Software Representation

Here we can design software in such a way that can automatically simulate the graph of heart rate from the received data. Here we can show the systolic and diastolic pressure in the curve and if possible in P-Q-R-S curve format through which it can also diagnose condition of the heart. Setting up a proper checking to justify the heart rate when we are actually sleeping or awake. This software will be sending instruction to the output switch or electrical component to regulate (ON/OFF).

F. O/P Switches Control

Output switch can be controlled through the instructions of software generated '1' or '0' that can be easily followed by relay switch or by Miniature circuit breaker (MCB). For 1=OFF & 0=ON and it is not fixed logic it could be changed as the programmer do implement the coding. Eventually it is evident that the algorithm should be designed in such a way that can easily control the output switches i.e. sending appropriate instruction to the external switches to extinguish or turn on the light, fan and many more electrical components.

3. Proposed Model

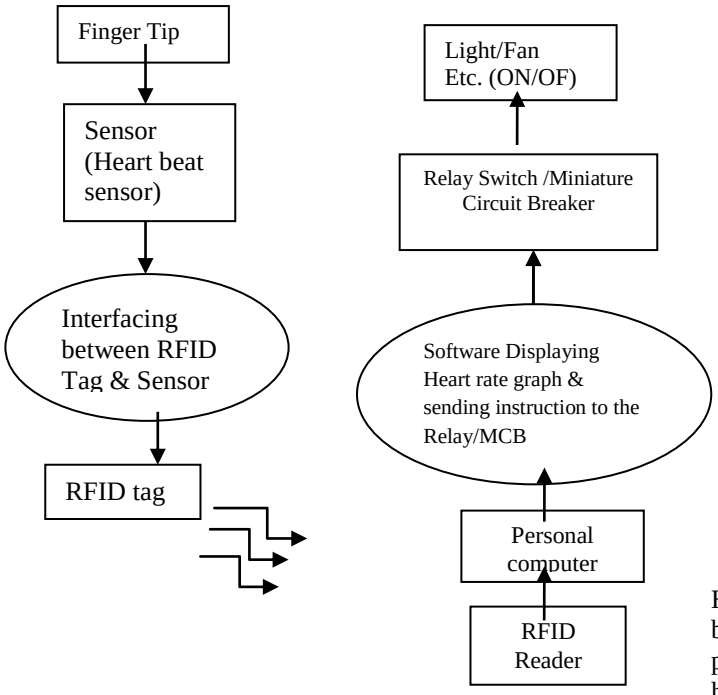

Fig 2: Overview of the main stages of the system

It is already explain that why heart beat sensor used at finger tip. So, clip of the heart beat sensor is properly adjusted to the finger tip. Blood pressure difference can be detected from the blood vessel through infrared. There will be creating a voltage difference which will be feed to the RFID tag with the proper format by converting through A/D converter with the help of microcontroller. This total package of heart beat sensor and RFID tag can be depicted as intelligent sensor or wireless sensor.

RFID tag will be transferring the data and the RFID reader will be acting as receiver end here. It collects the data and feed to the personal computer with the proper interfacing technique.

In the PC use application software to simulate the data which is coming from the RFID. With the various parameter that can be very easy to analyze the state of the heart. And we all know that blood pressure is lowering when we are sleeping than awake. So a proper checking with proper cut-off value of blood pressure can easily be controlled the output switching system and electrical component.

Finally instruction will be sent to the relay switch or MCB on the basis of the cut-off values upper and lower condition. According to which lights, fans etc will be keep ON or OFF.

4. Application

Its application can be categorized into two parts:

1. **Home based Application:** Normally used to track individuals heart state as well as for the saving of electricity. Many of us are sleeping at the night without switching off the light. In this project can be one of the solutions of reducing wastage of power unnecessarily.

2. **Medical practice:** In electrocardiogram machine doctors can visualize the state of heart of any patient. In this project also depict that P-Q-R-S curve also have the possibility of visualize more precisely and give a good demonstration to the heart beat analysis.

5. Conclusion

Here in this time we have tried to make such a design by which we can save electricity. It can be a useful product in our nearest future .If a person sleeps, his/her blood pressure reasonably drops, and the literature of this product itself says that the light will

be off automatically. Till now we are working on it and trying to implement it for completely practical purpose like switching on or off the fan, light action. On the other hand it can be cite a new device for the medical practices in respect of cost affectivity. In this project as an ancillary task we have gone through RFID. RFID is a new age technology that is going to dominate the world and has already replaced the BARCODE. We have used RFID by giving it a different dimension. Some drawbacks may be occurred at the time of implementation. We are working on it and hopefully we can present the electricity saving wireless switch giving it all practical dimensions shortly.

Acknowledgment

Thanks to Mrs. Anindita Sinha, Asst. Professor of Siliguri Institute of Technology, for her great support.

References

[1] RFID journals by L.AGASTULIN AND NIAMO in the year 2009.
[2] Choi W., Kim H., and Min B., "A New Automatic Cardiac Output Control Algorithm for Moing Actuator Total Artificial Heart by Motor Current Waveform Analysis," International Journal of Artificial Organs, vol. 19, no. 3, pp. 189-197, 1996.
[3] Celler B., "Remote Monitoring of Health Status of the Elderly at Home," International Journal of Biomedical Computing, vol. 40, no. 2, pp. 147-153, 1995.
[4] Ayang-ang C. and Sison L., "Electrocardiograph Pre-Filtering, QRS Detection, and Palm Display Programming for Biomedical Applications," in Proceedings of the ECE Conference, University of St. Tomas, Manila, 2001.
[5] Arif C., "Embedded Cardiac Rhythm Analysis and Wireless Transmission (Wi-CARE)," MS Thesis, School of Computing and Software Engineering, Southern Polytechnic State University, Marietta, Georgia, USA, 2004.
[6] Percutaneous fiber-optic sensor for chronic glucose monitoring in vivo. Liao KC, Hogen-Esch T, Richmond FJ, Marcu L, Clifton W, Loeb GE. Biosens Bioelectron. 2008 May 15;23(10):1458-65.
[7] Clark HA, Kopelman R, Tjalkens R, Philbert MA. Optical nanosensors for chemical analysis inside single living cells. 2. Sensors for pH and calcium and the intracellular application of PEBBLE sensors. Anal Chem. 1999 Nov 1;71(21):4837-43.
[8] Entrapment of biomolecules in sol-gel matrix for applications in biosensors: problems and future prospects. Gupta R, Chaudhury NK. Biosens Bioelectron. 2007 May 15; 22(11):2387-99.
[9] Nanomedicine and its potential in diabetes research and practice. Pickup JC, Zhi ZL, Khan F, Saxl T, Birch DJ. Diabetes Metab Res Rev. 2008 Nov-Dec; 24(8):604-10.
[10] International Union of Pure and Applied Chemistry. "Biosensor". Compendium of Chemical Terminology Internet edition.
[11] Balm G., "Cross-Correlation Techniques Applied to the Electrocardiogram Interpretation Problem," IEEE Transactions on Biomedical Engineering, vol. 14, no. 4, pp. 258-262, 1979.
[12] Abenstein J. and Tompking W., "A New Data-Reduction Algorithm for Real Time ECG Analysis," IEEE Transactions Biomedical Engineering, vol. 29, no. 1, pp. 43-47, 1982.

Santu Gharui had completed B.Tech in Electronics and Communication Engineering from Siliguri Institute of Technology.

Sk. Shaidul Islam had completed B.Tech in Electronics and Communication Engineering from Siliguri Institute of technology.

Writabrata Guha had completed B.Tech in Electronics and Communication Engineering from Siliguri Institute of Technology.

Barnali Chakrabarty had completed B.Tech in Electronics and Communication Engineering from Siliguri Institute of technology.