

# Web based Appliance Monitoring and Control

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**Abstract**— *Technology is to provide comfort and easiness to society but at the same time it must be commercially viable and sustainable. In today's era, electronics technology is growing rapidly. Towards increasing population and their demand, every day we came across new technologies and developments. As we know that we can transmit information wirelessly from the farther place by using Bluetooth, NFC or Zig-bee module and that information is enough for smart controllers to perform any types of switching action from industrial motors to small home appliances but these modules are power consuming and capable to transmit information up to certain distances. Here we proposed a simple technique to use the internet and send the switching and control information which breaks the barrier of distance limitation. This paper proposes a methodology by which we can monitor and control any appliance by sitting across the world and at the same time appliance can also communicate and validate the response to their users and make this technique suitable as an internet of things. To control the switching action a secure webpage is made for each user from where a user can login and update the status to automate any of his appliances or can monitor the temperature, humidity and other parameters by sitting at remote location. Arduino boards are low cost Matlab compatible open source hardware. At the monitoring and control end we are using AVR based Arduino board with Ethernet shield connected to router. The complete setup of Arduino with Matlab standalone application access the update status and performed the task assigned as per the algorithms where any appliance can be controlled. In this proposed concept there is no transmission distance limit as data has to travel through internet and make possible the internet of things. There is no limitation on the number of appliances to be controlled. User can control and monitor the appliances using this. This type of application can be used in any field not only in automatic switching of appliances such as in hospitals a doctor can monitor his patients status on internet and can do a quick treatments as per status rather coming again and again at the patient end. The major programming part of this concept has been done on Matlab.*

**Keywords:** Arduino, AVR, IOT

## 1. INTRODUCTION

With the changing life style, demand for the advance technology is the need in every sphere of life. Aim of this proposed technique is to design an embedded system through which all the electronic and electrical appliance can be made accessible online so is to convenient via internet from anywhere in the world using smartphones. The idea of smart workplace can be accomplished with the help of this technology.

In recent technology, devices like Bluetooth, NFC and Zig-bee are the most popular wireless communicating medium but can work up to certain distances. When there is a need of global coverage then internet is always the most popular and reliable communicating medium. This also eliminates the barrier of communication distance likewise other wireless communicating mediums.

In today's world, lifestyle is so busy that people often forget to switch off the mobile chargers, bulbs and other appliances while going out of home. A company owner is going out of the office for some company work can't monitor the status of critical appliances and the work progress. In medical field also doctor wants to monitor the patient status from the remote location. There are many more such areas where need of online appliances are critical. The proposed methodology is quite suitable to make the things online so that we can talk to those things and monitor their status like our facebook account and can update some new status. Using this internet based application a person is able to switch off their appliance from his work place and a company owner is able to get information of his critical appliances time to time. Doctor is also able to monitor his patient's status in case of emergency.

The proposed methodology is divided into three parts. In the first part of this technique a interactive web page has been made using a free google sites domain containing the detail of online things their id and status update of the smart workplace so that a remote user can make any schedule of the changes or can change the status of things available online from a remote location anywhere in the world only internet connection is required for that. This control features are secure because each user will be given a login id and password for his smart workplace account.

The second part is the programming part. Most of programming part is done on Matlab. To make an easy interface this method also proposed to use a cluster of programming language consist html coding for webpage and app inventor coding for android mobile compatibility.

Last and the most important part of the proposed technique is the hardware part which is implemented on the AVR based arduino Uno.

It has been proposed to use a web page or an android application to monitor and control the things available on internet at smart workplace without any physical presence. This is the most secure control because login id and password information is required to access the control web page or the android application.

To make this project gainful google sites has been used to create the webpage and app inventor tool has been used to make an android based monitoring and control application. A unique login id and password is required to make any change on this control webpage. Webpage consist of the status and other details of the things so that authorized user can update the status from any remote location using login detail. It enables the remote user to control the various functionalities of home appliances like speed, duration of operation, scheduling of switching etc. The person can control their whole workplace from the remote location.

## 2. LITERATURE SURVEY

Smart home environment have evolved to the point where everyday objects and devices at home can be networked to give the new method to control them. The purpose of this web based control is to devise a set of intelligent home appliances that can provide an awareness of the user's needs, providing them with a better home life experience without overpowering them with complex technology and intuitive user interfaces.

Rodden and Benford had divide smart home devices into the following three types: interactive household objects which are familiar, existing household objects incorporating new possibilities for interaction; augmented furniture, which has interaction capability embedded in it; and information appliances, which are existing household appliances with standardized interaction and communication facilities and devices layered on them.

In their research, their aim was to explore the possibility of using information appliances already in the home environment to control a section of familiar household objects. Three common appliances used such as a PC, a media terminal or a mobile phone to select smart home function. The usability and acceptability of these functions were analyzed through focus groups, laboratory test, and an ethnographic study through actual use and living experience in a real smart home.

In other research by others, user experiences of smart home solution have been studied, for example, with test and walkthrough of wizard-of-Oz-type prototypes and brief field trials. Also, longer trial period have been used, but the user have often been a part of the design team. The unique value of their research lies in its empirical setting that allowed comparison of three functional UIs in an actual living environment over a long time period.

This paper shows that a server with an Arduino board can be used to control the home appliances. Here we consider PC/laptop/mobile as a server and Matlab stand alone

application access the web page on the server to get the update value using internet (A simple PC or laptop with internet connection is also enough) This update value can be mapped to Arduino to drive the appliances.

## 3. TECNOLOGY CLUSTER

### 3.1 Matlab

Matlab is versatile platform to access the multidimensional activity like urlread, Arduino interface, object oriented programming and stand alone application with graphical user interface.

### 3.2 Webpage

Here in this paper we suggested google sites free hosting service for design a control web page for end user. We can buy our own domain as well to host the control page.

### 3.3 Arduino

Arduino is an AVR based general purpose controller board. Matlab support this hardware to do the things easier for appliances control.

### 3.4 Web Servers

At the destination we need a web service so that we can watch out the control webpage status. For this purpose we can use a web server or a simple computer with internet connection.

### 3.5 Drive Board

Driver board consist of a number of relays as per the requirement and their control circuit. This board get connected to Arduino and Arduino is already connected to a web server.

## 4. METHADODOLOGY

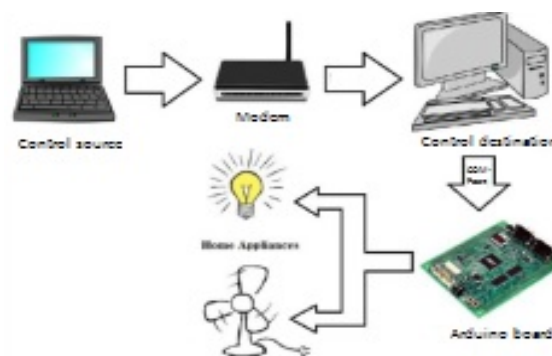


Fig. 1: Methadology

## 5. ALGORITHM

- Initialise of Arduino board
- Test the web connection

- If connection status is ok, read the url of control web page else test the web connection
- Save the url content in a string form and find the string location of the updated value
- Read the string location of update value this gives the updated value in string form
- Update value string data type converted into number suitable for logical operation
- Use switch statement to access certain Arduino pin on which relay or other devices are connected.
- After switching the Arduino program bounce back in an infinite loop starting with testing of web connection.

Now update the control page with the specified control values and run the above program to get the update values.

## 6. ADVANTAGE

### 6.1 Real time control

User can monitor the real-time status of each of the connected appliances and make adjustment as & when he/she feels it necessary.

### 6.2 Report generation

Allows user to analyse the usage of the various appliances and its time of usage through generation of detailed reports for the appliances. These usage reports are useful in identifying the working and efficiency of each appliance and can set usage timings and power inputs to optimise the usage to cost ratio.

### 6.3 Notifications

Provides user with appliance related notifications regarding state of the appliance etc. as and when required. Arduino is an AVR based general purpose controller board.

### 6.4 Security

The system can be employed as a very efficient security tool by connecting cameras, and other sensors to the system. The status of these sensors and monitors can be monitored from a remote location and can be used to gather security information about the home in general and take the required measures for the same

### 6.5 Versatility

Many technologies has been proposed so far to control the appliances using internet but all of them has limitation that they need to be restarted if internet connection get fails. But this proposed methodology also watches the status of internet and it can alarm if internet connection get failed but the system keep working as per the latest update value. As the internet connection reverts, this will automatically pick the latest update value.

## 7. APPLICATION

### A. Security and Surveillance

Various security systems can be integrated along with this system such as, cameras, motion sensors, luminance sensors etc. to enable the users to monitor various accepts of their home via a remote machine in real-time.

### 7.1 Energy Management

One of the major applications of this system one involving the optimised management of energy consumed by the various appliances of a household. Since all appliances has to be monitored and controlled in real-time, users can program the system so that a schedule is followed for the home appliances. The proposed system can be very useful in situations where the user has forgotten to turn off a particular device while leaving the house. All the user needs to do is access the web application and make the required changes.

### 7.2 Lighting

The system can be scheduled to switch on certain lights when required, using the circuit.

Example: turning on the porch light at 7PM every day and shut them off at scheduled time.

### 7.3 Access Control

The proposed approach can be integrated with digital locking systems or can provide biometric recognition systems etc. so as to provide the remote user real-time monitoring of the house and other places.

## 8. CONCLUSION AND FUTURE SCOPE

This system of web based appliance control has a vast area of application. The general prospect of this paper is to create concept that how we can monitor and control the destination from any web source. The most significant limitation of the system is that it is completely dependent on the internet for the feature of remote access and arduino is system dependent. To make it an independent device AVR based Arduino has to be replaced with a Wi-Fi enabled device. The based proposed solution for this is to use a mobile web server. This proposed idea can be used in medical field, industrial monitoring and control, home automation and many more.

This proposed scheme can be further extended to industrial application point of view where machines have to be monitored 24x7 hours.

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