Energy Saving Through Smart Home Automation System

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Abstract:
As home energy use is increasing and renewable energy systems are deployed, home energy management system (HEMS) needs to consider both energy consumption and generation simultaneously to minimize the energy cost. This paper proposes a smart HEMS architecture that considers both energy consumption and generation simultaneously. The home server gathers the energy consumption and generation data, analyzes them for energy estimation, and controls the home energy use schedule to minimize the energy cost. The remote energy management server aggregates the energy data from numerous home servers, compares them, and creates useful statistical analysis information. By considering both energy consumption and generation, the proposed HEMS architecture is expected to optimize home energy use and result in home energy cost saving.

Keywords: Home energy saving system, IOT, Android app, Arduino controller, Electrical equipment.

1. INTRODUCTION:
Internet of Things or (IoT) is the internetworking of physical devices, vehicles (also referred to as “connected devices” and "smart devices"), buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. When IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of cyber-physical systems, which also encompasses technologies such as smart grids, smart homes, intelligent transportation and smart cities.

2. LITERATURE REVIEW (EXISTING METHODS):

<table>
<thead>
<tr>
<th>NAME</th>
<th>DISCRUPTION</th>
<th>YEAR</th>
</tr>
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<tbody>
<tr>
<td>Energy Efficient Smart Home Automation System.</td>
<td>This framework only work when people present in home &amp; it leave the room automatically switch off all equipment.</td>
<td>2013</td>
</tr>
<tr>
<td>Home Automation Systems -</td>
<td>This paper is based on Bluetooth device and also use GSM network for conn.</td>
<td>2014</td>
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</tbody>
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3. PROPOSED WORK:
To provide easy access of home equipments to old aged and handicapped persons. To provides more safety control on the switches with low voltage activating method. In order improve the standard living in home, this system provides Android based application. Main focus is to control home equipments like fan, Bulb etc. System is also able to Check Room temperature using temperature sensor.

3.1 OBJECTIVE:
1. It improve the robustness and imperceptibility
2. The scheme is free from false positive error.
3. Authentic access is possible

3.2. ALGORITHM:
i. Step 1: register on App with Mobile no. UserName and Password.
ii. Step 2: Get user Trigger value.
iii. Step 3: call Arduino function
iv. Step 2.1: Get U as Input to TD.
v. Step 2.2: for i=0 to MAX //MAX = maximum no of Trigger to be generated by user.
vi. Step2.3 : trigger goes to TD
vii. Step 4.1: Get TD as Input.
viii. Step 4.2 :Call Arduino function
ix. Step 4.3: Process trigger data.
x. Step 5: Display Result Light ON or OFF.
xi. Step 6: Stop.

3.3 MATHEMATICAL MODEL:

System Specification:

S= {S, s, X, Y, T, f\textsubscript{main}, DD, NDD, f\textsubscript{friend}, memory shared, CPU\textsubscript{count}}

S (system):- Is our proposed system which includes following tuple.

s (initial state at time T ) :GUI of Home Automation. The GUI provides space to enter a query/input for user.

X (input to system):- Input Query. The user has to first enter the query. The query may be ambiguous or not. The query also represents what user wants to search.

Y (output of system):- List of URL's with Snippets. User has to enter a query into Home Automation then Home Automation generates a result which contains relevant and irrelevant URL’s and their snippets.

T (No. of steps to be performed):- 6. These are the total number of steps required to process a query and generates results.

f\textsubscript{main} (main algorithm) It contains Process P. Process P contains Input, Output and subordinates functions. It shows how the query will be processed into different modules and how the results are generated.

DD (deterministic data):- It contains Database data. Here we have considered ON OFF Trigger values. This contains number on off trigger values. Light ON OFF triggers value use for showing results. Hence, ON OFF trigger value is our DD.

NDD (non-deterministic data):- No. of input queries. In our system, user can enter numbers of queries so that we cannot judge how many queries user enters into single session. Hence, Number of Input queries are our NDD.

f\textsubscript{friend} :-WC and IE. In our system, WC and IE are the friend functions of the main functions. Since we will be using both the functions, both are included in ffriend function.

Memory shared: - Database. Database will store information like list of receivers, registration details and numbers of receivers. Since it is the only memory shared in our system, we have included it in the memory shared.

CPU\textsubscript{count} :- 2. In our system, we require 1 CPU for server and minimum 1 CPU for client. Hence, CPU\textsubscript{count} is 2.

Subordinate functions:
Identify the processes as P.
S= \{I, O, P,...\}
P= \{TD, AD\}
Where,
TD is Trigger data for Arduino
AD is Arduino Data.
P is processes
TD= \{U, MAX, LG\}
Where,
U=ON OFF trigger
MAX = \{0,1\}
LG is output where Light ON or OFF base on U .
AD= \{LG, Arduino Techniques, Info\}
Where,
LG is input which is given to AD
Arduino is use for Glow Light ON or OFF

4. ARCHITECTURE DIAGRAM:

5. FUTURE SCOPE:

The basic vision of the system is to provide a Home Automation System Using IR Sensors convenient secure system to the user, which would aid the high degree of mobility control we aim to achieve nowadays. The future work for Intelligent Home System can be porting the system to the cloud so that any device eventually could be used to control and monitor the Intelligent Home System remotely over cloud. The monitoring part not only limited to the ON/ OFF the home appliances only. Motion sensor may add for automatic lighting and turning ON the fans in the area where user were there. Schedule may add to enable user to set the ON/ OFF timer for home appliance.
6. RESULTS:

• Remotely on/off the electric appliances.
• Check the Status of electrical devices in home
• If user found electrical appliances is ON then user can operate or OFF appliances using Android application from outside the home.
• Using this system we can successfully saves Electrical energy.

7. CONCLUSION:

From this we can conclude that An Android Smartphone is effectively use to control Home Equipments like FAN/ BULB. The user can send commands to ON/OFF the equipments. Android application provides user interface to communicate with system.

8. ACKNOWLEDGMENT:

It gives us a great pleasure to presenting the paper on Energy saving in Home Automation System. We would like to take this opportunity to thank my guide Prof. Ajit Pagar for giving me all the help and guidance that all we needed. We are really greatful to them for their kind support. There valuable suggestions were very helpful for us. Thanks to all of those who are support to us in this project implementation.

9. REFERENCES:


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