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1   Introduction

1.1   Purpose

The purpose of this document is identify from research and analyse, the high-level needs and features of the yet to be named Home OS system. The current focus is on the end users and the needs of the users. Lower level technical design information including Use Cases will be available in supplementary documentation at different stages throughout the project life cycle.

1.2   Scope

This Vision Document applies to the interior appliance management system, which will be developed by Keith Byrne with student ID C00170460 as part of Honours Bachelor's Degree studies at the Institute of Technology Carlow. The project will provisionally optimised for web based interaction using HTML, CSS, JavaScript, JQuery (AJAX), Raspberry Pi B+, GPIO radio communication and yet to be decided web framework and database framework, provisionally MySQL or SQL-CE. Depending on progress it may also be possible to add mobile support using the Android operating system. The system will provide a medium for home owners to control certain areas of their homes and better reduce the impact that excess and unnecessary power consumption has on the environment and also on the home owners utility bill. There is also a concept of parental appliance controls.

1.3   Definitions, Acronyms & Abbreviations

- HTML – Hypertext Mark-up Language.
- CSS – Cascading Style Sheet.
- AJAX – Asynchronous JavaScript & XML.
- Android – Mobile operating system developed by Google using a Linux kernel.
- Raspberry Pi – Low power single board computer.
- GPIO – General purpose input output power and data nodes on the Pi.
- OS – Operating system.
- MySQL – Database technology.
- SQL-CE – Compact edition of SQL database technology.

2   Principle Requirements

The Home OS system will be used by home owners or tenants (with the agreement of the landlord). There are no ideal age bands for the system. The system will not be available to people with clinical blindness or missing extremities unless the control of the system is surrogated to a care giver. These issues are not however considered within the project scope.

- The system will allow for remote appliance binary control.
- To measure based on electronic averages the consumption and cost of electricity.
- The macro manage rooms of appliances.
- Parental time locking control of appliances.
- Remote review of the above measures via web application and Android application.

3   Stakeholders

3.1   Key Stakeholder Needs

Need	Priority	Concerns	Solution	Proposition
Ease of use	High	Users must be able to control the system without existing technical knowledge.	Yet to be defined.	Make the web based interface as visibly friendly as possible.
Extensible	High	To allow for future developments and maintenance, the system must be able to react to change and improvement.	Developer support	Rich documentation to support future developments.

4   Home OS System Proposal

With the rising costs of electricity due to the dwindling supply of the finite resources that provide a large portion of the world's energy supply, making small changes to how behave can really make a difference. Many of us leave our homes without a care as to what unnecessary energy consumption is actually doing to the physical state of planet. Leaving appliances on because it's more convenient to simply leave it on, rather than going through the effort of turning it off and back on when it's needed.

It is true that people have very hectic schedules and simply may not have the time available to be concerned about these seemingly trivial issues. However, upon analysing the actual costs of unnecessary power consumption, even with a small number of idle phone chargers, laptop chargers, one can understand the need for a change in how people view this issue. As these electrical items are still active and drawing a current. The following points are a brief overview of the impact that even leaving the house for two hours can have:

1. The increase of the carbon footprint
2. Higher cost of living
3. Maintenance costs of appliances

My proposed project idea aims to help people in reducing this impact by creating a system that makes it easy to control what's on and what's not, even when that person is not even in the home. Furthermore, to allow householders to monitor activity in an effort to cut costs of the electricity bill (appliance by appliance basis) and potentially regulate usage of certain systems, such as TV's after hours for children.

A brief sample of hypothetical usage:

1. Users acquires a system for 15 appliances
2. Installs the system with information on each
3. User can create groups of appliances such as kitchen area, bedrooms etc…
4. User can set time rules on certain appliances, such as turn off lamps in kitchen at 10pm on weekdays or turn on lamps in bedroom at 7am until 8am on weekdays
5. Add users that can control the system remotely via web access
6. Reports can be generated on the usage over the past week, month or longer

5   Overview of Technology

I had conceptualised an RF controlled socket solution, available at hardware's or online. However, I am continuing my research into a more tightly controlled solution as this option contains many hacks to use one set of devices to control another set of devices.

With this solution in mind, a small device can then communicate to these devices using the analysed frequencies from the included radio remote. How many of these can be linked, I am not sure.

5.1 Physical System

I would consider using a RaspberryPi or Intel Arduino. At the moment the Pi has much broader community support and less reinventing will be needed for handling the general purpose input output pins.

5.2 Front-End

At the moment, I would consider firstly a browser for handling the user's interaction with the system, with the option of an Android application if the supervision considers it feasible.

5.3 Backend

The list of options for RaspberryPi is rather long and I have yet to consider a viable candidate for this. Plenty of frameworks are available and also plenty of operating systems are available for the Pi itself, with Ubuntu Mate being the preferred so far.

6 High Level Overview Diagram