

MyHome Bluetooth Socket

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Abstract

This technology can harness the power of Bluetooth, to control all electrical outlets monitored on your smart phone. MyHome is a revolutionary energy monitoring socket capable of learning homes through use. The software will recommend schedules and provide feedback on power conservation.

Motivation

The importance of monitoring power usage is ever growing around the world due to the increasing availability and affordability of electrical appliances. MyHome aims to reduce the domestic carbon footprint by transforming regular homes into smart and energy efficient homes.

This product has currency in the British market as the implications of Brexit will impact on the economy and many imported fuels. It is estimated that the average U.K. tax payer will be more energy cautious over the coming years through “soaring energy bills” (lovemoney, 2016).

Although, spending less than their American counterparts (Fig. 1), the U.K. ranked second in Europe’s household average electricity consumption in 2010 (Wilson, 2012).

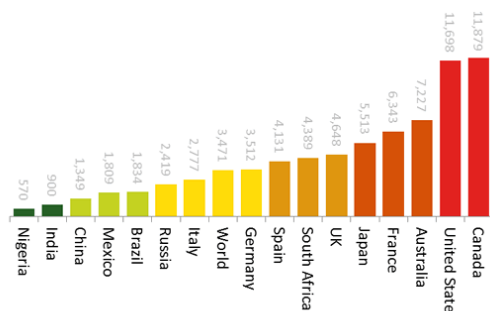


Figure 1 - Household Electricity Consumption (kWh/year)

Market research indicated an already saturated area with most products claiming to be ‘the be all and end all of smart home technology’. However, most products require expensive implementation costs and therefore, discourage the average home owner. For example, Hive Home by British Gas requires the purchasing of a controller as well as Hive’s own heating & lighting appliances that contain a Hive sensor. Other products such as infrared plugs are intrusive, require a remote and have no additional functionality justifying the large costs such as feedback on power usage.

The rise of Kickstarter has greatly increased the number of patents for smart home technology. A patent search was conducted on Espacenet and no patents relating to the current product could be found. See results in the table below.

Search Words	Results
Bluetooth plug	17
Bluetooth plug mobile / phone	0
Bluetooth switch	71
Bluetooth switch mobile / phone	
Bluetooth wall outlet	0

The patent search results prove that MyHome is unique and its technology patentable. Therefore, the product could be sold in not just the United Kingdom but also across Europe. The product’s multi-regional socket and smart voltage calibration means that no additional sockets will need to be designed before exporting to new markets.

Overview

This technology is compatible with conventional wall sockets allowing for easy installation. Therefore, all products plugged in will be recorded and their power usage logged.

MyHome contains an Arduino Bluetooth board providing access to our socket readings from your phone. Arduino's growing use in education (Arduino, 2016) and cost efficiency means that technical minded consumers will be able to develop their own code to enhance their MyHome and schools will be able to teach different programming in an engaging manner at different levels.

A "Bluetooth device uses radio waves instead of wires or cables to connect to a phone or computer" We use Bluetooth over alternative wireless mediums because "Bluetooth is everywhere, it operates on low power, it is easy to use and it doesn't cost a lot to use" (Bluetooth SIG, 2016).

Smart home technology is predominately makes use of WIFI. Some uses of WIFI are voice control (Amazon Echo), provide feedback regarding carbon monoxide (Nest Protect) and control cooking appliances (Belken WeMo). WIFI allows users to control their homes over long geographical distances however, unlike Bluetooth, homes must be fitted with a WIFI network. As of 2012 only 73.3% of homes in the United Kingdom had WIFI networks (Jackson, 2012). Therefore, smart home technology requiring WIFI will not work in over a quarter of British homes.

Until home internet access is more commonplace, Bluetooth will be the main wireless medium. Bluetooth is commonly found in smartphones and can be integrated in remotes meaning that it is highly assessable and no additional products are required.

MyHome unlike rival start-ups will contain a manual switch on each socket so that the socket does not fully rely on a Bluetooth device in case of technical failure.

The product will feature an LED notification light. The LED light will change colour to point out issues with the socket, the socket's current Bluetooth status and when appliances are charged. The LED light can be controlled via the app allowing the user to enable and disable certain notifications. For colour-blind users, they can set the LED to blink instead of change colour.

Physical Product

MyHome sockets are designed to accept universal plugs but, will understand and distribute power per the region's standards that it is installed.

For use in the U.K., the socket will accept British standard Type G power plugs and will be available in both single and dual outlets, meeting the region's standards (World Standards, n.d.). Our sockets are based on BS 1363 sockets (Mullins, 2006), ensuring they meet U.K. safety regulations. Therefore, they will have shutters on the line and neutral contacts to prevent the insertion of a foreign object into the socket as well as having a socket cover to ensure electrical safety (Gov UK, 2012).

The product will meet conventual UK socket dimensions 86mm x 146mm for dual sockets and 86 x 86mm for single sockets (forbesandlomag, n.d.).

The backbox is 30mm deep, made to fit between the smallest of conventual partitions. The product will fit inside the backbox safely and with enough room to air and cool components.

Inside the chassis are incisions for insertions for two circuit boards and areas dedicated for each component.

The Product will contain two USB ports, one female USB port to charge devices and one male USB port to flash or write code to the Bluetooth board.

Prototype

The prototype/3d print consists of the main shell of the socket. The prototype shows a physical representation of how the product will work.

Figure 2 shows the concept for the physical socket, displaying the components, backbox and faceplate.

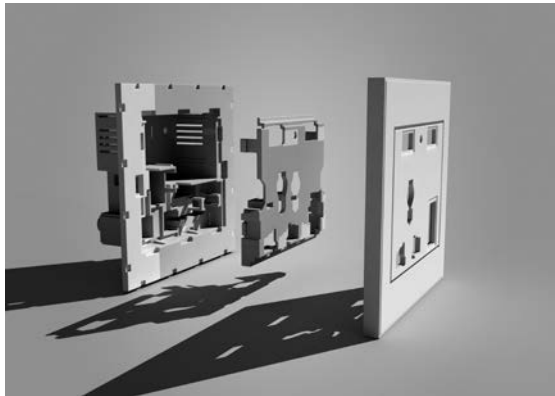


Figure 2 - Prototype Concept

Figure 3 displays how the product will fit inside wall partitions up to 50mm. This means that it is suitable for majority of U.K. homes.



Figure 3 - MyHome socket inside wall partition

Innovation

MyHome provide an interactive and easy to learn interface through a smart phone mobile app available on IOS and android. Unlike similar smart home technology, MyHome grants wireless interaction through Bluetooth.

The app allows users to map their house with rooms and their appliances displaying the user important and useful information. Appliances can be turned on and off and their power

usage monitored in the form of easy to read graphs. Using Google's and Apple's push functionality, reminders can be sent to user's phones, reminding them to turn off the power for an item not in use.

Furthermore, MyHome is equipped with ability to schedule when appliances should be turn on and off, giving home owners the power to completely control their own home.

MyHome can adapt to all lifestyles and uses. Using specially design algorithms, it can provide suggestions on energy conservation for certain products by comparing the home owner's usage against the usage of other home owners.

The device can be updated by flashing new software via Bluetooth or through USB. By allowing users to code or install premade software on a MyHome socket will reduce the necessity of even requiring a Bluetooth device through programming schedules directly on the socket.

MyHome's uses extends beyond the home and can be used in education. Students can be taught programming at different levels and visually see how their code can turn on and off appliances.

This product is unique by taking the features of most smart home products and making them available to the average homeowner through accessibility and affordability.

User Information

The physical product must be fitted by an electrician to ensure the device is safe and in working condition.

Any plug or a male USB (for charging purposes) can be inserted. The USB port will charge immediately but the plug's power can be controlled using the rocker switch.

The MyHome app can be downloaded from the Google Play Store or the Apple App Store. An account must be created to log in, store personalised data and receive feedback. Each

room that a MyHome socket is installed must be added.

Pressing search will search for and connect to any nearby MyHome sockets. Rooms suggest possible products that are to be used in the sockets. Products can be added manually or chosen from those suggested for both the plug and USB port.

A timer can be set to enable and disable power to each port. Power usage and related data will be automatically recorded and displayed. Notifications can be turned off and tailored.

The male USB can be connected to a computer giving access to code directly to the Bluetooth socket. Updates can be installed through Bluetooth.

Figure 4 shows how users would interact with the app, scheduling the power of an electrical appliance in a MyHome socket.

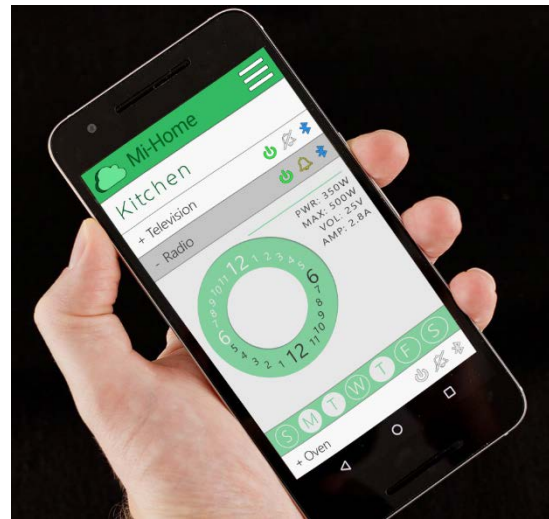


Figure 4 - MyHome mobile application example

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