

Dotslash Home

Designed by Zuwee Technologies Private Limited

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Sweeter , Smarter Homes ..!

Summary

It is proposed that Zuwee Technologies Private Limited will design, produce and market, a line of smart home devices, as part of series called Dotslash Home. There will be two major components in the initial product line.

- i) Dotslash Hub which has WiFi and ZigBee capabilities. Hub uses WiFi to connect with user(over internet/local-network) and ZigBee to communicate with smart devices.
- ii) Dotslash Switchboards which has the capability to function as a regular switch ,as well as a smart switch, that can be controlled remotely to turn devices on/off. Switch also monitors the energy consumption of each device. Together they can provide monitor and control capabilities on all electrical appliances in a home locally or even remotely.

Market and Competition Analysis

There is an extensive nascent market for Home Automation solutions all over the world. It is expected to grow rapidly over the next five years and become an INR 30000 crore market in India alone by 2022. As Information Technology develops and smartphone penetration and technological awareness further increases, it is inevitable that customers will want better ways to interact with their in home electrical/ electronic/mechanical devices.

Let us take a look at some of the current options available in home automation segment. Schneider electric provides wired home automation systems and their solutions are expensive for an average middle class family in India. Technology giants like Amazon and Google also have solutions, but they seem to focus on the voice search and associated AI and hence not a direct competitor to our product line. The ecosystem of smart devices around it, which has to be developed by third parties, has not yet matured. There are a few Indian startups working on this problem as well. Let us take a look at their solutions.

- 1) Pert :- Provides retrofit solution connected over WiFi.
- 2) Cubical Labs :- Provides retrofit solution over custom IR protocol.
- 3) Silvan Innovation Labs : - Wired solution for new homes over WiFi.

App download numbers on Play Store of the above companies can be considered as a reasonable estimate of their market reach. Currently they stand at about 1000 downloads each which indicates that their products has not yet achieved widespread adoption. All of them have some shortcomings such as the technology is not designed for new homes[retrofit solutions can't indicate the current state of a switch

visually], or they require custom wiring which is inefficient in this wireless era or they can't provide interoperability with third party devices due to custom IR protocol.

Hence we believe that market is still up for grabs for a product that is market-fit. The key is to provide a wireless home automation solution targeting new middle class home owners in fast growing cities, and then expand to existing homes as awareness further develop. Once we give the home owners a chance to experience smart home and associated benefits at a price point they can afford[around 1% of cost of home ownership], they are probably going to consider it as home buying is one of the most important decision a family makes and they will want it to be future proof.

Product Details

Our Product design is based on the following principles.

- 1) Solution should target middle-class families buying a new home in fast growing cities.
- 2) It should conform to an existing wireless protocol suited for home automation so that third party value addition will happen.
- 3) Realty builders who are willing to differentiate their offerings by building smart home should be able to easily integrate our solution in their projects

Dotslash is our in house developed secure and reliable framework that provides monitor and control capability wirelessly on a set of nodes[smart devices] over internet /local-network .Dotslash Home, uses this custom developed framework to make homes sweeter, smarter, and safer by offering the following devices.

- 1) Dotslash Hub- It will have ZigBee and WiFi wireless capabilities. ZigBee Protocol is designed for home automation. It has features including mesh networking[so that range issues which WiFi would have faced is reduced]and AES 128 encryption. By adopting ZigBee we can also ensure inter-operability with third party devices conforming to ZigBee standards.
- 2) Dotslash Switches -It has the capability to turn devices on/off as well monitor their energy consumption via on-chip logic. It can also act as a regular switch and switch state will be indicated via LED s so that customers can easily identify which switches are on/off. Product will be in an elegant form factor.

Together they enable the customer to

- 1) Remotely activate /deactivate all electrical appliances via mobile apps and web interface.
- 2) Schedule turn off/on of appliances. Useful for geysers, air conditioners et cetera.
- 3) Emergency mode that can turn on all lights in case of a need.
- 4) Presets for day, night,party, out of home etc.
- 5) Reduce energy consumption by better understanding monthly power bill and areas to conserve.

This solution ensures convenience, easy integration, and inter-operability, at an affordable price point. After some traction is achieved we have plans to improve the catalogue of smart devices by adding security cameras[that can stream footage and also understand and record events of interest using image recognition], in home connected entertainment system et cetera. Subsequent iteration of the hub will have additional capabilities including a smart speaker and mic for voice control and WiFi router with battery backup and hot-spot functionality from sim card . We plan to treat the hub as our customer acquisition product and it will be sold at very compelling price which competitors at best can only match. Overtime, the central hub itself will have quite a few features that every home needs, at a price point that is less than that of buying separate devices for each of the functionality.

Technical Details

Hardware Design

Hub - Hub will have an ARM architecture based System on Chip with WiFi and an additional ZigBee Chip. Currently we are prototyping on Broadcom BCM2837 SoC with Texas cc2538(for ZigBee) over USB. We plan to delegate some data analytics on to the hub which will require considerable resources.

Switchboard - Each switchboard will have a cc2538, along with solid state relay to provide on/off functionality, and circuits to measure voltage and current rating to monitor energy consumption,using on chip ADC s. Logic will be programmed to have regular switch functionality as well. LED s embedded in the lower part of each switch in an elegant manner will give a visual indication of current state of switch for the convenience of users. Currently we have completed the EDA . PCBs have been fabricated. Waiting for the components to arrive to assemble.

Software Design

Cloud-Server. - Server is written based on python tornado framework using web-socket for Hub connection and serving HTTP for UI front end. Server is responsible for authentication of hub and user separately, storing the required data in database[we use MongoDB] and for establishing a secure one to one connection between hub and user. Server also renders the front end for user access over browser/ mobile apps. Server has been designed from ground up with scaling in mind. Our server is currently hosted on Heroku.

Hub - Hub runs an OS hardened version of a Linux. A client program constantly maintains a web socket connection to server over the internet. Also there is a local server running on the hub to enable smart routing when the user is home [hub and the user are on the same network]. There is a binary written in C language to communicate with the CC2538 on board over UART. CC2538 runs a stock firmware called ZigBee Network Processor. This firmware is responsible for maintaining active connection with nodes and sending messages to and fro between hub and nodes over ZigBee. Commands coming from server are passed on from client program to binary via Linux message queues.

Switchboard:- Nodes run our custom firmware tailored for their particular use case. The nodes receives commands including Identification request, state change request, energy measurement request and acts on them to toggle switch state and/or send appropriate response.

