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GenZ

Global Trends in Home Automation

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Introduction

Cisco's CEO, John Chambers, predicted that the "internet of things" market will be worth \$19 trillion by 2020. He emphasised that gadgets and devices around humans will be interconnected wirelessly. With Google acquiring Nest, a company that designs and manufactures sensor-driven, Wi-Fi-enabled, self-learning, programmable thermostats and smoke detectors for \$3.2 billion dollars, Samsung introducing the "Smart home" app connecting home devices, and Apple developing Siri for voice command recognition and iBeacon for indoor GPS, the market is not far from realising the implications of home intelligence.

There is a need to utilise 'big data' to analyse human behavior, sensors and information to make 'things' smarter. Peter Nieh, a partner at Lightspeed Venture Partners sees the potential of integrating software and hardware to create a great customer experience. As we see the hype in automating and interconnecting home devices, where will the development of home automation lead to? This project aims to explain the development and direction of the automation/ "smart things" technology.

To provide an even deeper understanding, Home Automation provides an organised system in the home with a centralized control of lighting, heating, ventilation, air conditioning, and appliances. Locks for gates and doors have seen a recent increase in demand. Automation includes monitoring devices such as sensors that easily tracks motion and sound. The system integrates electrical devices in a house with each other. All these aims to provide simplicity, improved convenience, comfort, entertainment, energy efficiency and security for the entire family. The project emphasises on a comparative analysis of different gadgets automated in the home and its ability to be configured to connect with different gadgets. An introduction of Z wave as a protocol will be explored further.

Although it is said that the future will lead to Artificially intelligent gadgets, there is much to articulate in the process of improving the customer experience. Several other electronic brands have long been investing into the hype of home automation but until today, the service remains available to a selected few. Of which, have encountered numerous limitations in the technology itself. There are inherent setbacks and concerns such as the probability of being hacked, the loss of the centralised control as examples. The project will highlight the challenges. Recommendations and possible solutions will be provided to ensure security and limit risks.

In the last decade, various players have emerged such as Control4, Home Automations, AMX, and Schneider. There are different entities focused on home intelligence on the rise such as Fibaro, SmartThings, and Nexia. These brands provide personalised control solutions with products ranging from home control, thermostats, smart light switches, home audio systems, video surveillance equipment, touch screen interfaces and software to control automation system over the internet. These brands are developing advanced sensors that can detect different pressures, sound frequencies, and even breaches.

The GenZ project aims to provide insights of the overall Home Automation market. It will provide a good comparative data analysis on the existing brands, its geographical market and the

infrastructure setbacks that limit their potential to penetrate emerging markets. Furthermore, its position in the US, Canada and UK will be highlighted.

In light with the potential to move towards saving energy and resources, and making people's lives more secure, efficient and comfortable, members of the GenZ project have carefully put together the project with credible methodology. Resources are mostly from Financial statements of leading innovators, reports, and conducted interviews with leading companies. Members of GenZ believe that the project will enlighten parties with the direction of innovation in hopes to further improve existing operations. Intelligent gadgets has a way of adding value. More value will be developed as parties learn to appreciate the wonders of an intelligent life with intelligent things.

Status Quo

Market Players

Control4 Corporation

Control4 Corporation (Control4) is a provider of automation systems for homes and businesses. It offers personalized control solutions for lighting, video, music, energy, and security. The company delivers simple and personalized control solutions to consumers, major consumer electronics companies, hotels, and businesses around the world. The product portfolio of the company includes user interfaces such as touch screens and remote controls; home controllers; lighting and thermostats; and a wide range of audio/visual products. It also offers wireless thermostats, wireless dimmers and switches. The company's major solutions include smart lighting, advanced temperature control and safety and security solutions. Control4 is headquartered in Salt Lake City, Utah, in the US. (Global Data, 2013)

Home Automation, Inc.

Home Automation, Inc. (HAI) is a provider of automation solutions. The company manufactures integrated automation and security products for residential and commercial use. It categorizes its products under the categories of safety, energy management, and entertainment. Its product portfolio includes home control systems, programmable communicating thermostats, smart light switches, home audio systems, video surveillance equipment, touch screen interfaces, and software, which provides access and control of an automation system over the internet. The company also offers a family of Home Area network (HAN) products designed for use in smart grid projects for the utility industry. It works with various companies known as Connectivity Partners to integrate their products and services with HAI products. The company is headquartered in New Orleans, in the US. (Global Data, 2013)

AMX

AMX provides control and automation technology for commercial and residential markets. It is a subsidiary of Duchossois Industries, Inc. The control and automation technology enables homeowners to play music and videos, activate security systems, lead to adjustments of lawn

sprinklers and adjust temperatures just with the touch of a button. Some of the company products used for HA involve environment controllers, touch panels, keypads, lighting controls, control system accessories, network communication products as well as video management/distribution systems.

The company offers five solutions that are widely used in homes, such as: Distributed Audio, Media Room, Essential Home Control, Whole Home Control and Energy Management. (Global Data, 2013)

Crestron Electronics, Inc.

Crestron Electronics, Inc. (Crestron) is a clean technology company, based in the US. The company provides control and automation systems for homes, offices, schools, hospitals, and hotels. Its product catalogue includes audio products such as surround sound, home audio and pro sound systems; centralized media control systems for home and business; educational products; commercial and residential lighting control systems; and software to access and control home and business gadgets using mobile phones. The company markets its products through its brands such as Adagio, ADMS, Apple, Cameo, DigitalMedia, DVPHD, e-Control, Fusion, Green Light and iLux. Crestron is headquartered in Rockleigh, New Jersey, in the US. (Global Data, 2013)

Schneider Electric

Schneider Electric SA (Schneider Electric) is a global specialist in energy management and automation. The company provides solutions that support efforts to make energy more safe, reliable, efficient and productive for the energy and infrastructure industry, data centers and networks, buildings and residential markets. It undertakes the design, manufacture and sale of products, solutions and services for electricity distribution, automation and control, and advanced power electronic products and systems.

Its business units comprise automation and control, building automation and security, customized sensors, power, renewable energies, critical power and cooling, services and projects, and installation systems and control. The Wiser home control product from SE provides control over air conditioning, lighting, security, thermostats, and In-Home Displays (IHDs). (Global Data, 2013)

Vantage Controls, Inc.

Vantage Controls, Inc. designs and manufactures home control systems for luxury residences. The company offers control and automatic solutions especially for luxury spaces. The Vantage Lighting Automation System involves a main brain or controller, dimming technology, user interfaces as well as integration capabilities. The company's solutions enable support in making energy safe, reliable, efficient and productive in luxury residences. The company is headquartered in Orem, Utah, in the US. (Global Data, 2013)

Products

Varied Applications of Home Automation

HA offers a number of applications such as lighting control systems, security systems, demand response and HVAC. HA can vary in a number of ways:

- Simple, fixed applications involving pre-defined and pre-established operations
- Applications and devices which a user can program
- Fully flexible, automated applications and networks of devices that help out home consumers by providing them with information or that can be programmed for enabling information sharing with others (NYSOFA, 2012)

Lighting Control Sensors

HA systems can enable control of lighting in the home through motion sensors. Motion sensors and timers help consumers to turn on lighting in the home when it is occupied and, for example, turn on lights at night and off during morning hours when they will not be required. The timing set for the control sensors needs to be chosen wisely as the time spent in various parts of the home can vary from day-to-day. Lighting control systems can also detect the motion of people and accordingly switch lights on and off automatically. (Global Data, 2013)

Security Systems

A HA security system informs homeowners when emergency conditions are detected. The security system in a HA helps customers to remotely unlock doors such as the main door or a garage door, and involves motion detectors, vibration detectors, and smoke detectors, among other things. The security system detectors can sense movements, changes in pressure, sound frequencies, breaches of windows or doors, body heat, among various other things. (Global Data, 2013)

Heating, Ventilation and Air Conditioning

Heating, Ventilating and Air Conditioning (HVAC) controls can enable integration with the HA system and offer control of the home environment. Customers can program heating, ventilation and air conditioning on the basis of their preferences. The system helps to adjust the room temperature with the help of programmable thermostats. The HVAC control system enables an owner to decrease power consumption and thus reduce energy costs. (Global Data, 2013)

Demand Response

The HA system can be integrated with a demand response mechanism and includes appliances such as washing machines, dishwashers, and electric immersion heaters, among other things. When it comes to HA, smart meters form a part of the communication system and demand response can also be performed without smart meters. This is done by connecting with HA systems through the internet for the purpose of communication (CEER, 2011). (Global Data, 2013)

SWOT Analysis

Strength

- Young and dynamic market with high growth levels
- Increasing competition benefiting product and price developments
- Resilient market to economic downturns (luxury Segment)

Weakness

- Complex software and programming
- Limited installation know-how
- Unknown product features to end users
- High upfront cost
- Under developed routes to market
- Installers lack Marketing, ICT and Management skills

Opportunity

- Opportunity in the refurbishment market
- High growth in emerging markets.
- Embedding ICT into Home Automation
- New market segment (Mid-range products)
- Opportunities for open and upgradeable systems

Threats

- Increasingly globalised market with more US players entering the Market
- Risk of overlooking new technologies from adjacent sectors
- Lack of synergies between applications i.e., lighting, HVAC, Motorization etc.

Financial Analysis

Berg Insight forecasts that worldwide revenues from shipments of home automation systems will grow at a compound annual growth rate (CAGR) of 33 percent from US\$ 2.3 billion in 2010 to nearly US\$ 9.5 billion in 2015. These numbers include all 3 categories of home automation: professionally installed, Do-It-Yourself (DIY) and the more recent category systems installed by broadband and utility service providers. Significant revenue contributions will come from retrofit of existing homes, both luxury and mainstream. The home automation industry is also opening up a new potential market for cellular M2M devices and services. Berg Insight forecasts that the number of cellular connections used by home automation systems worldwide will grow at a compound annual growth rate of 85.6 percent from 0.25 million in 2010 to 5.5 million connections in 2015. The vast majority of these are security and access control systems. Shipments of cellular M2M communication units for home automation systems are forecasted to grow from 0.2 million units in 2010 to 1.8 million units in 2015. (Berg Insight, 2014)

Pros and Cons

Below are some of the main pros and cons of a home automation system. While such a system can deliver a level of digital connective-ness that firmly brings your house into the modern age, many owners will find their money better spent towards other remodeling ventures.

Pros of Home Automation:

- Enhanced home security. Even if you are thousands of miles away and halfway around the world, you can control the lighting system in your house and be immediately alerted if anything suspicious occurs.
- Daily convenience. Home automation can help you eliminate small hassles. No longer do you need to get up from your bed to turn off the light or walk around the house at before going to bed to insure that no appliance or light is still on. Ultimately, having a master control system for your home can make many daily tasks far easier.
- Energy savings. A surprisingly-high percentage of our home energy use is incurred by appliances that we are not using at the time. To reduce your utilities bill and help make your home more eco-friendly, home automation can be used to turn off outlets or appliances with the touch of a button.

Cons of Home Automation:

- Installation burden. Installing a home automation system can be a significant burden to the homeowner. This burden falls either in the area of price, if you choose to use an outside contractor, or in the area of time, if you decide to do it yourself. Self-installing a home automation system probably requires a familiarity with the X10 protocol system and with various software applications.
- Future remodeling plans. If you plan to remodel a room in your home in the future, you may need to incur an added cost when updating your automation connections in that section of the house.
- Chance of obsolescence. Your home automation system would probably increase your house's value and cachet if you were looking to sell in the next couple years. But if you plan on staying in your residence for decades to come, there's a chance that your system falls out of synch with new technologies – thus forcing you to upgrade regularly. (Alex, S., 2014)

Technology

We all have home appliances. We are used to them for a long time and we saw them progress from simple tools to advanced pieces of technology. One may think about the period when the first television came along, or the first computer.

Technology in our homes has been becoming more and more invasive, initially in the form of technologically advanced single appliances while in the recent years the trend is to interconnect these devices. In other words, first the devices have become smart: the thermostat lets you know the temperature inside the house and will act consequently to maintain the temperature you wanted; or the burglar alarm system that is equipped to know whether the house is locked and if someone entered. Lately all these smart appliances are becoming more and more interconnected. This means that the smart locker of your main door can talk to the lights and tell them to be turned on as soon as you enter your home. Another example can be the smart TV that is capable of dimming the light and close the windows when you are out to watch a movie or a TV show.

In order to make all of this happen, all the devices need to communicate to one another using a common language- a protocol is required. A protocol is a group of instructions and digital rules used by computers to communicate with one another. HTTP, for example, is the protocol used by computers to talk to web servers when you browse the web. In this paper we will use ZWave as a reference protocol, which, by the way, is the most popular one and seems to be the one that will dominate in the future.

In order to know more about the technological aspect of the protocol and the company behind it, we decided to visit Sigma Designs in Milpitas, CA. Sigma Designs is the company that acquired ZWave when the latter still was a startup in The Netherlands. In their headquarters we learned how the company was born, how the technology they have works and, eventually, we also had the opportunity of entering their showroom to see how the technology works. In addition to that, we also had the chance to see with our own eyes the chip that they manufacture that integrates the protocol they developed. As it will be explained later, they develop both the software (i.e. the protocol) and the hardware needed to physically implement it.

In this technological analysis I will first give some examples of smart devices we saw there, then I will talk about protocols and I will use ZWave as an example. At the end I will talk about how the smart devices use ZWave to do amazing things.

Smart Devices

In our houses we have many devices. Some of them are born smart, and many other became. A smart device is a device that is aware of its status or work it is doing and can act accordingly, it can receive instructions from the the outside world (i.e. the user) or from other devices. Think about the AC. This is considered a smart device because it is equipped with sensors that are used by the embedded computer to adjust the speed of fans and so forth in order to accomplish the final goal required by the user: have the right temperature in the room.

Another smart device, probably *the* smart device is the mobile phone or the computer. With this device people can interact with the other devices in the house, among the other things.

Actually, recently, wearable devices seem to become more and more popular and they will find a great usage in the home automation sector. You will use your watch (or smartphone) to check if all your light are off before leaving for your holiday, or to turn the AC on or to start recording your favorite TV show while you are busy doing something else.

On the other hand there are some devices that are not born smart, they have no electronics inside. Examples of this kind of devices are the following: lamps, wall outlets and switches, windows, lockers of the doors, and so forth.

In the home automation context, these objects can be brought to life. The lamps can be aware of their on/off status and can have the possibility of being dimmed or turned on or off; the wall outlets can embed a power meter so that they know how much energy the load they are feeding is using. and they can also react, for example by interrupting power supply if the requested energy is above a certain threshold; windows can be opened or closed to maintain a certain temperature and a environment friendly manner, they can be used to let fresh and new air inside your house. In addition to that, the curtains in front of them can be made smart and can be opened and closed electrically; Door can also become smart. You will not need a key any longer: they will know your fingerprint and can be opened remotely if you, let's say, need the plumber to enter your house to fix something.

Now, having all these appliances is awesome, but it would be much better if they could talk and interact between each other. Imagine if when you close the door before going away for the weekend the entire house will secure itself (all the windows will be closing by themselves) and all the lights and appliances are set automatically in sleep mode. This way you would focus more on your journey than to make sure that your house is ready for you to leave.

The same applies if you are watching a movie: all the lights can be dimmed to the proper intensity, the sound system would turn on and you can play or pause the movie whenever you want with your smartphone.

In order to do that, in addition to being smart, the devices need also to be able to talk to each other, speaking a common language. This is where the protocol comes into play. A standard protocol is desperately needed, in order to avoid the classic device with its own remote control, or its own smartphone app to remote control it.

Protocols and ZWave

Every smart device can do a certain number of things and can provide a certain set of data. Using the same examples provided earlier, the wall outlet can provide informations about the amount of energy absorbed by the load and can receive some commands, like the one to suspend the supply of power. The thermostat can tell what temperature it is measuring and can receive the command to increase or decrease the temperature or to set it to a specific value.

All these scenarios need to be taken into account when developing the protocol. In the case of ZWave, they use what they call *profiles*. Every device can belong to one or more profiles and each profile provides a list of commands that can be sent to that particular device. It basically is the same concept behind the object-oriented programming, where profiles can be compared to classes. Classes have methods and variables. The same way each device can provide methods (commands can be executed on them, like the one that tells the windows to open to let the sun shine in the house). Each device can also provide the equivalent of variables in object-oriented programming languages, for example the lights can provide their on/off status.

This way each device can be programmed in order to have a particular set of profiles and, at the same time, the app knows how to talk with the other devices. For example the mobile phone, that uses the wifi to connect to a gateway, which in turn is connected to the ZWave network, knows the exact command to send to the thermostat to increase the room temperature. The beauty of a standard protocol, like ZWave, is that different manufacturers can build their own devices and they can decide to use this protocol to talk seamlessly with other devices made by other manufacturers.

This is the main difference between ZWave and all the other home automation manufacturers. Usually what happens is that a company builds a very cool smart device which unfortunately is able to talk only to its remote control, most likely the smartphone or the computer in your living room. Zwave uses instead the power of a standard protocol that enables different devices to talk to each other.

At Zwave, as said, they defined the protocol to communicate. In addition to that, they are also building a microchip (see picture) that implements the hardware behind the protocol.

Examples

In order to better understand the technology we decided to go to visit Sigma Design, the company that acquired Zwave back in 2008 when it was still a small danish startup.

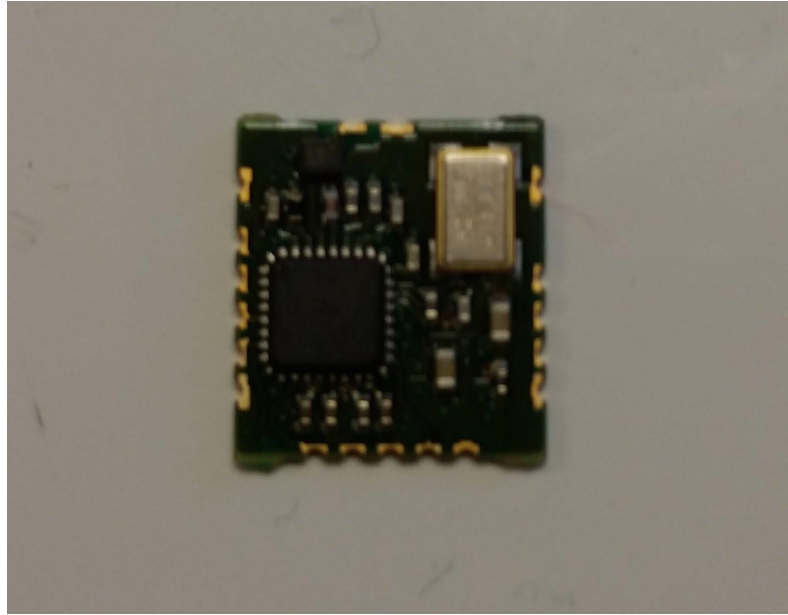
There, after having gathered all the required technical informations, we had the chance to go and visit the showroom where they gave us examples of what the smart devices are and how they can become more powerful thanks to ZWave.

It all started when Mary, the marketing director at Sigma Design, composed a 5 digits pin on the locker of the door of the showroom. After she did so, the door opened, the lights turned on and the curtain of the windows also opened. The locker communicated to those devices, asking them to perform some well-defined tasks.

She then explained us how all the outlets have a power meter and the light switches are not simple switches but rather buttons that, if pressed, set the lightning in a certain configuration, handling more than one light at a time. For example there may be a button that turns all lights off, another the dims the lights for a movie night, while there can be also a so called *panic button* that turned all the lights of the house on.

She also explained us that is she turns on the TV all the lights would dim accordingly and the audio system would turn on.

After that we moved on and reached the desk where the computer was. The web browser was open on it and the Nexia home page was displayed. She provided the required credentials and she had instantly access to all the ZWave devices in the house. She gave us the example of the thermostat. She set it to an higher temperature, saying that this functionality can be super useful if, let's say, you have been on holiday and you are about to come back home and you may want to adjust the temperature for your needs. This way you can avoid to keep the house warm (or cold) for the entire holiday period.



In addition to these things, she showed us some other devices: the oven, the AC, the main power supply panel that can provide statistics about the power consumption of the entire house, the water pipe tap that can be remotely controlled in order to decide when to water your plants, the surveillance systems and many more.

After that, we walked out, she pressed the lock button on the door, the lights turned off and the curtains closed. And we went back to the meeting room to talk more about the future of the home automation.



Future Trends

Future Developments

The market is heading towards a more convenient and comfortable lifestyle. Connecting all the devices and understanding the host will take time until data science becomes more mature. There's a lack of data scientists to quickly develop big data analytics. Artificial Intelligence will utilize big data in order to develop hardware products around humans.

Since the world is becoming more cautious about their environment and sustainability of products, Brands will have to develop energy saving and environmentally friendly gadgets.

On top of this, since individuals will need to replace existing electronics for electronics that allows for chips. Cheaper and more affordable gadgets will be required. Just like mobile phones, prices will drop throughout the development of devices and hardware products. In order to be more efficient, the new system should be accessible to everyone.

When products and people become more interconnected, there will be a rising need for data protection. A centralized governing board to protect individuals may be necessary.

Areas of Development

A governing body that ensures protection and security of breach of data security will be needed in the future when data will have to be widely available and needed to interconnect gadgets and promote artificial intelligence. If humans are to live more comfortably through automation, these gadgets need to be smart enough to understand the behavior of their host. Data protection will become necessary.

The development of legislation on data protection should be constituted by a central governing body. Choosing the right candidates and the appropriate method of supervision can be beneficial for the growth of the automation - intelligence industry.

Players

With Google acquiring Nest, a company that designs and manufactures sensor-driven, Wi-Fi-enabled, self-learning, programmable thermostats and smoke detectors for \$3.2 billion dollars, we see it emerging in the Artificial Intelligence scene. Google is valued at \$410 Billion USD at most with its valuation higher than 49 countries' top most internet related technology company (World Startup Report, 2014). It has liquidity to acquire existing companies that can compliment the products they have been developing. Currently, they have been investing in wearable hardware devices such as the Android watch. They have expanded to Android TV and even driveless cars. It has been investing heavily in Research and Development and is the leader of the Search industry – internet related technology at present (World Startup Wiki, 2014).

Samsung Electronics, a Korean multinational company, is a subsidiary of the Samsung Group, amounting to 70% of the group's revenue in 2012. It has launched its own hand phone devices and has recently been investing in its electronic gadgets. It introduced the “Smart home” app connecting home devices. As one of the leading conglomerate companies based in Asia, it has the potential to tap the Asia market that has a wide population. Since it has existing successful hardware products and electronics (refrigerator, cameras, hand held devices), its easier for them to scale.

Apple on the other hand has been developing Siri for voice command recognition and iBeacon for indoor GPS. Apple products has gained a lot of reputation for being user friendly, sleek and sexy. It is the most liquid hardware technology company based in the US.

Recommendations

Possible Solutions

Security is the main issue in present home automation. When the owner loses his phone, security can be breached. Strangers can easily access personal territory. How do we mitigate the risk?

It is possible to switch off access from a particular device like a mobile phone or ipad. Companies that have built the software to manipulate the automation can switch it off for you. The particular service provider should be a trusted company.

In order to build trust within users, companies should provide strict compliance among employees and restrict access to database. A company that is internally systematic is likely to be successful. They will need to maintain their reputation and provide excellent customer service. 24 hour maintenance will be necessary just like credit card theft. In case of theft or emergency, one can easily call the emergency hotline to cut off validity of the stolen credit card. This will automatically make one's stolen credit card invalid.

Profitability and Scalability

There are a number of brands in the market with the likes of Fibaro, SmartThings, and Nexia. It is important that these brands can interlink and interconnect with one another. Through ZWave, the protocol allows electronics and hardware devices to communicate with one another seamlessly.

To compete, brands need to develop more user friendly interfaces. They need to create products that can benefit users. They need to focus on more research and development on Energy savings and environmental sustainability. The more users can save on electricity, the higher the demand.

Sales also heavily relies on good brand management and marketing. Marketing should reflect the ability of these devices to cut back on electricity. Promoting sustainable development can change the mindset of users that technological innovation not only provides ease and comfort, decreasing resources but it can be good for the environment.

Lastly, although brands have different niche markets, most of the existing brands are targeting western nations and the upper class. Emerging markets and developing nations are still very new at using security devices and automating their homes. Labor tends to be cheaper than installing these devices. If brands can create cheaper products that are affordable then scalability will be faster.

Areas of Collaboration

Google has been investing in hardware devices such as Nest. It has been developing wearable technology products in hopes to develop the world of artificial intelligence.

Brands and ZWave should work closely with Google. Given the ability of google to develop its own protocol and brands because it is heavily funded and it has talent, it might be best to

approach them as soon as possible to understand their direction. Google is a big market player. Given its acquisition of Nest, it would be important to understand targeted developments so existing players can create complimentary products. It would be wise to save resources and time. Collaborating can help players work together and share technical know how to develop cheaper and more sustainable technology.

Conclusion

Home Automation is the initial development to accepting and understanding Artificial Intelligence. Although the Home Automation technology is not new and has been in existence for a decade, it recently has attracted attention. This is due to big technology companies investing in automating devices particularly in Security, and home devices. Apple, Google and Samsung have scaled into hardware products that use a chip to allow its products to communicate with one another.

However, the market is very limited to the upper class and western geographic regions because products are not affordable and it requires products to be replaced. ZWave has developed a protocol that allows different devices of different brands to communicate with one another. Other brands have developed more affordable hardware devices. According to Z Wave, partner brands have increased sales. Moreover, ZWave have seen double growth every year in providing the chips to install devices. They focus on B2B with partner brands using a chip to allow wireless connectivity.

New market intelligence report titled, Home Automation Market (Lighting, Safety and Security, Entertainment, HVAC, Energy Management) - Global Industry Analysis, Size, Share, Growth, Trends, and Forecast, 2013 – 2019 on their official site. This report provides valuable information on the global home automation market, which was worth USD 3.6 billion in the year 2012 and is estimated to grow at a rate of 24.5% CAGR during the 2013 to 2019 period. It also gives the prediction that future home automation industry will be crowded by too many competitors. Companies with better innovative idea and sustainable product only can be survive.

To even improve the home automation scene, it is important to find solutions to concerns in big data such as security and governance in information sharing. This can regulate the development of data extraction when devices learn more about their host. Brands will also need to focus on human experience, user-friendly devices with stressing on environmental sustainability. To further develop home automation, it is important for brands to work with one another since hardware products take time, financial resources and expertise. Brands and leading companies like Google, Samsung and Apple should work together. Once this can be done, humans can experience a more seamless lifestyle with devices adjusting to the needs of humans automatically.

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