A smart home review

Early home automation started back in the 1900s. With the introduction of electric power distribution, self-contained electric or gas powered home appliances became feasible and such examples included washing machines, water heaters and refrigerators. However, as technology and services advanced greatly thoughout the past 3-4 decades, people now have higher expectations towards home automation and security. Over the years, different automation systems have tried to provide efficient, convenient and safe way for home inhabitants to access their homes. Regardless of the change in user expectations, advancement of technology, or change of time, the role of a home automation system still remains the same.

A smart home is a convenient home setup where appliances and devices can be automatically controlled controlled from any internet-connected place in the world using a mobile or other networked device. A smart home has its devices interconnected through the internet, and the user can control functions such as security access to the home, temperature, lighting and home theater. Related terms include “ home automation” and “ smart building”. A smart home also provides its home owners comfort, security, energy efficiency (low operating costs) and convenience at all times, regardless of whether anyone is home.

Due to the fast-paced living in Singapore, people are always rushing off for either work or school, and they tend to forget to bring their things, usually keys. In the case of a student, their parents might be home late from work. So even if they end class early on that particular day and wish to go home earlier after a hectic day in school, they would not be able to do so since they have forgotten their keys at home and nobody is around to unlock the

door for them. The same goes for a working adult, if they work overtime and reach home late, they can only wake their family members up to open the door for them since they have forgotten to bring their keys out. Many would not like this to happen since their family members also need to rest after a busy day and some may even need to wake up early the next day. Not only that, everyone loses things once in a while. Instead of mindfully setting your keys down when you walk in, you just walk in. Your hand lays your keys down while your mind is doing other things. You don’t have a chance to plan ahead or place things sensibly. Similarly, when you leave, you don’t think about all the things you need to pick up.

Instead of using the traditional locks, people can now choose to use a smart lock. By installing a bluetooth smart lock pro, you and your family will just be able to unlock your house door with a tap of your hand. The system uses your smartphone to unlock your doors, by connecting the two devices using bluetooth. They use host controller, which is implemented on a PC or a smartphone, is connected to a micro-controller based sensor and device controllers. Since it is cheap, easy and quick to set up, bluetooth is an attractive technology for creating smart homes. Furthermore, people are already familiar with the technology. The hardware required for setting up the bluetooth communication is readily available and the technology also provides the necessary bandwidth for the operation in a home.

Smart locks are usually composed of the following key functional blocks: Human machine interface (HMI) provides a method for the user to interact with the system or to view a response from the smart lock. It may include a keypad, backlight, LEDs, speaker, or even a microphone. Wireless

connectivity enables part of the HMI functionality, such as the keypad, to be handled on a remote device (such as a smartphone or tablet). Wireless connectivity (such as wifi, bluetooth low energy, Sub-1 GHz, or RFID) adds an additional data interface to the lock. This interface can be used for various purposes including wireless authentication of the user, remote control and monitoring, wireless transfer of software updates, or communication with networked sensors. In some cases, the addition of a wireless interface allows for part of the HMI functionality to be handled by a remote device. Host controller is responsible for processing inputs from the user and from sensors. It also generates responses by actuating the physical locking mechanism or providing feedback through the HMI. Using the CC3220 wireless MCU, the host controller and wifi can be integrated into a single chip.

Sensors

Several sensors can be used in a smart lock to detect the state of the lock and door. For example, an accelerator or inertial measurement unit (IMU) to know when a door is open or closed. It can also detect the presence of a user. For example, a passive infrared (PIR) sensor for proximity detection.

Motor subsystem includes both the motor driver and the motor used to actuate the locking mechanism. Smart locks commonly use brushed DC or stepper motors to move the locking mechanism. These types of motors can be driven using low-voltage, single H-bridge or dual H-bridge motor drivers, such as the DRV8833, DRV8833C, DRV8837, and DRV8837C devices.

Power

Smart locks are usually powered by four AA batteries. The various lock subsystems may operate different voltages, which creates a need for voltage regulators in the system. An appropriate regulator must be carefully selected in order to use because this choice has a direct impact on the battery life achieved by the system.

Challenges

Bluetooth has a miximum communication range of 100m in ideal conditions. More may be needed in a home condition. Bluetooth communication has comparatively high power consumption, so the batteries of devices need to be frequently charged or replaced. Bluetooth technology has advanced and improved. However, it has serious security concerns such as eavesdropping and weak encryption. Bluetooth communication can only be used on occasions where there is a need for quick short-lived network communication with little concern for security.

Alternative solution

Instead of using bluetooth-based home automation system, people can choose to use locks with built-in wifi circuitry. Wifi can be easily found everywhere these days and the wifi bridge can be controlled from almost anywhere as long as they are connected to your home router. The wifi smart lock pro offers things like voice activation, geofencing, and auto-locking features. It works with Google and Siri voice commands, which allows easier locking and unlocking of doors With voice activation, simply tell your phone to “ unlock the front door”, and the lock will disengage. The smart lock also offers activity logs which allows you to go back in time to see who entered or

exited your home and when the activity took place. With geofencing, you will never have to worry about whether you have locked up when you left the house. You can just use the mobile application to set up a perimter around your house, and use your phone to pinoint your exact loaction.

Hence, when you leave the perimeter, the lock will automatically engage behind you. Similary, the lock witll also automatically engage after it has been unlocked for a specific time period. The smart lock also has a keyless touchpad for those times when you don’t have your phone or keys. However, if you prefer to use the traditional way of unlocking the doors, you may still do so. With the special inner mechanical design, the door lock will alert you through your phone by sending push, text and email notifications that let you know who is coming and going in real-time. If anyone tries to tamper with the lock, it can also trigger siren to scare off intruders and warn you of a possible break-in.