

# **A PROPOSAL OF DEVELOPING AN AADL MODEL OF THE SMART HOME SYSTEM**

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# 1. SYSTEM DESCRIPTION

## 1.1 System Overview

For this project, we are going to develop an AADL model of the smart home system. Smart home system is an human living environment which uses computer technology, network communication, Internet of Things technology, etc, to connect all the home life subsystems such as security, lighting control, curtain control, information household applications, heating, etc. Through the smart control and management, smart home can provide a more comfortable, more convenient, more secure, and more environmentally friendly living environment. For example, you can open your heating or light through your smart phone before you go home, you can view your pet on the real time through the IP camera on your phone, etc. Figure 1 shows an example of the smart home system.



Figure 1. an Example of Smart Home System.

## 1.2 System Components

The smart home system consists of the following major components:

- Main Control Router
- Remote Server
- Clients



- Zigbee Controller
- Zigbee devices (sensors, light)
- IP devices (IP camera, TV, music player)

Figure 2 is an overview of the architecture of the smart home system.

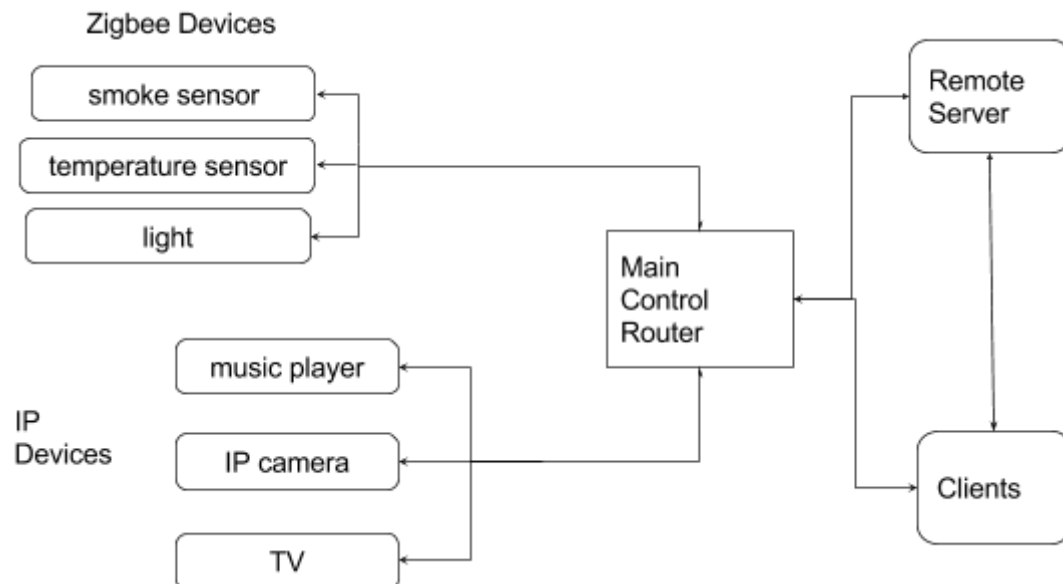


Figure 2. Overview of the Architecture of the smart home system

### 1.2.1 Main Control Router

The module Main Control Router (MCR) is the most important part of this system. The following are the main functions of this module:

- It connects to the Internet and provides Internet connection function to all the devices.
- MCR receives commands from Remote Server or Clients directly (Only if when clients in the local area network, this measure can guarantee the system works well when there were problem with Internet access).
- MCR send log information to Remote Server.
- MCR has two connection methods with devices, one is Zigbee, and another is IP.
- MCR provides a storage system to temporarily store data when there is no Internet.
- MCR check the data from sensors and send alarm to Clients.
- MCR manage all the connected devices.

### 1.2.2 Remote Server



The main function of this module are creating connection between MCR and Clients when Clients are not in local area network, and storing related information, like logs, user information. Remote Server handle the requests from different Clients and transfer to MCR.

### **1.2.3 Clients**

The clients module can be an application in smart phone or a website. It provide the user interface for user to control and manage all the subsystem.

### **1.2.4 Zigbee controller**

The main purpose of zigbee controller module is connecting all the zigbee devices such as sensors and light, and transferring message between the MCR and zigbee devices.

### **1.2.5 Zigbee devices and IP devices**

There are two kinds of devices in the system, and they use different method to connect to the MCR.

## **1.3 Qualities**

### **1.3.1 Scalability**

Smart home system should be a scalability system, more and more subsystem can be added in the future. Hence, we use modularity method to design this architecture.

### **1.3.2 Security**

Security is one of the most important part for smart home system, we will provide very strict access rules and authentication methods in the architecture.

### **1.3.3 Reliability**

For smart home system, it should operate for 24 hour per day, so the reliability and fault-tolerant ability should provided. We will design different error model to handle the error behavior to ensure the system has the ability to scope any complex environmental changes.

### **1.3.4 Usability**

The design of smart home system should be easy to use. Users should be easily use the clients to control the whole system, so we will design a user-friendly user interface.

## **EXPECTED OUTCOMES**

We are trying to develop an AADL model of the smart home system, which means we will use AADL to present the architecture of the smart home system. We will give the definition and implementation of the entire architecture, the detail definition and implementation of each models,





the error modeling and related flows in the system. As a final expected outcome, we hope we can design an scalability, reliability, security, and usability smart home system.

## **MILESTONE**

Delivery Date	Milestones
Mar 13, 2017	Project proposal
Mar 20, 2017	Accomplishing the subcomponents and connections of implementation of the smart home system
Apr 03, 2017	Accomplishing the definition and implementation of the main control router model
Apr 10, 2017	Accomplishing the definition and implementation of the remote server and clients model
Apr 17, 2017	Accomplishing the definition and implementation of the zigbee controller and devices module
Apr 24, 2017	Identifying and Adding related modes and flows, which include nominal and error flows
May 01, 2017	Adding error and nominal behavior for error model

