Smart Home: Voice-Controlled Home Environment

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FP4-07
Introduction

Nowadays, many buildings have already installed a smart control system to manage the whole building. For example, the International Finance Centre (IFC) is using the LonWorks system to control and monitor all the lighting and HVAC (Heating, Ventilating and Air conditioning) systems. In our project, we would like to apply this kind of system, embedded with the latest voice recognition technology, to implement a new system known as a 'Smart home System'. This system will use the new wireless industry standard ZigBee (IEEE802.15.4). The system installation and wiring of the present home can be simplified.

Aim and Objective

The Aim of this project was to build a system combining front-end and back-end processes to implement recognition and home control in the present home.

The Objectives of this project can be summarized as follows:

1) To achieve a reliable voice control system
2) To develop a user friendly Graphical User Interface
3) To design 5 types of module for controlling the existing home devices:
   A. Voice Detector (Figure 1)
   B. Control Module (Figure 4)
   C. Infrared Control module (Figure 3)
   D. Detector Module
   E. ZigBee to Computer Connector (Figure 2)
4) To develop an automation system that the devices can operate automatically within the state of the home environment.
**Network Architecture**

![Network Architecture Diagram]

**Implementation Phase**

- **Hardware Implementation**
  - Figure 1
  - Figure 2
  - Figure 3
  - Figure 4

- **Software Implementation**

  The Graphical User Interface was designed using National Instruments LabVIEW 7.1. There are two kinds of interface: one is for the Local User (Server), another is for the Remote server (Client). Using the function point of view, this can be divided into 3 parts:
  1. Monitoring and Control
  2. ZigBee devices driver
  3. Internet communication
Conclusion

We have successfully implemented ZigBee standard (IEEE 802.15.4) and voice recognition technology to develop a Voice Controlled Smart Home Environment.

Further Work

To develop a system that can interoperate with other factory standard is a trend of Smart Home. Such as LonWork, X10, Insteon and HAI they would be a good partner with our system.