

Intelligent Home System

Project Proposal

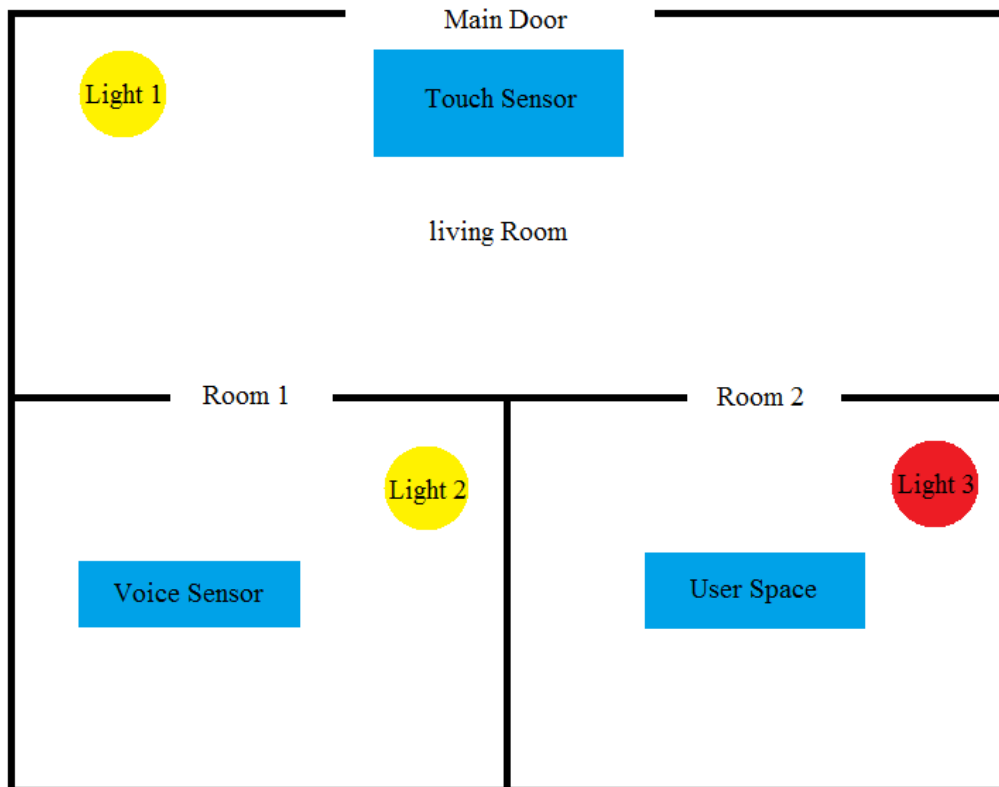
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I. Problem Description

In the future, people will live in the house with embedded system that can add much convenience to their life. For example, they can control different switches with their voice instead of going to the certain position to turn it on or off. There will also have sensors setting under the floor to tell whether there is a person entering the room or not. It will turn on the light for the room as soon as someone walks in and turn it off after the sensor has been deactivated for a while. Furthermore, there will be a user interspace for the people to control the system manually. So when the automatic part is not working well for the system, the person can still control each single electronic unit of the house. Moreover, the user can also decide to activate or deactivate the system from the user space. For instance, when people are going to bed and sleep, it is not necessary to have all the system activated so it will be energy saving to turn most of them off during the night.

Therefore, this project is going to display the system in a simplified way with TS7250 board and multiple auxiliary boards.

II. Project Diagram

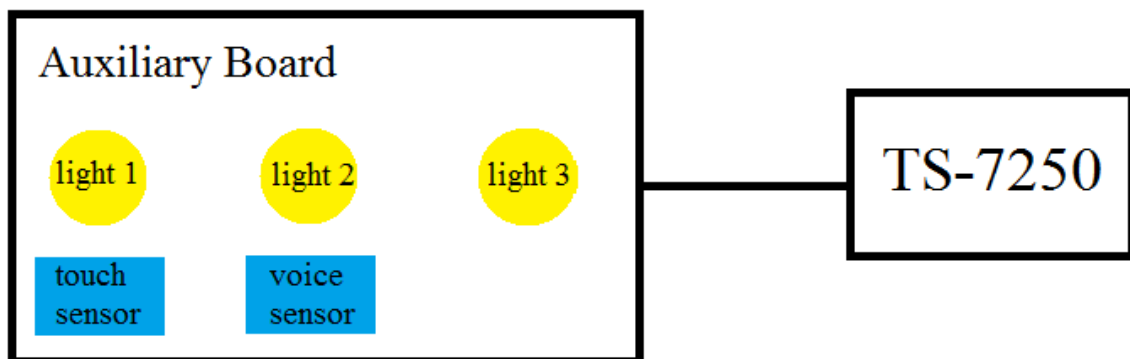


There will be three main parts displayed in the project. Assume that each part represents a room with one simple function.

The first part is living room which contains a **touch sensor** and **light 1**. Assume that when a person walks into the living room, sensors on the ground under the carpet will be activated and turn the light on. In the project, the sensor is simplified as a small piece of plastic with copper on it. When the sensor is being touched (activated), it will generate a signal and that will be the trigger for turning on the LED.

The second part is room 1 which has a **voice sensor** and **light 2**, which explains the idea that people can make a sound such as a snap to use as a switch for their electronic devices. In the project, the LED represents electronic devices and the trigger signal will be generated by the microphone circuit.

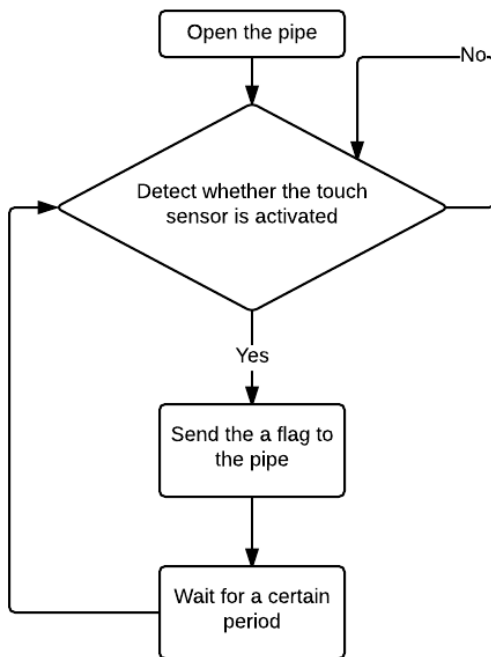
The last part is room 2. It has a **user space** system that has the highest priority to control all signal units of the house. In the project, the user space will be able to turn on or off the LED in the living and room1. It can also to deactivate the sensor for both rooms. The LED in room 2 is used for represent the state of the whole system is activated or not.



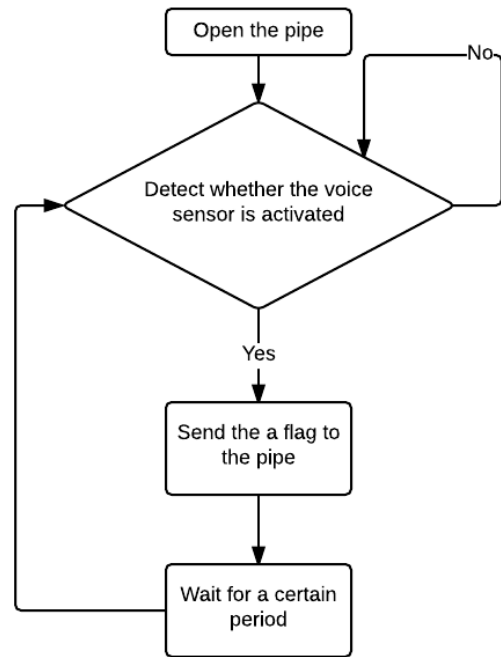
In real case for the project, the first two parts will be built on the auxiliary board and last part will be achieved by using TS7250.

III. Project Flow Chart

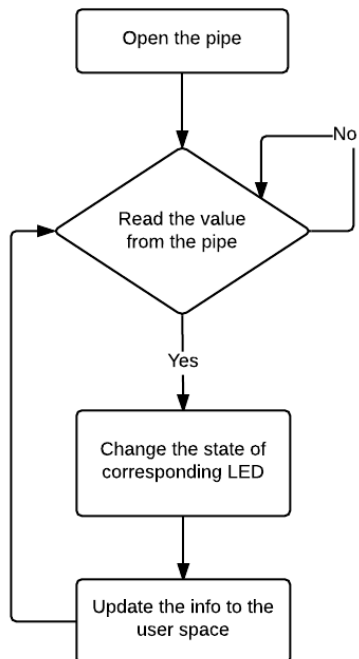
Kernel Module 1



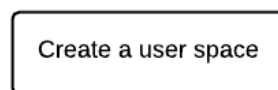
Kernel Module 2



Thread 1



Thread 2



IV. System Related

- a. Interfacing to peripheral devices

Build the auxiliary circuit board which contains the voice sensor and touch sensor.

Since signal process is not the main focus of this project, the circuit will consist of analog part and logic chips to convert the analog signal into digital signal.

- b. Multi-Tasking

Different threads will be created to operate all different function which are shown in the flow chart.

- c. Task communication, cooperation and synchronization

The trigger flag value which determine to turn on or off certain LED will be sent through pipe between kernel module, thread, and main program.

V. Project Schedule

1. Build auxiliary circuit board and test the output signal
2. Connect the auxiliary board to TS7250 to test each basic function
3. Write the code for kernel module for auxiliary board
4. Write the code for user space
5. Test and improve the system
6. Consider adding new elements

VI. Project Expectations

Based on the limitation of lab resources, the project itself doesn't seem like building a home sized system. However, the main idea is letting the processor handle different input from outside auxiliary board and then make a decision based on those input. Therefore,