

## Advance Home Security System

This security system can be set to different modes: minimum, normal, maximum, and custom security settings. Depending on the mode chosen lights, televisions, and stereos can be activated. There are options to sound the alarm and/or notify the appropriate authorities according to the specified events. There are motion and sound sensors. The user will be able to adjust the threshold (sensitivity level) of these sensors. The different modes have predefined thresholds. All doors and windows have open/close sensors (or switches). Optionally, there can be a quick short sound when doors and windows are opened or closed. The open/close status of the doors and windows as well as all the security settings and options can be access through a display terminal.

The predefined modes are as follows:

| Mode    | Trigger (Sensor Type)                  | Threshold                       | Action  |
|---------|--|---------------------------------|---|
| Minimum | doors                                  | open                            | alarm sounds  |
| Normal  | doors, windows, motion                 | open, open, medium              | alarm sounds, lights blink on/off   |
| Maximum | doors, windows, motion, sound, cameras | open, open, low, low, recording | alarms sounds, lights blink on/off, televisions and stereos turn on, notify police. |

Note: The user can customize there own mode settings and adjust all triggers, thresholds, and actions.

Our group has come up with the following idea for our group project. We want to create a Home Theater. This home theater will give the user the options to select between TV, Video, Audio (connection to stereo). For example if the user presses video, VIDEO will be actuated. Our system will have a volume control, ON/OFF, remote control, Display, and Menu for options.

Our project proposal is the control systems for a Battle Bot (i.e. [www.battlebots.com](http://www.battlebots.com)). The system would take input to control motion and attack systems via remote control (or simulated remote control anyway). It would involve controlling the speeds for various motors as well possibly activating hydraulic systems.

## Configurable Internet Router

One of the key components of any computer network, a router allows an entire network of computers to share an Internet connection. Routers allow hosts on one sub network to communicate with another host on another sub network. Routers function as gateways to other networks. Now you may know why Cisco Systems makes so much money off routers. Routers are needed everywhere the Internet is used and form the foundation of the entire Internet. And to share the data based on individual requests, the router is paired with a switch that provides an intelligent way to transfer data between the systems depending on the sent traffic. Perfect for a small home that has a casual Internet user and intensive gamer who require different amounts of traffic.

Take the modern freeway system for example. There are a fixed amount of lanes that can handle so much traffic; once the traffic capacity has been reached the entire freeway slows down. The same can happen to a computer network that has large systems transferring large amounts of data to a shared bus. Based on the network traffic, the switch assigns priorities to systems transferring data before relinquishing control to other systems. The gamer who requires a constant stream of data will have a higher priority over the person checking plain text email.

Our project will try to simulate a router/switch combination such as the ones made by Linksys or Netgear, while adding the items such as the ability to monitor network diagnostics via real time LED displays or by logging into the system. Sending mock Internet and intranetwork requests will accomplish the simulation of the system. Implementing a true Internet router, although not impossible, would take considerably longer than the amount of time given.

We would like to implement a police dispatch system. There would be approximately 8 cars which would be able to be dispatched to various addresses stored in a database. The UI would show the status of each car (like whether it was traveling or responding to a call). Each car would log when it changes states. The database would store the distance between the police station and the address. Therefore, each car would remain in transit for different periods of time depending on the distance from the police station. Depending on the complexity of implementing the above described system, we may advance to dispatching multiple cars or intercepting cars in transit and sending to them different addresses depending on their priority. Please let me know if you have any questions.

For our group project, we would like to simulate a time machine. We feel that while this might not be the most realistic project we could implement, we would get the chance to be very creative in implementing it, and could make it as complex, if not more, than other projects. The features of this time machine would include:

1. Gauges—We will model this machine after the Dolorian from the Back to the Future series, so we will need a gas gauge, a plutonium gauge, and a speedometer, a “year”odometer, keeping track of how many years you’ve traveled, and a battery gauge, making sure one does not have too many electrical devices on in the car at the same time.
2. Time Circuits—These will display when you were, when you are now, and when you’ll be going in the future.
3. User Identification—Our time machine would function as a regular car until the user identifies themselves and enters the correct password.
4. Upon arrival there would be an automatic display of the World Series winner for that season in which you enter, so as to facilitate gambling purposes if one would like.
5. Jump checker—Will check the place that one will enter the new time period, making sure you don’t run into a big rock or something, and check the temperature and to make sure there is an available wormhole for jumping through.
6. All the standard car functions such as headlights, windshield wipers, and A/C and heat.

We would probably break up this function into someone working on the display, someone working on the gauges, and someone on the other features (jump checker, world series display, user id).

Our group would like to implement a cell phone.  
The cell phone would have a variety of functions:

Basic functions:

- 1) Input/Output – Pressing the buttons
- 2) Placing calls
- 3) Volume Control
- 4) Time maintenance
- 5) Date maintenance
- 6) Battery level monitor

Features:

- 1) Recalling stored numbers in memory: calls received and dialed (speed dialing)
- 2) Adjusting different tones & Vibrate & Silent
- 3) Banner Change to display different titles/names
- 4) Recharging the battery
- 5) Lock feature

Other actors

- 1) Owner of the phone
- 2) Callers dialing to the phone
- 3) Cellular company providing the service

Our project design is for a complete jacuzzi system. Following is a list of components that we are planning to include in our system.

#### I. Temperature/Heater

- A. Temp Sensor/Thermostat
- B. Timer?
  - 1. User able to set a time for heat to come on
- C. Solar/Electric or Gas hybrid?
  - 1. Use solar to save energy but supplement with more efficient heat source
- D. Combination temperature sensor - air & water
  - 1. Enable user to specify different water temperatures for differing air temperatures

#### II. Circulation/Filtering Pump

- A. Timer
- B. Filter sensor
  - 1. Detects full filter
- C. Clean filter reminder
  - 1. "Change/Clean Filter" Led

#### III. Jets

- A. On/Off
  - 1. General switch turns jets on or off
- B. Groups of Jets
  - 1. Switch only specified jets on
- C. Air - bubbles On/Off
- D. Speed/Volume/Pressure
  - 1. User able to control speed, volume, and pressure of water coming out of jets
- E. Timer
  - 1. Set jets to go on for a specified amount of time

#### IV. Chemicals

- A. Sensors (Chlorine, pH)
  - 1. Track Chlorine and pH level in water
- B. Dispensers
  - 1. Automatically dispense the correct amount of chemicals when needed

Our proposal for an embedded system is a pool-monitoring and control system with the following attributes and operations:

- Temperature Sensor
- Water Level Reader/Adjuster
- Chemical Sensor
- Light On/Off
- Cover On/Off
- Filtration System – Timer
- Backwash Option
- System Status Display
- Heat On/Off

We plan on providing a user-interface to display these functions for the user.

We plan on working on this project as a group, mostly in lab, to avoid miscommunication or confusion.

For our project, we chose to simulate an oven that is found in most households. Some of the features of the oven include a source of heat, a fan, a timer and clock, and a self-cleaning function.

There are various knobs on the oven which control its different modes of operation. There is one main knob which is used to control the state of the oven. These states include: off, preheat, warm, bake, broil and clean. When the states preheat, bake or broil are set, the temperature knob must also be set. The temperature knob is capable of ranging the heat from 0 to 500 degrees F. Also, when one of these states are set, the user has the option of setting a timer. The timer is used in conjunction with a clock to manage the duration in a real-time situation. Additionally, at any time during one of these states, the user may choose to turn the light to check on their food. Thus the user is responsible for turning the light on and off.

When the warm state is set, there is a predefined temperature that is set by the oven, not by the user. When the oven is set to the off state after being used, the fan is automatically turned on to cool down the oven for a fixed amount of time. Thus the option for setting the timer in when in the fan is used is not in the hands of the user. Again, in these two states, the user has the option of turning the light on and off if desired.

When the self-cleaning state is set by the user, the control of the system is passed on to the oven itself. A predefined duration of time is set by the oven timer for this mode of operation. Additionally, during this oven state the user may not have anything in the oven. Thus a sensor will be used to detect if there is something in the oven when this state is invoked. If there is something in the oven, the self-cleaning state will not begin and the oven will give the user a warning message by blinking the lamp on and off. Otherwise, this operation continues.

Initially, the oven is obviously in the off state, yet the clock is still running to keep track of real-time. Thus the system is pending. The user can invoke any state choose at any time. Additionally, when the door of the oven is open, the oven detects this and turns the light on for the user. Consequently, when the door is closed, the lamp is turned off. This function of the oven can be implemented as a switch.

The proposal is to create a device that controls a robotic pet dog. This dog does several things. It's either idle or interacting with something else (his owner, another human, a real dog, the carpet, a car, a strand of blonde hair). The dog is moody, and its mood controls its reactions to stimuli. The dog also requires training (most likely accomplished via the 'train dog' command) and can be trained to perform certain tricks.

In its idle state, the dog randomly barks, chases his tail, or wets the carpet, depending on his level of training. While idle, its mood might change, and it might get hungry, triggering an event that would take it out of idle and into a chain of events.

The dog also reacts to stimuli such as being petted, kicked, trained or shot. Some of these stimuli are terminal (for the dog and the execution of the program), while most lead the dog down a chain of events that would eventually return to him to idle. Stimuli are of two types, internal or external. Internal stimuli include the dog getting hungry, frightened and the like, and external stimuli are usually induced by the owner or another actor, and include petting etc.

The dog's ability to perform a trick is dependent on its training level. Clearly, tricks are predefined and associated with a training level. The scope of 'trick' could be broadened to include toilet training and politeness. It might bark less randomly when he is better trained.

We are planning on making a virtual pet. Something based along the lines of the ferby or a giga-pet. The actual animal that we will create has not been discussed or decided upon. The plan is to make the pet somewhat complicated with user input to keep the pet alive.

After the use case diagram and object model diagram is created by the group (as a group effort), we will split the project up into sections by class. Each person will work on a statechart and then we will come back together and work to put all of the pieces together and do finishing touches.