CSCI 360 Software Architecture and Design
Spring 2010
Bowring

# Team Project – Garage Door Opener System

Consider that your team is the software development team for a new company that will make and market a residential garage door-opening system. The requirements for the system have been established and follow this project statement. Your team's job is to use the techniques presented in our textbook to specify a software solution for the garage door-opening system by designing a virtualized product that operates as a Web-based simulation. This approach is used in the aviation industry, for example, to explore airplane designs. In this context, the various stakeholders will explore and test the simulation of the product before committing to production.

Your team will produce a number of deliverables over the next few weeks that will serve as chapters in your final deliverable. The final project deliverable will be a compilation of these chapters with appropriate title pages, table of contents, introduction, conclusion, and team self-evaluation.  The final document will be a single PDF document and submitted electronically via email. You are free to expand the contents of your submittal to suit the professional goals of your team and to reflect the quality of your design. Your deliverable will contain at a minimum an identifiable SRS, SAD and DDD.

All questions regarding this project must be submitted in writing via email, so that all teams may be electronically notified of the answers.

# Schedule of Deliverables

## 03 March: Requirements Deliverable (#1)
    User-level Requirements including functional, non-functional, and data requirements
    Use Case Model
    Use Case Descriptions
    =>SRS illustrated with UML diagrams

## 31 March: Architecture Deliverable (#2)
    Conceptual Model of architecture including decompositions and Class Diagrams
    Profiles and Scenarios (weighted) in prose as well as a Utility Tree summary diagram
    =>SAD illustrated with UML diagrams

## 19 April: Detailed Design and Final Project Deliverable (#3)
    Class Diagram(s)
    Sequence Diagram(s)
    State Chart(s)
    =>DDD illustrated with UML diagrams
    ==>**Completed project including SRS, SAD, DDD**
    ==>**Presentation materials for use on 21 and 26 April in class**

**Go the extra distance and build a prototype if you like !!**

## Requirements

1.  The garage door-opening system consists of three devices: a remote control device, a stationary control device, and a mounted motor that operates the garage door.
2.  The remote control device consists of an activator button and a telltale light. The light goes on when the button is pushed and goes off when the button is released. The remote control device sends a signal to the motor.
3.  The motor works in two directions: pulling the door up and pushing it down. The motor is turned on and off by either of the control devices. If the motor is currently inactive, and it receives an activation event notification, it will move in the opposite direction from the direction caused by the previous activation. If either control device button is pressed while the motor is pulling the door upward, the motor is immediately turned off. If either control device button is pressed while the motor is pushing the door downward, the motor stops and then immediately starts again, pulling the door in the upward direction. The motor is automatically turned off when the door reaches its fully open or fully closed position.
4.  Housed with the motor is a work light. Each time the motor is activated, the light comes on and stays on for at least five minutes. The light then turns off unless overridden by requirement 5.c. If the motor is re-activated within the five-minute period, the five-minute period is reset.
5.  The stationary device consists of three button/light pairs. These lights are small telltales indicating system state.
    a.  The first button/light pair works identically with the remote control device.
    b.  The second button/light pair enables and disables the remote control device. The button acts as a toggle, alternatively enabling and disabling the remote control device. If the remote is deactivated, this button's light is on; otherwise, this light is off.
    c.  The third button/light pair controls the work light on the motor. There are four possibilities for the work light, depending on whether the motor has run in the last five minutes or not and whether the button has been pushed an odd or even number of times, shown in the following table. The light in this button/light pair comes on with the first press and alternates on with off with each button press.

|                              | Even button-push count  | Odd button-push count         |
| ---------------------------- | ----------------------- | ----------------------------- |
| Motor ran in last 5 minutes  | Light on until time out | Light on until button press   |
| Motor not run in last 5 min  | Light off               | Light on until button press   |

6.  When creating diagrams of system state, assume that the garage door is initially closed, the motor is off, the light is off, the remote is enabled, and the motor has not been run in the last five minutes.
7.  Note that this model does not address issues like the security code settings for the radio signals, the motor's obstruction detection system, and any range limitations for the remote signaling device. Please do not be concerned with these.

*Thanks to Spencer Rugaber of Georgia Tech for the original problem statement.*