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ECE 4220

Project Proposal

Security Monitoring System

In almost any business, or even home, security is one of the top concerns. The problem I will be addressing in this project will be the issue of securing buildings. I chose this project because I want implement my own version of a security system, and gain experience with knowing what a good security system needs. I want to explore the various opportunities on how to make a security system stronger and more reliable. The knowledge and experience I will obtain by building this project could help me discover more ways how to improve popular security systems that are used today.

I will be addressing this project by creating three major components. These components will be 3 independent systems that will be communicating with each other using FIFOs and named pipes. The first component will be a user space program on a computer that will implement the main security station. The second and third components will be two keypads. The two keypad stations will constantly check for key presses, it will receive a series of key presses and send that data to the main security station. I will be using FairCom in this project. The main security station will compare the given password to the already stored passwords on the database, and will tell the keypad whether to lock or unlock depending on if it found the correct series of numbers in the database. If there was an incorrect key series entered the system will implement a security breach. The security breach will cause both keypads to lock down, and not be able to be open. Only the main security station can clear the security breach allowing both keypad stations to go back to normal functioning. Which would be checking for key presses and sending key series to the main security station. Specifications for my project are that it will use two programmable numeric keypads, 1 or 2 microprocessors, and a Computer.

Similar systems to my project would be everyday home security systems such as those created and used by ADT. Another example would be security systems that are used in highly secured government controlled areas.

My short term goals for this project are to demonstrate that I have acquired and fully understood the learning objectives for this course and to receive an excellent grade and review from my professor. My long term goals for this project are to have a strong project that demonstrates to my future employers the skills and abilities I have obtained about programming and building embedded systems and devices. My final goals for this project are to learn in depth about the way security systems work and are built. I would like to discover ways to improve security systems and also how to repair them.

The benefits of this project are that it will demonstrate the use of real time kernels and operating systems, the use of threads, processes and real time tasks. This project will also demonstrate Task communication, cooperation and synchronization with the use of programing elements such as FIFOs, named pipes, and semaphores. There will also be implementation of scheduling, and most Importantly Server-Client communication.

The expected outcome of this project is that it will be a great example of what is to be learned from this course. I intend for this project to work efficiently. My assumptions of this project are that programming the two keypads will not be that difficult, they will in fact be incredibly similar in code, the difference will occur within the main security station which will be on the computer using a user space program. I suspect the most difficult part will be the synchronization of the two keypads and the data they are receiving from the main security station.

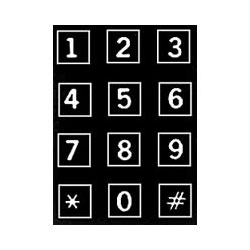
A Strength of the system is that it will demonstrate the usefulness and importance of communication between systems. Some limitations of the system are that it will be limited to only two keypad stations, however I would like to have the option still available to extend the security coverage to large buildings. Another constraint is that when demonstrating I cannot use actual doors, and this may raise doubt that my prototype would actually work efficiently in real life setting

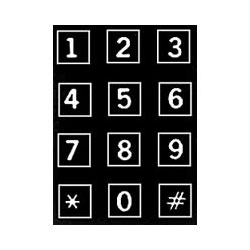
Timeline

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| --- | --- | --- | --- | --- | --- |
| Systems | Week 1 | Week 2 | Week 3 | Week 5 | Week 6 |
| Component 1  (Security Monitoring Station) | Program the main security Client | Debug | debug | Debug/Prepare for demonstration | Demonstrate |
| Component 2  (Keypad Station) | Write program for keypad | Build/program keypad | debug | Debug/Prepare for demonstration | Demonstrate |
| Component 3  (Keypad station) | Write program for keypad | Build/program key pad | debug | Debug/Prepare for demonstration | Demonstrate |

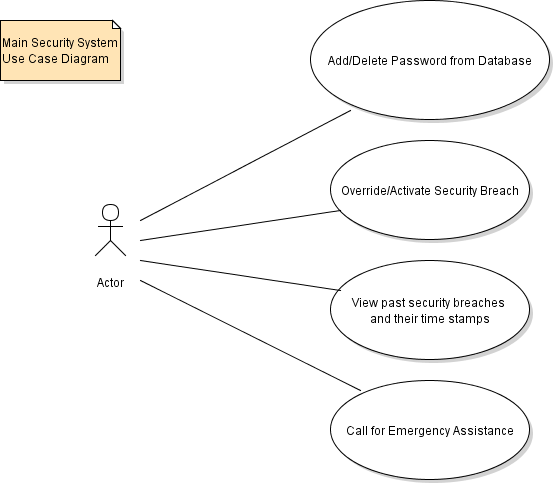
Hardware Diagram

Main Security Station

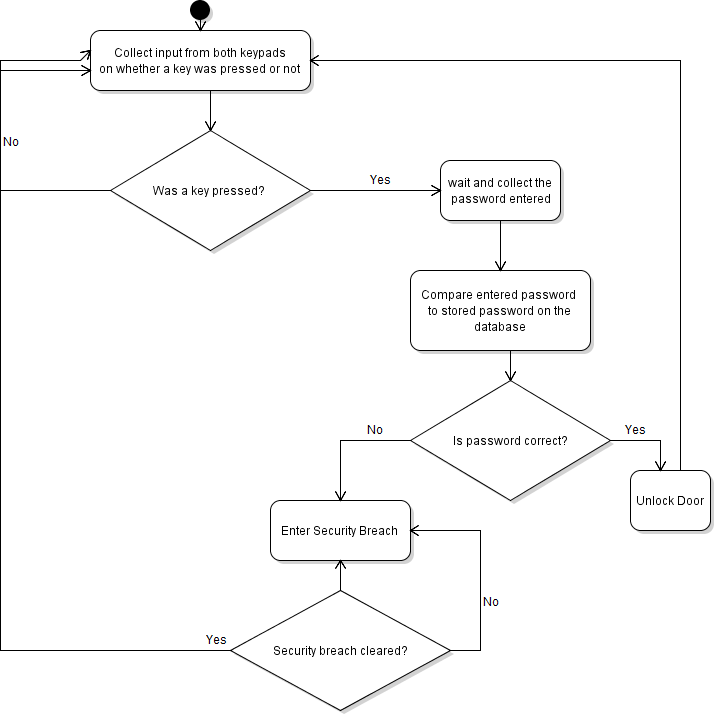




Door 1 Door 2



Use Case Diagram for Main Security System



Activity Diagram for Main Security System