

Smart Home Security Module

ECE Capstone Design Project, Spring'13

Advisor:

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Introduction

This project creates an independent module that updates existing smart home security solutions. This is accomplished through the use of analog sensors and converting this analog input into a digital output.

Motivation

Looking around there is no complete solution to protecting your home. Security solutions do exist, but they are centered around protecting the home from people, not so much the environment. After seeing the effects on a burst pipe in a home after a fire call, the inspiration to prevent, or mitigate this and any other kind of environmental damage, came about.

Design

A home automation and security system needs to be scalable and adjustable to the many different applications that present themselves. The system needs to be flexible and adaptable with a simple easy-to-understand user interface. To accomplish flexibility across a wide expanse of applications the systems need to be modular. Additionally the individual components need to be properly packaged and sized to be incorporated into various appliances, outlets, or lighting systems. The power consumption of such devices needs to be minimal to ensure maximum power efficiencies.

Backward compatibility is an important consideration and needs to be incorporated in the system design. This ensures the system will work most devices both existing and future along with being non-proprietary. To accomplish this a programmable microcontroller was used. The microcontroller used in this project is an Atmel chip series. Using this chip allows to the ability to send I/O signals to any device and allows necessary modularity.

Conclusion

From the very beginning our project was made to be customizable based on needs, useful, modular, efficient and inexpensive. There are solutions to each problem that this device solves, but they are problem specific, you would need an array of devices to do what this single device does. When we were going through the design process, we focused on how we could use it in our own homes. Thus we tried to solve things that we ran into, and we built something that, not only that we can be proud of, but something that we can use on a day to day basis.

Our smart home security module fulfills all these goals and has the potential to do so much more. From connecting with cellular networks and your home Wi-Fi, to being able to run off solar power in remote locations, these unexplored avenues have an almost unlimited amount of potential, due to our steadfast hold onto those few ideals that we kept in mind while designing our project.