Introduction

Today’s culture is filled with stories of home break-ins and burglaries, leaving people to fear that their home may not be protected from the outside world. Americans want their home to be safe and secure from any would be intruders. This fear for the lack of security has caused an increase in the demand of sophisticated home alarm systems. This demand for better home security systems has also drifted over to a need for home automation. Not only does a home need to be secure, but home appliances need a more refined control system. Americans are always on the go, and they demand to have technology that is flexible for their lifestyle.

I propose to work with Leo to build a product that not only is an alarm system, but also a household automation control unit. The key to this control system will be the use of a telephone for a two way communication path to the central control unit. By using a phone the end user will be instantly notified via telephone for any intrusions in their home. Also, the telephone will double as a remote control device for household appliances such as lights, and an outdoor sprinkler system. I will be in charge of the alarm side of the system including the trip sensors, while Leo will be responsible for the home automation controls.

Description

The main control module or the heart of this project will be a microcontroller to handle the signal control processing. The telephone interface otherwise known as the data access arrangement (DAA) will be hooked directly to the MCU to allow control of the telephone. The control unit will be hooked to a wireless transmitter/receiver to transmit data to and from the sensors or controls in the house. When an alarm sensor has been tripped a signal will be sent to the MCU, which will in turn determine what prerecorded message needs to be sent through the telephone interface. There will be a different message for each sensor allowing the end user to know what part of the security system has been violated. DTMF decoding will be used for password authentication, which will safeguard the controller from any unauthorized access. Decoding will also be utilized for the control scheme of the sprinkler system and lights inside the house. The system will allow for schedule changes, and instant on/off control of the sprinkler system. DTMF encoding will be the used when the MCU needs to call the end user indicating an alarm sensor has been tripped. The figure below shows a high level block diagram of the proposed layout for the project.

Control System Block Diagram
**Benefits**

This alarm/home control unit will have numerous benefits. A standard alarm will give just an audible alert, notifying the occupants of the house an intrusion has been made. This alarm, however when paired with a cell phone will allow for notification of home intrusion no matter where the end user is. It allows the user to have confidence that their home is safe, and secure even when they are not home. The addition of the home control unit allows for an even more versatile system. The end user will have the ability to control several appliances anywhere they have cell phone service. The home automation control will incorporate output relays that for example could control a sprinkler system or any other appliance at the house.

**Market Comparison**

Home automation, and alarm systems are widely available by many vendors. Separately there are similar home automation systems, and home security systems, but together as one unit I have found only a select few. Also, the ones that do exist are quite expensive and complex. For example Intelahome makes one that costs $430, and has 16 hardwired controllers, which can control some 80 devices, which can be a bit overwhelming for many consumers. This system will be designed with ease of use in mind, and a very simple setup. The addition of the sprinkler control is a very unique idea, and I have not seen any systems that can perform this feature.

**Project Development and Demonstration**

The project will be constructed using the equipment available in the ETEC 340 lab in the Ross Technology Building. The lab has a large assortment of electrical test equipment, helpful design software, and hardware debugging tools.

The physical layout of this project will be a main control box, which will consist of a MCU and a wireless transmitter. There will be 4 sensors for the alarm, which will each have a wireless transmitter/receiver circuit, and their own particular mounting capabilities. The home automation will most likely be a wall plug in unit, which will incorporate wireless controlled relays to activate appliances. The only cords and wires for this system will be the telephone line interface and the power supply cord for the main controller.

The final project will be demonstrated at the end of the 2005-2006 academic year. The unit setup will simulate the triggering of individual sensors on the alarm, which will demonstrate notification via the cell phone. The home automation portion will be demonstrated by calling into the test line, and performing simple control of a simulated sprinkler system.