Project Name: Magic Glove

Team Members:
Name: Alan Hess  
Email: hessa1029@ufl.edu

Name: Gianni Gibelli  
Email: gtac01@ufl.edu

Project Abstract:
The wireless Magic Glove project aims to take the place of the traditional, easily displaceable remote control for your television set. The glove itself is the input mechanism to a system which recognizes a variety of hand gestures and translates them into infrared signals for the cable box to recognize, at the receiver end. Embedded into the layers of the glove will be flex sensors for each finger and a gyroscope.

The transmitter microcontroller and circuitry will be so ergonomic it will be virtually invisible to the user. Its low-power design will also make it comparable in battery life to its remote control counter-part.

The gyroscope will help in detecting when to “wake up” the device, minimizing power consumption.

The project will attempt to at least implement the basic commands of “volume, channel, numbers and power” in the simplest way possible to the user.
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Project Features

The Magic Glove attempts to solve the problem of the commonly misplaced television remote, while at the same time re-inventing the way we interact with multimedia centers. This version of the Magic Glove is a prototype showing the possibilities of a “remote control glove” in the application of controlling a television set. Specifically, implementing flex sensors and an ergonomic glove solution, the Magic Glove will be able to send specific commands to a receiving station for decoding. The receiver is responsible for decoding the signal sent by the glove and generating the appropriate infrared signal for the television to understand. By combining the inputs from at least five flex sensors and an accelerometer, the goal is to implement as many commands as possible. The final device will be a comfortable, innovative television remote control to replace a bulkier, easily misplaced remote control involving buttons, with sometimes confusing layouts.

Objectives

The television remote glove will include:

- Transmitter board small enough to fit on the back of a medium-sized glove.
- A wall-powered receiver base with an IR LED to transmit to the television/cable box
- A battery-powered transmitter that will only consume power when in use for detecting hand signals and transmitting the information to the receiver.
- Flex sensors for the fingers of the glove and an accelerometer on the glove
Components

- CC430F6137
  - The purpose of using this specific microcontroller is its incorporation of the MSP430 and an RF transmitter into a single chip. The device that we are designing is intended to be small, yet still capable of transmitting to a receiver base. This microcontroller will be able to meet these specifications along with providing a low power solution for a battery-powered glove. This microcontroller in comparison to another MSP430 and a separate RF transceiver is cost efficient.
  - The disadvantage of the microcontroller is its size and packaging. The QFN packaging makes it difficult to easily solder the chip onto a board. The chip will need to be professionally soldered to a board and will require having an easy way to program the chip on our final board.

- 2.2” Flex Sensor
  - The flex sensors will be placed on the back of each knuckle in the glove so that the bending of a finger will cause a variation. The shorter flex sensors will be more cost efficient, yet still achieve our needed range of motion.
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- Accelerometer
  - The accelerometer will be useful to implement hand gestures for added commands with the remote glove. An accelerometer is all that is needed and cuts cost when compared with a gyroscope/accelerometer package.

- IR LED
  - Will transmit to the television from the receiving base using pulse-width modulated signals specific to the television/cable box that is chosen.
Technical Concepts

The purpose of the television remote glove is to provide a simple alternative to a television remote that does not require locating a specific button and that is more difficult to lose track of while watching the television. The most practical design for the glove portion of the project is to have a battery-powered transmitter within the glove. The CC430 is useful in this regard for its low-power modes and lower voltage requirements in comparison to other microcontrollers. The CC430 is also practical for its simple RF transceiver built into the chip. Other methods of transmission may require directing the glove or more complicated design. The RF transmitter will prove to be more practical for transmitting to a receiving base. The CC430 is also very useful for its compact design. The glove should be comfortable, lightweight, and an appropriate size for normal wear. In order to achieve these requirements, the board on the glove should be small. A small microcontroller benefits this specification.

While simply placing the IR LED on the glove may seem easier and more practical, the IR LED must be directed towards the receiver on a television. By using an RF transmitter between the glove and a base, the desired IR transmission can be made from a location very close to the television while allowing the user freedom to direct the glove in whatever direction is most comfortable. Obstacles between the glove and television will also not be a problem.

The glove will be powered by simple coin-size batteries that will be placed in the glove as well. These batteries should provide power necessary to use the gloves normally with the use of low-power modes and the ability to turn off the glove entirely.
Distribution of Labor

The following is a breakdown of the expected percentage of work from each team member.

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<th></th>
<th>Alan Hess (%)</th>
<th>Gianni Gibelli (%)</th>
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Table 1: Labor Distribution Breakdown
Projected Timeline

The following is a Gantt chart showing the expected timeline for the project.