

## CSE 4392 / CSE 5392 - *Smart Home Technologies*

Homework 1- Spring 2006

Due Date: Feb. 7 2005, 3:30 pm

### Components

- Power supply (5V)
- Protoboard with Javelin
- Javelin IDE and cable
- Digital Multimeter
- LM34DZ Temperature Sensor
- Photoresistor
- 6V lamp
- LED
- Various resistors, capacitors and cables

Problems marked with a \* are required only for students in the graduate section (CSE 5392). They will be graded for extra credit for students of CSE 4392.

For all problems you should hand in a short description of your experiences and your code by submitting it to [huber@omega.uta.edu](mailto:huber@omega.uta.edu). In addition, you have to demonstrate the circuit and programs to the instructor.

### Sensor Circuits

1. Using the lecture notes, build the light and temperature sensor circuits and the three actuator circuits (lamp, speaker, LED)
2. Write a program that senses when an object moves between the lamp and the photoresistor. Then repeat the experiment with the LED instead of the lamp. Explain what happens.

### Smart Home Control

3. Write a program that simulates a basic temperature controller that operates in two different modes dependent on the occupancy of the room. You should use the photoresistor and the LED to establish a detector that determines if someone entered or exited (you can assume that initially the room is empty and that every time you move your hand between the photoresistor and the light the person either entered or exited). Depending on the presence of a person in the room your temperature controller should use a different temperature setpoint and light the color change LED red if the temperature is above the setpoint and green if it is below.

4.\* Write a program that uses the light and temperature data of your sensors to generate a set of alerts in the temperature control application from the previous problem:

- a) A/C failure (the temperature exceeds the setpoint by more than a maximum tolerance)
- b) Heating failure (the temperature is below the setpoint by more than a maximum tolerance)
- c) Loss of lighting (low light for more than 5 seconds when a person is in the room)
- d) Fire (medium light, very high temp)

The program should set a unique audio and visual alarm for each alert condition. It should also allow you to turn off either or both types of alert notification (alarm) both before and during an alert.