**Smoke Chamber Design**

The S.M.A.R.T. Alarm system employs the use of Photoelectric Sensors in order to detect smoke. The use of these sensors requires the design and implementation of a “Smoke Chamber” that serves as a chamber where the ambient air can enter, and thus if smoke is present it may enter as well. The most effective way to place the smoke chamber would be to have any perforation on the underside of the alarm, so that the smoke can rise into the chamber while also avoiding any light that may come from windows or the ceiling from entering the chamber. The Smoke Chamber will have two main components: an infrared or ultraviolet light emitting diode (LED) as a source and a photodiode to act as a receiver. The LED is emitting light continuously at the photodiode, and as long as the photodiode is receiving this light a current is produced, therefore if this light is interrupted then the current will stop. A lack of current stemming from the photodiode will serve as a marker for the system that smoke is present and the alarm should sound. The smoke chamber should contain as little outside light as possible, so that the outside light does not interfere with the photodiode, while allowing enough air flow for smoke to enter the chamber if present. In fact, the design of the Smoke Chamber as a Photoelectric Sensor should serve as a black box, with an input to power the LED and an output from the photodiode, so that the Alarm circuit can measure to determine the presence of smoke.

**Infrared LED**

Infrared radiation is a type of electromagnetic radiation that is often referred to as infrared light. Discovered in 1800 by Sir William Herschel, infrared radiation is invisible to the human eye however heat stemming from infrared can still be felt by touch, extending just past the red edge on the visible spectrum. Infrared radiation is classified as falling between the wavelengths of 0.75 um to 1mm. The IR LED used for the purpose of measuring smoke presence in the Smoke Chamber serves as a low power option for transmitting the IR light meant to be received by the photodiode. This component must also provide the ability to emit the light normal to sensor, in order to avoid wear and tear that is associated with bending the leads of the component. The wavelength of the light transmitted should also match the wavelength of peak sensitivity for the photodiode, to ensure that the sensor will work.

**Photodiode**

A photo

**Smoke Chamber Case**

**Additional Notes**

* We should add an LED that serves as “detector is working” display
* Maybe we can use “test switch” to show our system works rather than using fire and real smoke
* Research smoke detector algorithms
* We need to notify of low battery in noticeable “smart” manner (email)
* Research life expectancy of sensors
* Combination algorithms of several sensors
* http://www.ssspl.org/uploads/Products/Pdf/firealarmsystem.pdf

**To Quantify**

* Sensitivity in % per meter
* Life Expectancy of sensor
* Accuracy of sensor
* Response time

<http://www.mouser.com/Search/Refine.aspx?Keyword=TSKS5400S>

**References**