# CALIFORNIA STATE SCIENCE FAIR
# 2017 PROJECT SUMMARY

**Name(s)**

Gajan R. Nagaraj

**Project Number**

**S0316**

**Project Title**

## A Novel Fire Hazard Autodetect System for Vents, Pipes, and Chimneys

**Abstract**

**Objectives/Goals**

The goal of this project is to develop a gadget with can be latched onto a vent and detect any clogging, heat buildup, and/or combustion in an air vent. Design criteria of the device are that the device must be equipped with a functioning temperature sensor that can sense heat buildup within an air, a functioning pressure sensor that can sense pressure build up within an air vent, the device can detect the dust density within the air vent and process whether the vent is clogged, the device should be able to adapt to various set points depending on the type of air vent, and the device should have connectivity capabilities so that it can send alerts depending on the status of the air inside a given vent.

**Methods/Materials**

In this project, I constructed a device from commercial grade electronics (temperature sensor, pressure sensor, opacity sensor, and arduino 101) to fit my design criteria. I then wrote my own software to control these electronic components and make them function to fulfill my design criteria, do set points, provide alerts based on exceedance of those set points, and achieve the overall goal of the project.

**Results**

After rigging the device to a mock air vent (which was connected to a heater/fan), the device performed per the design criteria. The device was able to react the build-up of these factors fairly quickly and with a reasonable amount of accuracy. Testing of the device shows that it was triggered within a small reasonable margin of the set point. The device adapted to the various set points the user set and sent alerts via Bluetooth when set points were violated for temperature, pressure, and dust density.

**Conclusions/Discussion**

In the end, the design criteria were satisfied. A device which was equipped with a functioning temperature sensor, pressure sensor, dust sensor, and Bluetooth connectivity was created. These sensors were also configured in such a way which allowed the device to detect any extreme values within the air vent and report it back to the user. The user was also able to set values which fit their environment and the device adapted to these conditions. This is a powerful tool which can be used to save many lives around the world and prevent the possibility of property damage/total loss of a house. This device ought to be deployed around the world for this specific use immediately.

**Summary Statement**

I developed a gadget which can be latched onto a vent and detect any clogging, heat buildup, and/or combustion in an air vent.

**Help Received**

None. I designed, built, and performed the experiments myself.