



AUTOMATIC FIRE EXTINGUISHER

¹Manasi Ghamande, ²Shantanu Pathak, ³Sanket Veer, ⁴PreetiOswal,
⁵JanhviUnganlawar, ⁶IpsitaPadhi, ⁷Chaitanya Malegaonkar,
⁸Gaurav Bagale, ⁹Om Patil

*Department of Sciences and Humanities, B.R.A.C.T's Vishwakarma Institute of Technology,
Savitri Bai Phule University, Pune, India.*

Abstract

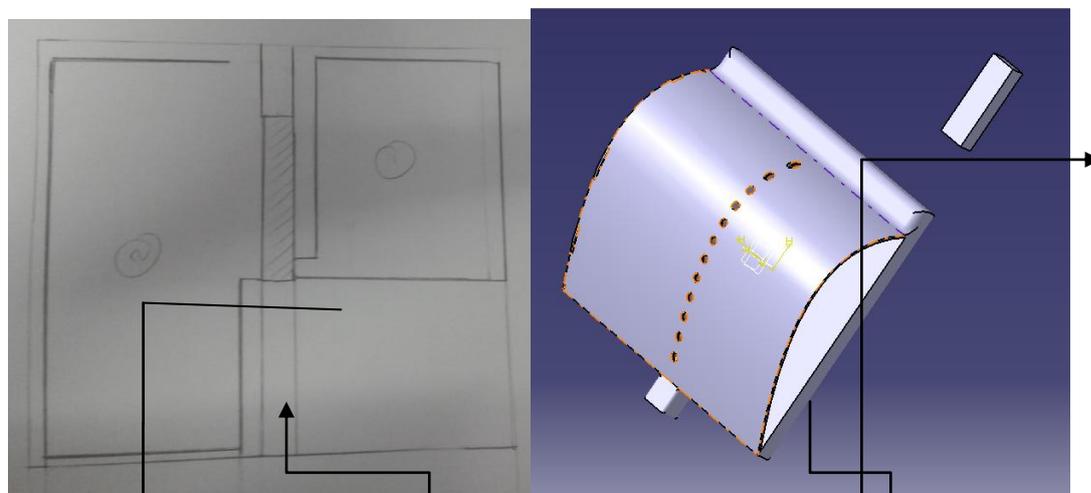
Fire disaster is a common threat to lives and property. An automatic fire extinguishing strategy provides real time monitoring, exploration and programmed smoke sensor. This paper presents the design of a low cost, robust and secure fire protection system for buildings .It sends early alarm when the fire occurs and helps to reduce the fire damage. This system consists of a smoke detector . The system takes into account the density of smoke. Over the yrs death rates by d fire has increased tremendously . Fire consumes commercial premises quickly ,indiscriminately taking lives and ruining d property. No one shud become a victim of fire bt d reality is that d people do become victims everyday.

The problem with having jst detection is that although u know u have a fire , there is no way to safely supress d fire urself n thats if u r there. The fire service will put it out when called bt the smoke damage occur before they arrive n the water damage after that can b quite significant. Fire supression systems r used to reduce the level of damage n downtime by automatically supressingthe power. Smoke detecting fire detector can reduce fire related deaths by 82% n injuries by 46% .

I MECHANISM:

Structure of the model:

The shape given to the model is the shape of a pillow. The Shape is given to it in order to avoid the pain after by mistake collision and also to reduce the space occupied by the fire extinguisher with a futuristic modern time innovative look. The figure given below:



Vinegar container

CENTRAL WALL

Sensor

In the bulged part of the structure lies the chemical compounds which are to mixed in order to produce CO₂. There are two compounds one acid and other is a base. We know that when a base is reacted with an acid neutralization reaction takes place. Here, the compounds used are NaHCO₃(Baking Soda) as base and dilute CH₃COOH(Vinegar) as acid. These compounds are kept in this bulged part in two containers which are separated by a wall.

There is a cuboidal shape behind the bulge. A string holds the walls load preventing it from falling. It is passed through a pulley allowing the string into the Cuboidal part where a mechanical support is has held it.

The support is metallic and is with the help of a circuit. The support is connected to a machine which can move the support. The machine runs when current is passed through it. This is connected to smoke detector and a battery. This whole circuit and mechanical part is in the cuboidal part of the structure of the fire extinguisher.

In the bulged part there are some holes present which will allow the carbon dioxide to come out of it to extinguish the fire. The holes are just in front of the wall which restricts the chemicals from external atmosphere. The carbon dioxide is formed after wall moves which also opens the holes. Thereby opening a passage for carbon dioxide escape which would extinguish the fire. There are hooks at top to hold it to a rigid support.

II MATERIAL OF MODEL

CO₂Aluminium body Fire Extinguishers are environmentally safe and designed to suppress the fires where Class B, C and Electrically energized fires could occur. CO₂ Fire Extinguishers are advisable to use in Indoors where wind and drafts doesn't affect discharge and where clean medium required which doesn't leaves residue. Advantage of having Aluminium Body Fire extinguishers are lighter weight compared to Manganese Steel bodies and longer life.



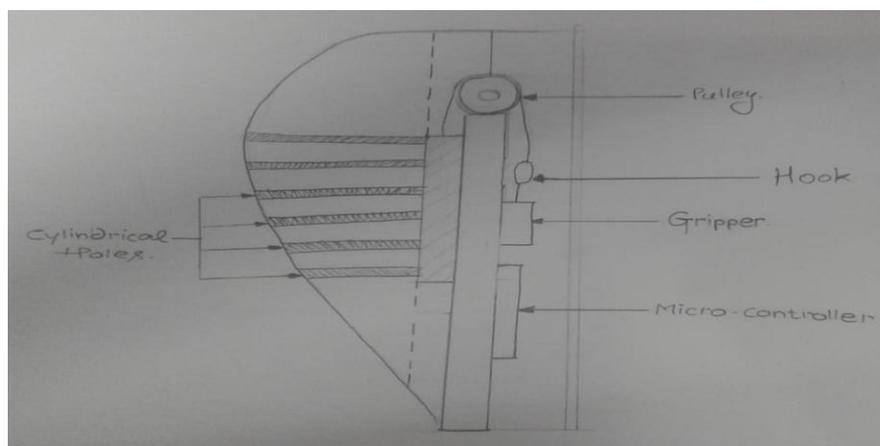
Carbon Dioxide is discharged as a white cloud of “snow” which smothers a fire by eliminating oxygen. It is effective for Class B flammable liquids and is electrically non-conductive. Carbon Dioxide is a clean, non-contaminating, odorless gas.

Vinegar is acidic. As such, it should not be stored in containers made from brass, copper, iron or tin or corrosion and leaching will set in, creating reactions between the metals and the vinegar and therefore damaging the food. The safest container for storing vinegar in is glass.

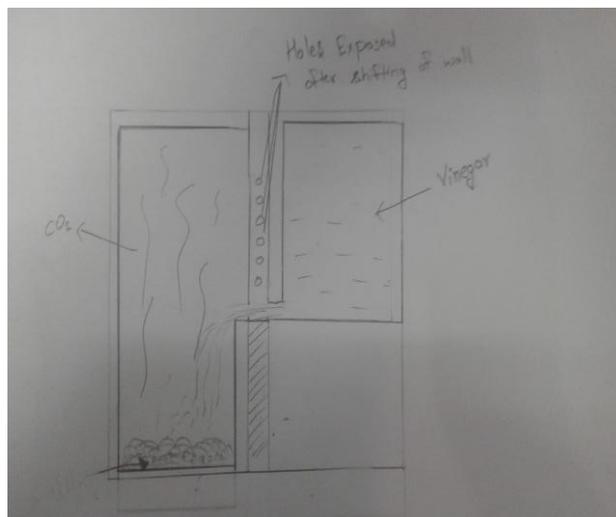
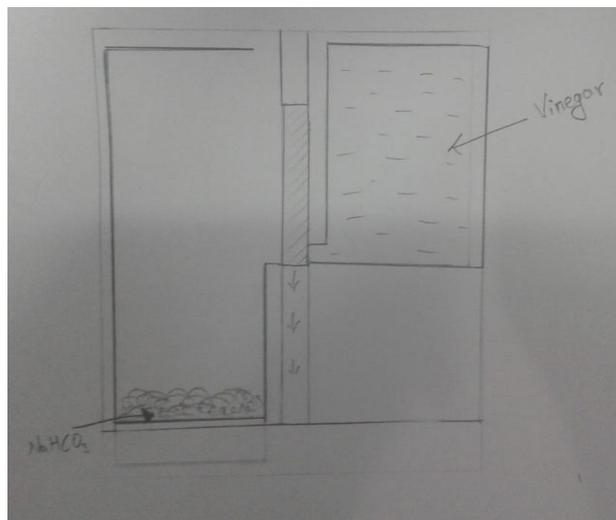
III WORKING OF MODEL:

When some place take fire, smoke would be produced. This smoke will be detected by the smoke detector attached to the fire extinguisher on its outer side. After the detection of the smoke, the detector would pass current in the circuit with the help of the battery attached to the detector itself. The current is passed to the hook which controls the hook. When current is passed the hook as per the machine is programmed moves aside or rotates some angle in opposite direction.

This leads to the rope hooked leaving it. As soon as the rope is set free, the wall to which it was giving support falls down. The pulley allows us to keep the hook in other side of separation and reduce strain on the string.



As soon as the wall falls down the components NaHCO_3 and vinegar which are separated get mixed. The reaction occurs in the container of the basic baking soda powder wherein the vinegar gets poured into it. After the wall falls down the separation is removed the vinegar gets a path to flow into the baking soda container. The reaction occurs there and CO_2 is liberated. The holes are opened due to the falling of wall. Carbon dioxide created in the reaction gets the path of exit through the holes. The CO_2 comes out of the system and extinguishes the fire.



Advantages of this model:

As it has a pillow type shape it does not acquire extra space. As the shape is thinner than other fire extinguishers, it also decreases colliding chances of people with the fire extinguishers. It can be fitted or kept anywhere without any interference in any way. The extinguisher is automatic so no need of taking risk to approach till the fire extinguisher.

INSTALLATION:-

This type of model is autonomous and introduced to be helpful at risky places.

It can be attached on any type of vertical support (such as wall) with help of nuts and bolts.

It is better to keep it near fire catching substances.

Three hook points are available at backside of the model. Two at topmost position (right corner and left corner) and one at bottom position near the sensor.



As it is autonomous we can install its control rooms, Automobile industry is also prone to fire accidents. These constitute class B fires and have great tendency to spread to nearby areas. Owing to the blanketing effect, a carbon dioxide extinguisher is most preferred for oil and automobile industries.

Application areas:

Financial institutions such as banks and ATMs, where sensitive equipment and large amount of money is available at any given point of time, need a clean agent that is residue free. Therefore, CO₂ fire extinguisher is a good option for such places.

Another area where they can be used is telecommunication sector. Call centers and telecom companies need such agent that does not put their work on hold for long time; hence advisable to be used at these places.

Computers, servers, sensitive equipment and gadgets are the backbone of any software company. If fire occurs at such places, CO₂ based fire extinguishers is the best option.

Automobile industry is also prone to fire accidents. These constitute class B fires and have great tendency to spread to nearby areas. Owing to the blanketing effect, a carbon dioxide extinguisher is most preferred for oil and automobile industries.

Server set-ups are always connected to electricity. Any spark or malfunctioning of wires can be hazardous.

However, the need here is that of a clean agent, which causes no harm to the servers and CO₂ extinguisher suits best in such areas.

Result:

Baking soda and vinegar react chemically because one is a base and the other is an acid. Baking soda is a basic compound called sodium bicarbonate. Vinegar is a diluted solution that contains acetic acid. The baking soda and vinegar reaction is actually two separate reactions. The first reaction is the acid-base reaction. When vinegar and baking soda are first mixed together, hydrogen ions in the vinegar react with the sodium and bicarbonate ions in the baking soda. The result of this initial reaction is two new chemicals: carbonic acid and sodium acetate. The second reaction is a decomposition reaction. The carbonic acid formed as a result of the first reaction immediately begins to decompose into water and carbon dioxide gas. Just like carbon dioxide bubbles in a carbonated drink, the carbon dioxide (that formed as the carbonic acid decomposed) rises to the top of the mixture. This creates the bubbles and foam you see when you mix baking soda and vinegar. If you mix a large amount of baking soda and vinegar in a small container with a narrow opening, expect an impressive eruption! Many science teachers use this simple chemical reaction to teach students about chemistry. If you've ever made a homemade volcano as a science experiment, then you know firsthand what happens when baking soda and vinegar react!



Conclusion:

In our daily life, whether it is an industry or domestic, the most common and fatal accidents are occurred due to fire. This results in both loss of property and human. Fire claim the lives of the innocent people around the world every single day.

ACKNOWLEDGEMENT:

We would like to express our sincere gratitude to our reverend mentor MRS. MANSI GHAMANDE for giving us this opportunity to work on this project. Thanks to our college B.R.A.C.T's VISHWAKARMA INSTITUTE OF TECHNOLOGY for introducing the major project to our course curriculum of first year B-TECH . Thank you to our Head of Department