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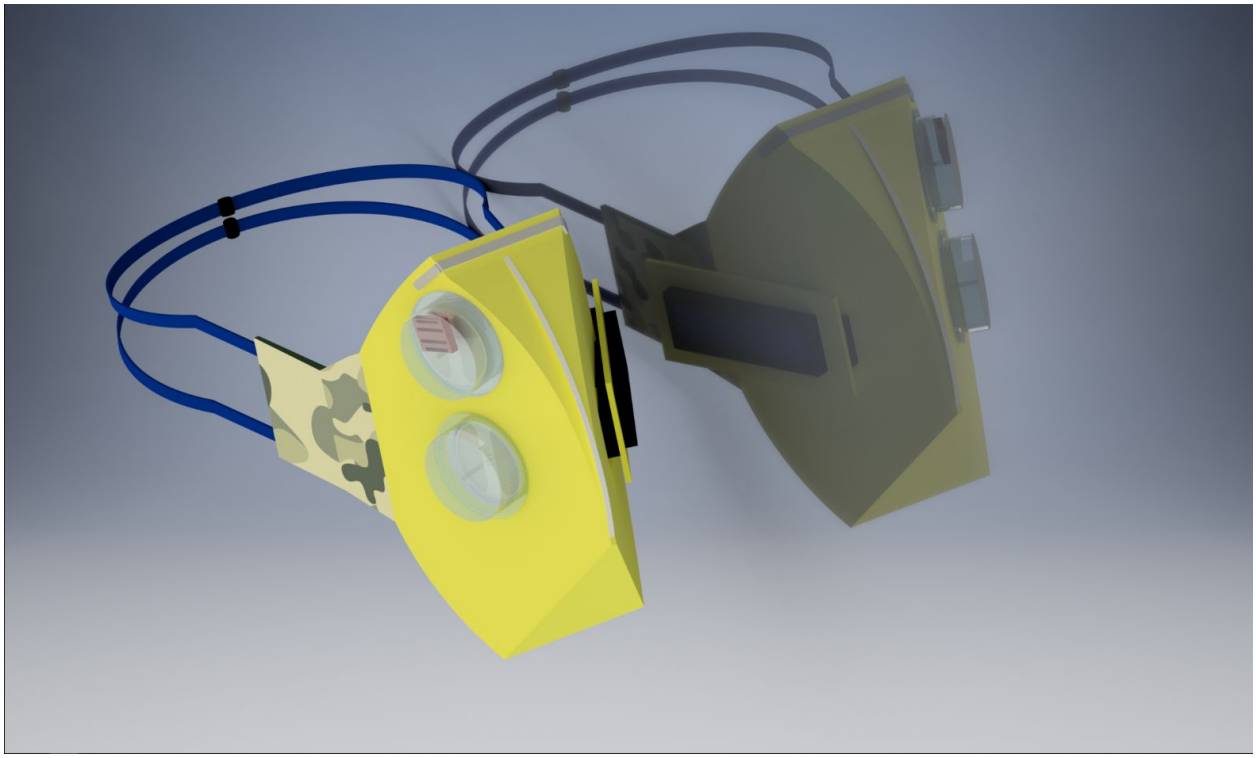
Science Report



My product is called MedMask. The MedMask is a high technology advanced mask. It contains temperature sensors which send the temperature of the surface of the patient. This data will be outputted through an app, which will be given with the mask. The mask will have 2 features which are to use the mask for personal use or hospital use. They are both designed and themed differently.

Impact on society and need for this product:

The need for this is because the amount of viruses are only increasing in various parts of the world. This device is meant to help society state safe from these diseases, as it is preventing the sick patient from spreading it. It will help the doctors, as they can check the temperature of the patient without physical contact. It will allow patients to stop taking of the mask while taking medications and eating. It will help the patient have an easier time going through the pain and sickness.

This will help keep the viruses away from other humans. This is designed for people who unfortunately get a virus which can be spread really quickly. This

going to help those people get through that time with maximum comfort. This targeted towards sick people and hospital/personal use.

The mask will contain various parts. Firstly, it will have layer of air filters which will cause the air intake to be dust free. It will have a slot in which you can insert your medicine and you can inhale it such as vicks. There will be a temperature monitor/ led screen which will display the temperature of the patient without the doctor having to make physical contact. This temperature will be shown on a app which will help the patient and doctors monitor the temperature of the patient's surface.

MedMask is giving a filtration rate of 98-99.9% which is classified as the most appropriate filtration for a mask which deals with bacteria and viruses. It is also reducing the need of ear thermometers.

Careers and Scientists involved:

- **There will be a n95 mask fit testing required which will confirm that the mask will have a good fitting. They will make sure that there is no leakage in the mask.**

- **There will be inhalation doctors and asthma doctor which will test the usefulness and the safety of the vick inhalation shaft.**

- **There will be air quality doctors testing the amount of air that is filtered through the mask. The mask will have to produce the minimum legal filtration of 95%. This is achieved through the MedMask.**

- **There will family doctors who will test the device at the small clinics to test the effectiveness of the mask and then give approval for it to be published in the vast neworking of the hospitals around the globe.**

- **There will also be a respirator fit test which will insure that the respirator is working and fits correctly to the mask. In this case, the MedMask has the 2 respirator so it should take about 40 minutes for a expert to analyze it.**

Other engineers will be working on the mask to ensure that the electrical work is safe on the device and the mask will survive the human contact and use. The mask portion of the MedMask is designed to be thrown away after severe use. The electronic parts will be required to be reused as they are really expensive.

Materials Needed/Used:

- LCD
- Computing platform such as, ardunio UNO
- Ardunio kit
- Male to male wires
- Female to male wires
- Ribbon wires
- Breadboard
- Fabric
- Elastics
- HC-06 bluetooth module
- MIT app inventor
- Electrical tape
- Filters
- Industrial mask
- Respirators
- Sewing machine
- Tread
- Foam board

Carbon Footprint and Environmental aspects:

Most of these items are accessible through amazon or even a local store. The app component will be done all on the computer so there is extra cost coming from that other than the fact that there will be electricity used in operating the system and the software which will be used to make the app. But this is an 1 time thing because you don't have to make a new app every single day.

The carbon footprint coming from the manufacturing will be that the sewing machines will be running for quite a long time which will use electricity. This electricity will mostly depend on the location of the factory. In the current place, there will be hydroelectricity used.

The parts are mainly composed of electronics. These will be less used than the fabric in production be a consumer only needs it once as the mask, they have to get a new one as it needs to be reused. The parts will contain a liquid crystal display which will have some cost to get. There will be a lot of aluminum and metal parts which will have get mined from a mine. The ore will be mined to get the specific metal which will produce a fantastic piece of metal, which will then be transformed into materials such as, wire(Copper), lcd, sensor, resistors and etc.

Overall the amount of carbon footprint will be way less than if you are

making some sort device which required a lot of wood or chemicals because that will just cause more non-renewable resources to be used. Whereas more than 90% of the materials used in the MedMask can be reused. Electronics will never be thrown in the waste and will be reused. E-waste is really large problems in the landfills because people just throw away the devices which causes the chemicals to leach into the groundwater which then cause the soil to be acidic and the water to turn poisonous which is bad for everyone.

Carbon Footprint for materials:

- **The carbon footprint of the fabric and the filters will be 1,074 billion kWh of electricity and 132 metric tons of coal. This will include the sewing machine**

- **Lcds produce 58.5 kg of CO2 minimum.**

- **Foam Board will produce the most effect to the Carbon footprint because it takes years for foam to decompose and while it decomposes it produces many harmful gases which are bad for the environment.**

- **Respirator plastic and circuit plastic components will create 6 kg of CO2 for every kg of plastic. Plus the process of burning the oil to create the plastic creates 3 kg of carbon dioxide.**

- **The carbon footprint for copper is 55.0, aluminum is 155.0 and steel is 24.4. These are included in the wires for the circuit.**

- **Ardunio is protecting 25 thousand square meter for rainforest in Costa Rica. For every 2 arduinos they are protecting 1 square meter of the rainforest from deforestation.**

The MedMask is reducing the thousands of millions of ear thermometer tips that are thrown into the landfills each year. These take several years to decompose and when they are are decomposing they leach serval dangerous chemical into the groundwater, where it affects everyone.

Science Aspects:

Science behind Vicks and side effects:

Vicks vaporub is a breathing inhalation medicine which helps relieve congestion and cough. Vicks actually tricks your brain into thinking that you have don't have a blocked nose and then ends up relieving your blocked nose. There is no scientific method on the way vicks relieves flu. Vicks has slight cooling effects which help soothe the irritation that occurs on the inside of the nose. Vicks is a petroleum jelly. This is a oil based product which is highly dangerous if it gets in the lungs. Therefore it has be strictly told to not put near nose, mouth or nostrils.

There have been 44 reports of people in the year of 2016 in france which have been negatively affected by the use of vick in an improper way. This caused people to be diagnosed with Exogenous lipoid pneumonia. This is the most rare type of pneumonia. This starts to make it even harder to breath. You start to get chest pain and chronic cough. This starts to happen when people put vicks on their nostrils or inside them.

This can be healed through the process of fibrosis. Fibrosis is the thickening and the scarring of the connective tissue, this occurs after an injury. But this may cause severe loss in the lung volume. There have been cases of death caused by this rare form of pneumonia. There are various types of therapy which prevent fibrosis and loss of lung volume.

Kids under the age of 5 should not be using vick under their nostrils because they are at an developing age and this is only going to be worse for the kids if they are getting in the habit of always putting a menthol jelly under their nose. There has been reports on 5 year old dying because of this un-acceptable reason. Addiction may also occur which is really bad for the patient. Therefore vicks in low quantity and safe use is the best.

What is my product doing?

The MedMask is completely taking away the contact of vicks with the skin. There will be a vicks cartridge, in which the vicks will be placed. This will then be put in side the top respirators of the mask. This will then acts as a one way medicine. The ventilation inside the mask will provide air to only go out and when it goes out the vicks will send its scent inside and then the user can use the vicks for its purpose.

Science behind flu and side effects:

20 % of the US population get the flu each year because of improper care being taken to stop the virus from spreading. Walking right past a person can cause you to have the virus into your lungs and then you start to get the symptoms. The MedMask will cut this out by at least 40%. The MedMask is designed to encourage doctors and personal users to use them.

80,000 people had died because of a flu. The common flu is not that harmful at first, but as it spreads it gets more and more dangerous until it dies of. This can be prevented at a really large scale if people start taking care of their surrounding and being careful while being sick. They need to start thinking about their surrounding.

What is flu?

- Flu is caused by an infection with the influenza virus. This mainly attacks

the upper portions of the respiratory tract, which includes the nose, throat, and rarely the lungs.

- The influenza virus is spread through respiratory droplets. Touching something that has a virus on it, body contact, shaking hands or touching your mouth.

Process of a flu virus:

- The flu virus is transmitted or inhaled from your fingers or the nearest source of the virus.
- Then it travels down the respiratory tract and joins the epithelial cells on the lining of the lungs.
- Then the virus takes control of the protein manufacturing machinery of the cell and it starts to generate its own virus proteins and they multiply. Once these cells are matured they then go and invade other cells.
- Soon after the virus is attacking the white blood cells begin to kill the virus infected cells.
- Coughing will occur which is trying to clear the airway in lungs.
- Headaches, fever, fatigue and muscle aches are all symptoms of the flu. This happens because there is so much going on in your body.

What is product doing?

The MedMask has various layers of filtration. There is low, high, and medium layer of filtration. This will make sure that 99% of the air that is coming through is filtered. This will prevent the user to spread their flu and keep the people around them safe and prevented from virus. It will also stop any kind of respiratory droplets that come out of the person's mouth. The MedMask will also make the contact between the doctor and the patient as minimal as possible. All the patient has to do is to wear the mask and wait for the doctor. Then the doctor comes and puts the lcd on the mask and attaches the mask sensor to his computer. This then will transmit the temperature of the patient to the app and the doctor can monitor the patient 24/7.

Extensions and improvements for the mask:

The improvements that can be made through further studies is to improve the technological aspects of the mask. There should be more sensors such as heart rate, breathing rate, moisture, and blood pressure. All of these will remove the need for the big and bulky machines that are found in hospital rooms. There should be studies on who we can use the properties of vicks and create steamer installed in the mask which will further enhance the experience of the patient or user. The steamer is far more effective at nasal congestion than vicks itself.

In the future, if I get the budget and the materials required than I will make the wire coming from the lcd and put them in the form or a thin ribbon wire strip

so that the system is less bulky. I would use the a rtc chip which would decrease the bulkiness of my project. That would have material in real manufacturing. But I couldn't use it because of complication and the budget.

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