I. Abstract

Hurricanes destroy property and can even kill people. For example hurricanes Katrina and Harvy caused $125 billion in property damage and took 2500 lives. Technology today can only warn people but our vision is to prevent hurricanes from forming in the first place! Our computer model will use quantum computing to predict where hurricanes will form. We will use ocean thermal energy conversion to cool down the ocean and prevent a hurricane from forming. The energy removed from the ocean will be combined with CO^2 from the air and hydrogen extracted from the water using electrolysis to create renewable synthetic fuels that can be used to help reduce climate change.

Hurricane Preventalater Fuel Maker

II. Description

1. Present Technology

There isn't any technology to stop hurricanes today. Every year global warming and climate change are causing more hurricanes according to the Geophysical Fluid Dynamics Laboratory. Hurricanes destroy homes, buildings, roads, and more due to flooding and wind. It's not just the money that we lose but it is also that people get injured and die too.

In order for hurricanes to form there needs to be warm water and moist air. There has to be a weather disturbance such as a thunderstorm where water evaporates and forms a storm cloud that moves at 32-75 miles per hour. If it moves faster than that, it is considered a hurricane.

Today there is no way to stop hurricanes. We can only forecast and track hurricanes using technology. Over time as technology improved, scientists began to use better tools to predict weather and warn people. The doppler radar is a way to observe storms and hurricanes. Doppler radar detects precipitation, the rotation of thunderstorm clouds, tornado debris, wind, and data for our scientists to analyze. The Automated Surface Observations Stations (ASOSs) monitors different conditions.

These conditions include surface visibility, precipitation and temperature. There are many volunteer news cooperative observers which also provide weather data. Another important technology is a supercomputer. Supercomputers help because they model collected data to provide weather forecasting to meteorologists. Another type of technology is Advanced Weather Interactive Processing System (AWIPS). AWIPS which is an advanced weather interactive processing system that uses the data and models to predict the path of hurricanes to tell where and when the hurricane will hit land.

2. History

History of Hurricane Prediction Models

The first hurricane prediction model was developed in the early 1940's and 50's. Technological advances continued with the aircraft reconnaissance of hurricanes which provided accurate estimates of hurricanes position and intensity. Computer technology and statistical models improved during the 1960's and 1970's allowing for the first statistical-dynamical tracking model in 1973. In 1976, the first dynamical hurricane model was developed to treat the atmosphere as multiple vertical layers known as a baroclinic model.

History of Quantum Computing

In 1981 Richard Faynman proposed a basic model for a quantum computer that could simulate quantum systems. It wasn't until over 10 years later in 1994 that Peter Shor was able to create a practical algorithm that could efficiently factorize large integers faster than classical computers. In 2017 IBM released the first usable quantum computer. Quantum computers are still very new and a lot of improvements and breakthroughs are expected in the coming years.

History of Ocean Thermal Energy Conversion History (OTEC)

Ocean thermal energy conversion started in 1880. Jacques Arsene d'Arsonval, was a person who thought of using thermal energy from the ocean. Georges Claude built the first OTEC plant in 1930.

3. **Future Technology**

We will have a fleet of mobile ocean platforms that will be able to get information from our quantum enhanced computer hurricane prediction model. The model will get information on pressure, temperature, wind speed, wind direction, and moisture. Classical computers are good at processing large sets of data, and quantum computers are ideal for solving forecasting and optimization problems. We will use

classical computers for preprocessing the data and a quantum computer for forecasting and optimizing the location of our platform.

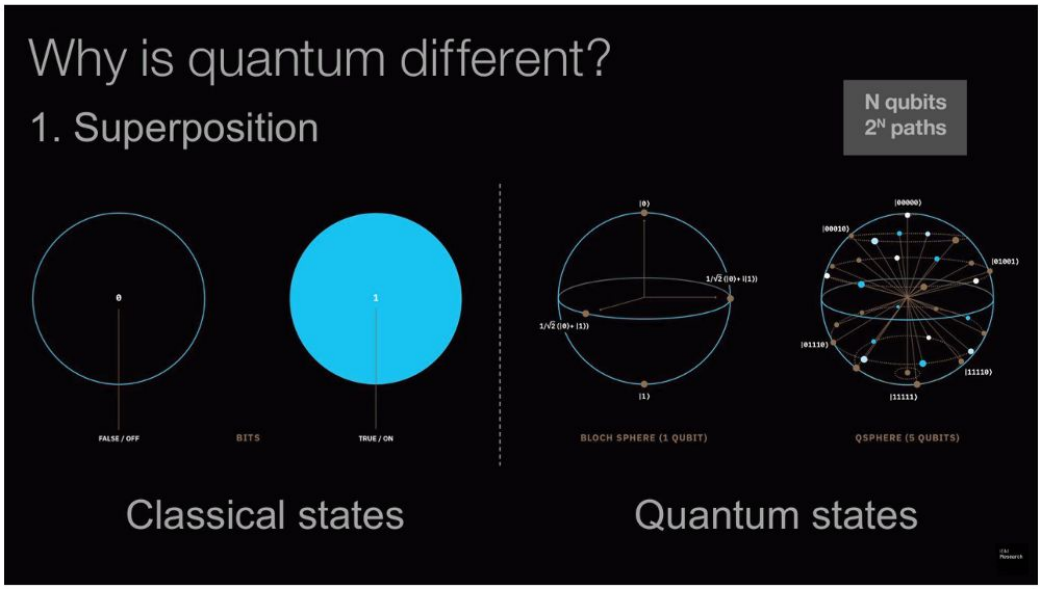

Figure 1: Quantum Computing

Computers today use binary code for computer instructions, text and data. The binary code is a pattern of zero and ones called bits. Quantum computing uses qubits which can hold zeros, ones and every number in between at the same time. Schrodigers cat describes the weird quantum world, we can imagine a situation where something like a cat could be alive and dead at the same time! Quantum computers can also do all the calculations at the same time. Our computer model will use quantum computing to predict where hurricanes will form.

‘’The Law of conservation of energy states that energy can be transferred or transformed but cannot be created or destroyed.’’[1] Using this law, we will transform the heat in the ocean into electrical energy. In Figure 3, ocean thermal energy conversion (OTEC) works by using the warm sea water near the surface in a low pressure container that allows it to boil and turn the turbine to allow the generator to transform the energy into electricity. The OTEC works by bringing cold water up and the hot water evaporates the cold water and the hot water gets colder and the evaporated water makes electrical energy.

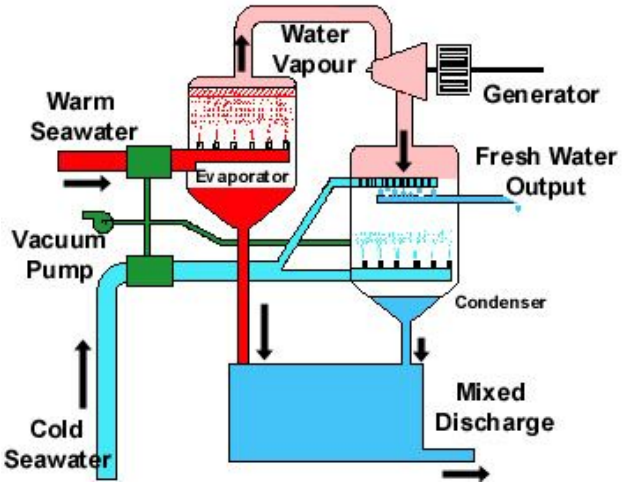

Figure 2: Ocean Thermal Energy Conversion (OTEC)

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1 **“Conservation of Energy.” *Wikipedia*, Wikimedia Foundation, 18 Jan. 2020, en.wikipedia.org/wiki/Conservation_of_energy.**

Once we know where hurricanes are forecasted, we will send a mobile ocean platform to cool down the water using OTEC. Since we are pulling more energy than we need to power the mobile platforms, we decided to use this excess energy along with water, CO^2 out of the air and hydrogen from electrolysis to make synthetic fuels similar to gasoline, kerosene, jet fuel and diesel. Carbon Engineering in Canada, the University of Calgary, and Carnegie Mellon University designed the process as shown in Figure 3.The oxygen from electrolysis will also be captured and can be used along with the synthetic fuel for rockets.

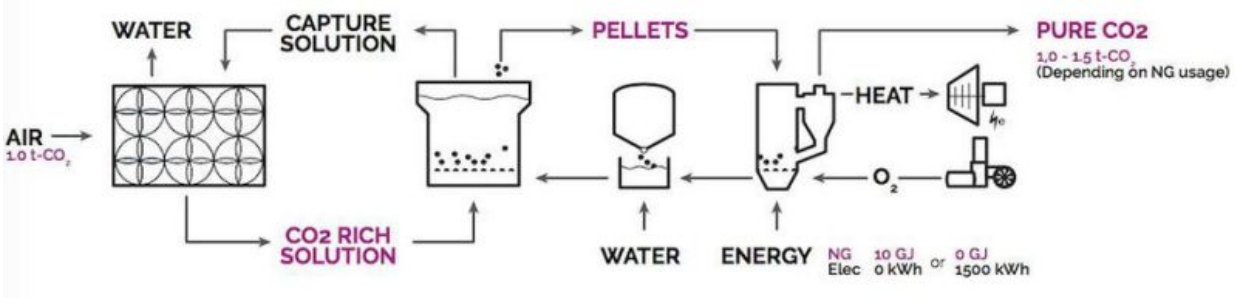

Figure 3: CO2 Capture Detail

Our team learned Tinkercad to 3D print our platform. In figure 4 shows our design.

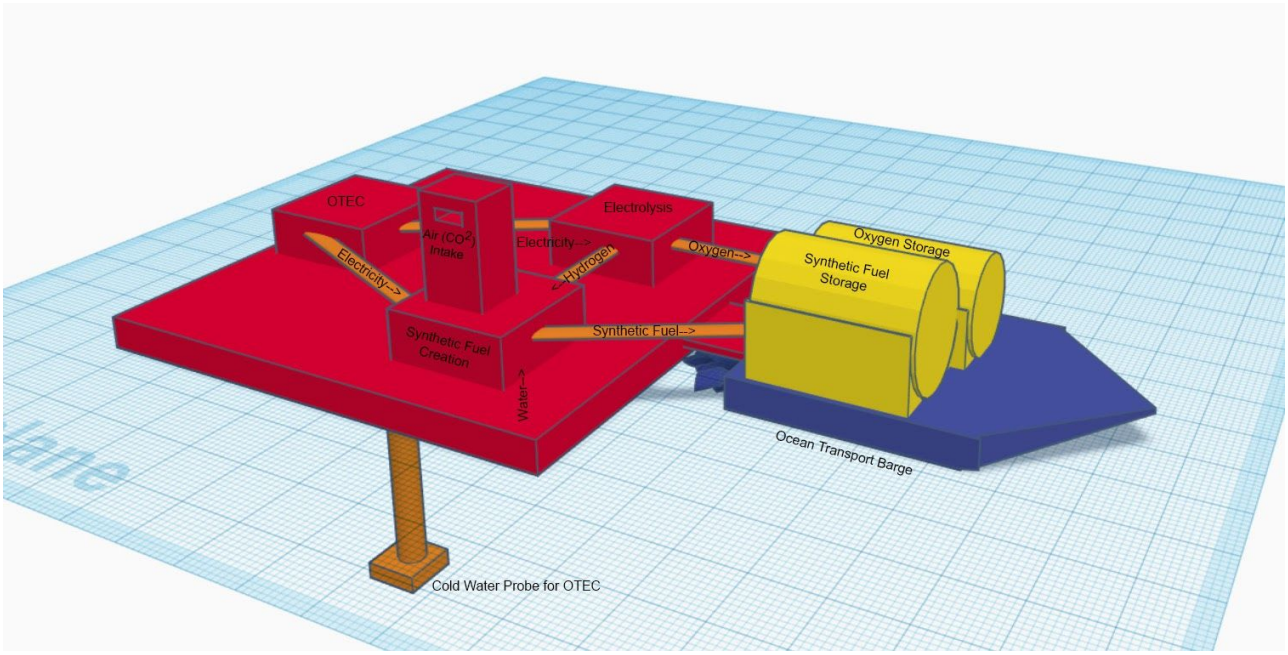

Figure 4: Overall Process Model Made by Team on Tinkercad

4. Breakthroughs

First we need advancements in quantum computing to help us predict where to cool down the temperature of the ocean and help stop the hurricane and global warming.

We would need several studies to ensure this future mobile platform can cool the ocean, reduce CO^2 , and make renewable energy. The first study will show how much we need to cool down the ocean with OTEC. We would take the ocean

temperature then run the OTEC. We would take the temperature after each day to see how much it cools down the ocean. We need to understand how many degrees we need to cool down the ocean to prevent a hurricane. We also need to study how well our quantum model can predict where hurricanes will form. We can run the program and look to see if the hurricance actual formed.

5. Design Process

Our initial vision was to have platforms that will sit on the surface and create ice so the water will not be warm enough to make hurricanes. It would have a huge container filled with ocean water and a vacuum. The vacuum makes it bubble and the warmer molecules escape into the vacuum and the colder molecules clump together and form ice. Making ice would take time and energy. We learned the ocean temperature is different at different depths. We were going to use a pump, to pump up the cold water from the bottom and put it on the top. We realized the pump would also make heat working against what we are trying to do. We learned about OTEC which allowed us to use the temperature difference to cool the ocean. We added to the design to use the excess energy along with water, CO^2 out of the air and hydrogen from electrolysis to make synthetic fuels.

We learned about the World Ocean which covers 139,434,000 square miles of Earth's surface. Our models today help us once a hurricane starts forming to tell us the

path and the strength of it. We learned we learned about classical and quantum computing and want our models to tell us where we need to cool down the hot spot.

6. Consequences

Our technology can have positive and negative consequences. Hurricanes can cool the water down naturally. For us to cool down the ocean, we would need to make a fleet of these platforms. The positive would be reducing climate change by taking harmful Co2 out of the air and making renewable fuel for cars, homes and many others. There will be less people that die and less stuff destroyed. The platforms could be negative because they could be obstacles in the ocean for ships and boats. You would need many platforms and hard to repair in the middle of the ocean.

III. Bibliography

Figure 1: Quantum Image

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Figure 2: OTEC Image

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Figure 3: CO^2 into Synthetic fuel Image

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Figure 4: Created by the team

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Web Images

BioFuel Image

500_F_106077572_jFCAfsbLSRKTYaQWbeK4h9XcdCc53Oxd.jpg

Image for SUPER Computer

https://www.engadget.com/2017/06/16/us-exascale-supercomputer-258-million-funding/

Picture of ice

https://www.google.com/imgres?imgurl=https%3A%2F%2Fclearlakeiowa.com%2Fwp-content%2Fuploads%2F2019%2F11%2Fice-cubes-e1573665814265-900

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Picture of Pump

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Image for OTEC

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Hurricane flood pic

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Image for Cursor

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RADAR

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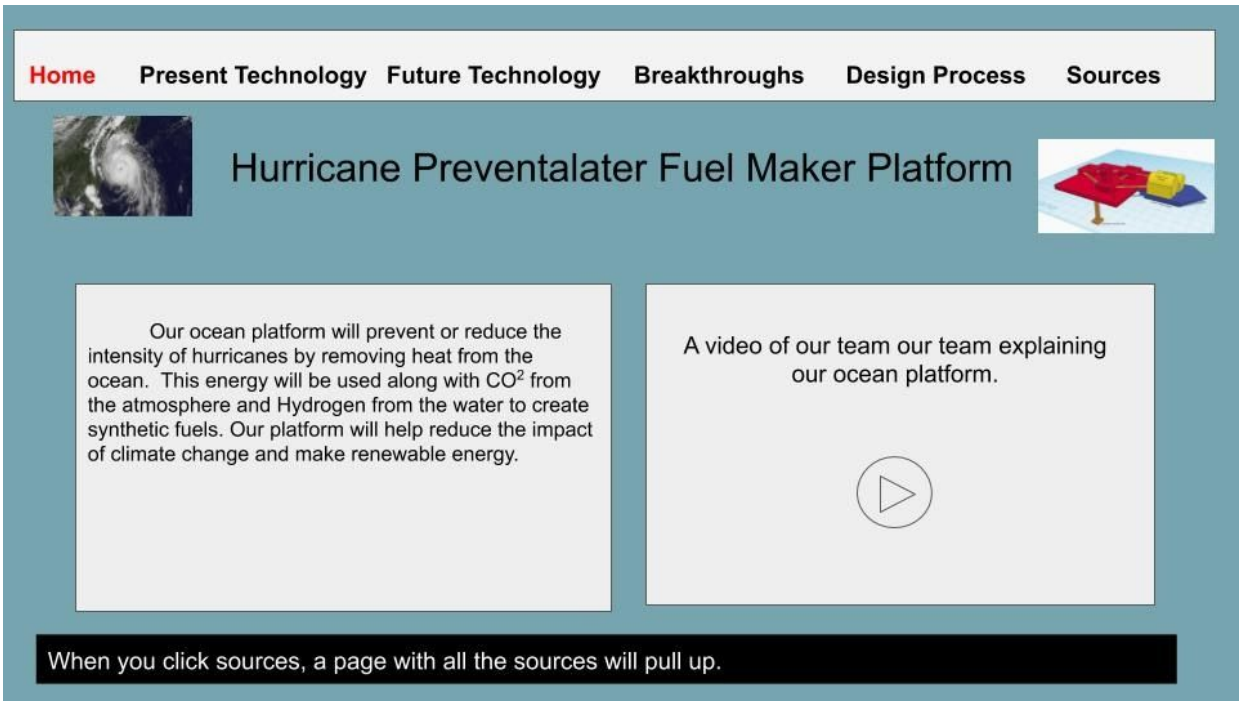
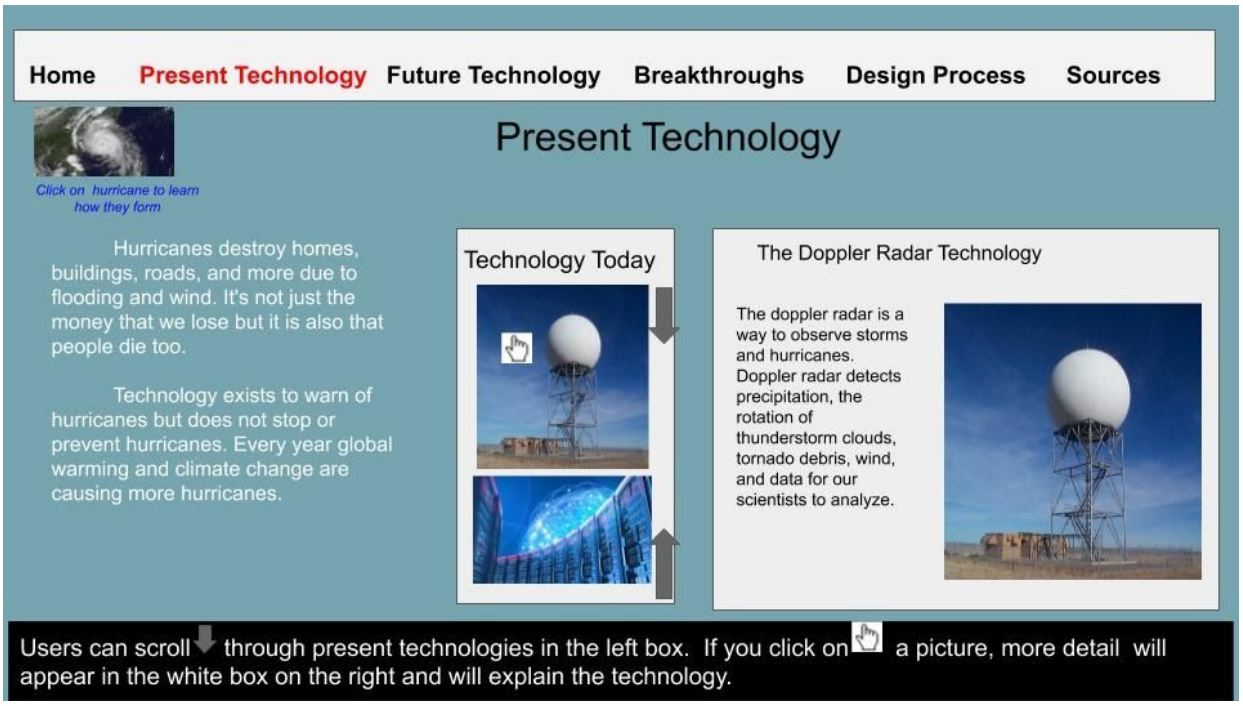
IV. Web Page Design

Page 1



Page 2


Home
Present Technology
Future Technology
Breakthroughs
Design Process
Sources
Present Technology
Click on hurricane to learn how they form
Hurricanes destroy homes, buildings, roads, and more due to flooding and wind. It's not just the money that we lose but it is also that people die too.
Technology exists to warn of hurricanes but does not stop or prevent hurricanes. Every year global warming and climate change are causing more hurricanes.
Technology Today
The Doppler Radar Technology
The doppler radar is a way to observe storms and hurricanes. Doppler radar detects precipitation, the rotation of thunderstorm clouds, tornado debris, wind, and data for our scientists to analyze.
Users can scroll through present technologies in the left box. If you click on a picture, more detail will appear in the white box on the right and will explain the technology.

Page 3


Home
Present Technology
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Breakthroughs
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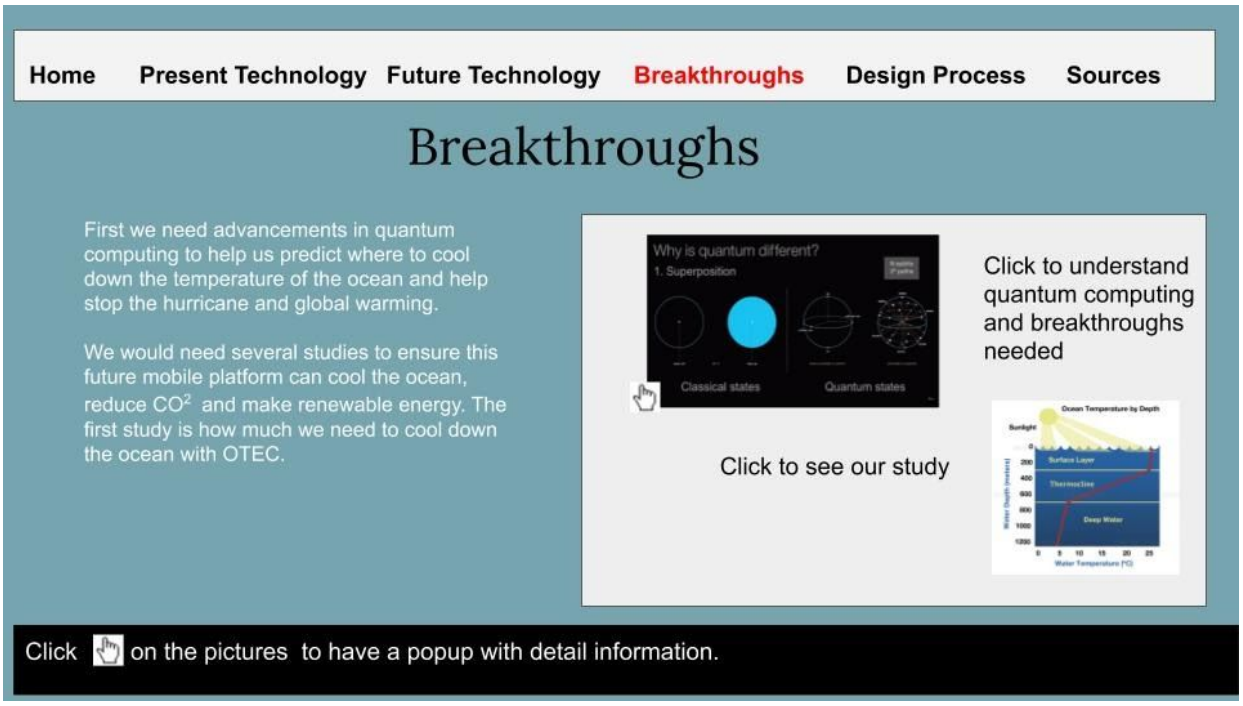
Future Technology
Hurricane Preventalater Fuel Maker Platform
Our mobile platform will use quantum computing to predict where hurricanes will form.
We will use ocean thermal energy conversion to cool down the ocean and prevent a hurricane from forming.
The energy removed from the ocean will be combined with CO2 from the air and hydrogen extracted from the water using electrolysis to create renewable synthetic fuels that can be used to help reduce climate change.
Click to understand how it will work
Predicting Hurricane Model
Mobile Ocean Platform to Cool the Ocean
Using CO2and Electricity to Create Synthetic Fuels
Click on the boxes to have a popup with detail information of how each area works.

Page 4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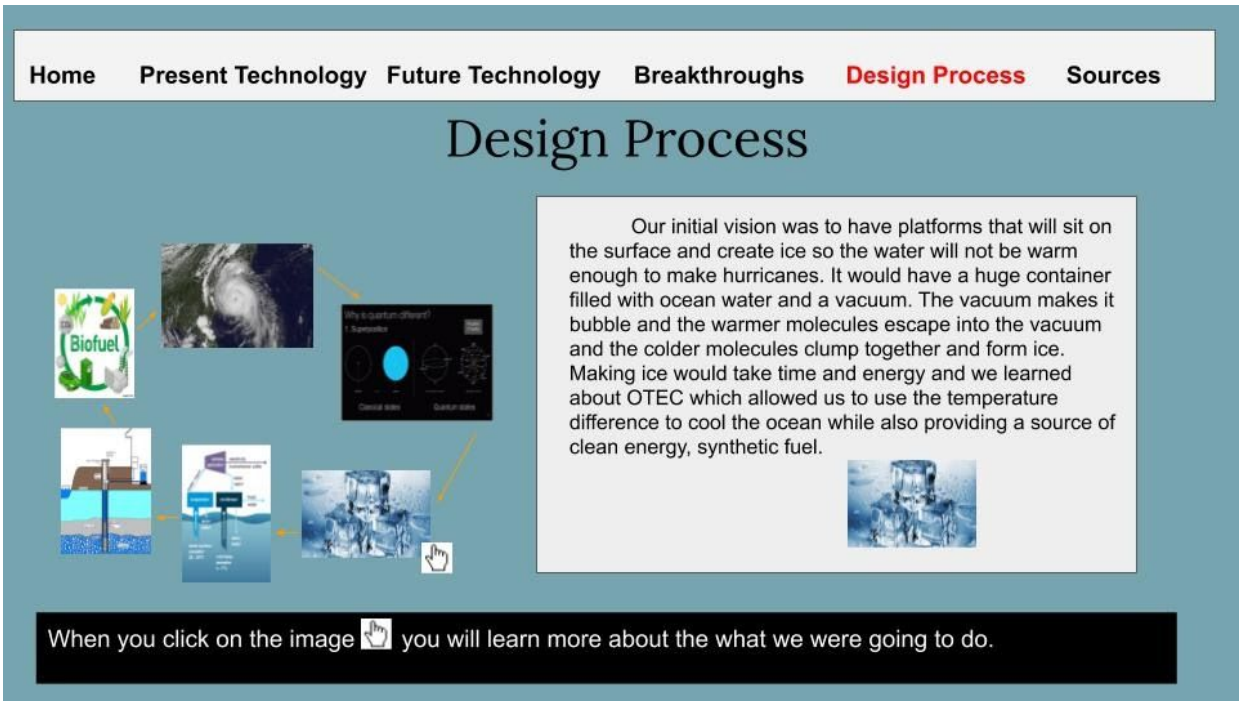
Why is quantum different?
1. Superposition
Classical states
Quantum states
Click to understand quantum computing and breakthroughs needed
Click to see our study
Click on the pictures to have a popup with detail information.

Page 5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When you click on the image you will learn more about the what we were going to do.