

iSUIT

I. ABSTRACT

Our swimsuit will save lives. The swimsuit will work by using sensors to understand if you need help, such as if you are panicking or underwater for a long time. If this happens it will inflate and signal for help. The swimsuit will help people with currents, drowning, sea creatures, and lightning. The suit will understand what is normal or not normal for your body and surroundings by using artificial intelligence (AI). AI will tell the crystals to release oxygen to inflate the suit and use radio waves to send a message to the parent and lifeguards telling them they need help.

II. DESCRIPTION

1. Present Technology

Today we only have swimsuits that make you go faster, but we are designing a swimsuit that is safer. There are high tech swimsuits that can make you swim faster but not save you. They are made out of nylon and lycra/spandex because this material does not hold water to drag the swimmer.

Life jackets are usually one pound of foam so it is more buoyant. It lasts long because it is made out of foam. It lasts up to ten years. If it was a solid block of metal, it would sink instantly to the bottom because it is too heavy to float.



Figure 1

A lot of people have drowned and most people drown in home pools. Today we have nice swimwear but not swimwear that helps us when we are in trouble. Life

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jackets are uncomfortable because if you want to go just a little bit under water you cannot. They are all so big, you cannot really swim well, and sometimes they can give you rashes. Our suit only inflates if you need it to do so. It lets you go underwater and be deflated when you are not in trouble. It will have a material that will not give you rashes when you swim.

2. History

“In 1855 the first swimsuit was made. In the Middle Ages they did not wear anything. Female bathing costumes were derived from those worn at Bath and other spas. It would appear that until the 1670s nude female bathing in the spas was the norm and that after that time women bathed clothed. In the 18th century the bathing gown was a loose ankle-length full-sleeve chemise-type gown made of wool or flannel, so that modesty or decency was not threatened.”¹

The first life jacket was made out of cork in 1854 by Captain Ward. The military made inflatable life jackets in the 1940s mostly worn by sailors and submariners. In the sixties synthetic foam life jackets were introduced.

3. Future Technology

¹ “History of Swimwear.” *Wikipedia*, Wikimedia Foundation, 25 Nov. 2018,

en.wikipedia.org/wiki/History_of_swimwear#cite_note-claud-2.

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This swimsuit will have many different features. The swimsuit will save people's lives. The swimsuit will work by using sensors to understand if you need help, such as if you are panicking or underwater for a long time, it will inflate and signal for help. It will understand what is normal or not normal for your body.

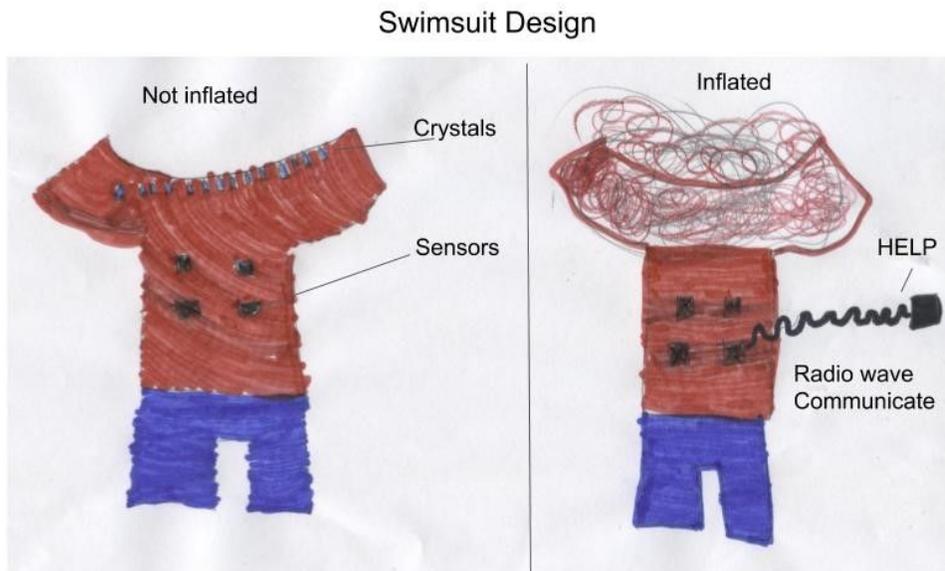


Figure 2

On our body our senses can detect pain, pressure touch, temperature, and smell. These are called physical quantities and our body uses our five senses to tell our brain to tell your body what to do. We will use a heartbeat sensor. It will go off when your heart is racing fast or when your blood oxygen level is dangerously low. It is a wearable sensor made of soft fabric that detects the rate of your heart and how much oxygen is in our bloodstream. This is called a pulse oximeter. The sensor will shine a light on your

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skin to measure the light that comes back. The pulses in the light will indicate your heartbeat and the brightness and color of the light will tell you how much oxygen is in your bloodstream. We need oxygen to live and this sensor can tell if we don't have enough.

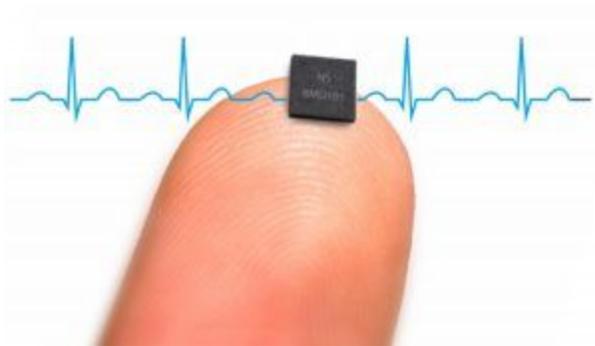


Figure 3

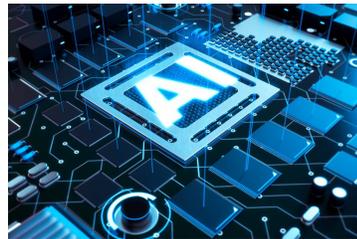


Figure 4

AI is something that our swimsuit needs. It knows the difference between what is normal or not normal. AI learns, and It will take the data from the sensors and know how to respond. In the case of a rip current, AI will help the swimmer by telling them how to handle the problem. If you are drowning, AI will know that you are low on oxygen and inflate the swim suit. AI will know when you are in trouble. It will be able to call 911 and the lifeguard. If sea creatures and lightning are a problem then AI will let the swimmer know.

The swimsuit will save you. If you are drowning the swimsuit will have sensors that can sense if you are drowning and will inflate by releasing oxygen into the suit. The

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oxygen provides the buoyancy. We are using crystals that can store and release oxygen made by scientists that are from the Department of Physics, Chemistry, and Pharmacy of The University of Southern Denmark. The crystal is a salt made from cobalt. We wanted to use the crystals since it can hold oxygen and release.



Figure 5

Our swimsuit will talk to 911 and the lifeguard using radio waves. They are invisible electromagnetic waves that are shaped like slopes and slides as shown in Figure 6 . It will have a global positioning system so it will use satellites to locate the drowning person.

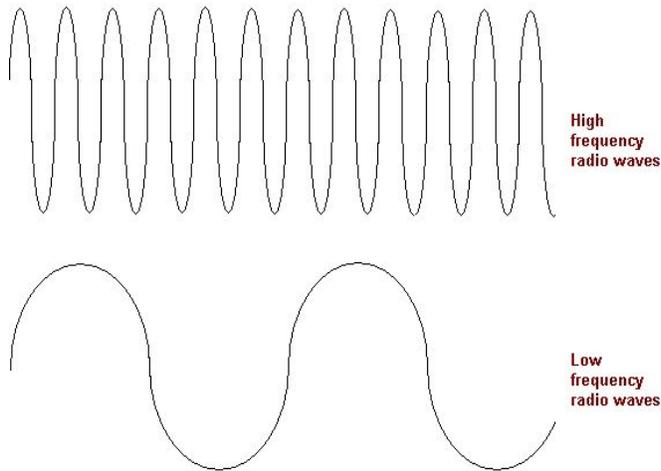


Figure 6



Figure 7

4. Breakthroughs

We need breakthroughs in Artificial Intelligence and oxygen crystals. Artificial intelligence is still being worked on, so it is not perfect yet. We need it to be reliable because life is going to depend on it. The oxygen crystals need to work with the sensors and AI to release the oxygen and inflate at the right time. We need to do studies on how to store the crystals in the suit. A future breakthrough for our suit would be to use the oxygen to inflate the suit and to use it to breathe. We would have to redesign the suit so we can use the oxygen to breathe and inflate the suit.

We would test the swimsuit on a real person to see if it will inflate. We would need to test AI and the sensors to make sure the suit reacts the right way. If it does not work we will have professional lifeguards next to the pool. One thing that could cause it

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not to work is if the communication gets messed up. If this happens we would need to make improvements to the AI and the radio that generates the electromagnetic waves.

An average person needs seven to twelve pounds of air to be able to float. We will do a study to make sure the oxygen crystals are put in the right place in the swimsuit. We will test it by putting the crystals in the top of the suit. We will test and prove that if we put the crystals in the bottom of the suit, you would flip over, and your head will be in the water. Because water weighs more than oxygen, it pushes down harder than the oxygen can push up. We want to make sure your head can be above the surface so you can breathe. We will want to test that the crystals at the top of the suit will not be so close that when it inflates it covers your mouth or nose. That might suffocate you. So we will put the crystals across your chest and around the midsection of the suit.

5. Design Process

Our swimsuit initially had many ideas to help save people. We decided to use sensors because it gathers the information and uses AI to tell if you are in trouble. We researched how we could inflate the suit using compressed air but decided on crystals that can store and release oxygen. We do not want to use compressed air because you do not want to refill everytime it runs out of air. We discussed having buttons to inflate the suit, but we decided we should use AI instead. If you are passed out you could not press a button. We thought the iSuit should do CPR or act like a defibrillator if you had a heart attack, but it would be too dangerous to have an electric shock in the water. Our

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team discussed having a tube to purify water but we decided not to include it since the suit helps us get rescued quickly using radio waves to communicate to our parents, 911 or lifeguards.

6. Consequences

Our team thinks the swimsuit would be a good invention because there would be less chance of people drowning. One consequence is that not everybody might be able to afford it. It would be really hard to make because it has a lot of technology. Extra work need to be done to reduce the cost in the future.

III. Bibliography

Figure 1: Life Jacket

“The Handbook of Indiana Boating Laws and Responsibilities.” *Florida Boat Ed Course Study Guide | FL | Boat Ed.com™*, Boat Ed Blog, www.boat-ed.com/indiana/handbook/page/33/Chapter-5-Required-Equipment/.

<https://www.boat-ed.com/indiana/handbook/page/33/Chapter-5-Required-Equipment/>

Figure 2: Created by the team.

Figure 3: Sensor Image

“ECG - EKG Sensor.” *NeuroSky*, neurosky.com/biosensors/ecg-sensor/.

<http://neurosky.com/biosensors/ecg-sensor/>

Figure 4: AI Image

Boulton, Clint. “7 Tips for Scaling Your AI Strategy.” *CIO*, CIO, 31 Dec. 2018,

www.cio.com/article/3329920/artificial-intelligence/7-tips-for-scaling-your-ai-strategy.html.

Figure 5: Oxygen Crystal Image

“Scientists Create Crystals That Absorb and Store Oxygen.” *Sciencenordic.com*, sciencenordic.com/scientists-create-crystals-absorb-and-store-oxygen.

<http://sciencenordic.com/scientists-create-crystals-absorb-and-store-oxygen>

Figure 6: Radio Waves

<http://www.qrg.northwestern.edu/projects/vss/docs/communications/1-how-is-data-put-on-radio-waves.html>

Figure 7: Wireless Communication Image

“Communications System.” *How Does Gravity Work in Space?*,

www.qrg.northwestern.edu/projects/vss/docs/communications/1-how-is-data-put-on-radio-waves.html.

<http://wireless-communications-systems.blogspot.com/2013/04/wi-fi-wireless-communication-system.html>

ONLINE ARTICLES:

Present Technology Swimsuits

Edmonds, Molly. “How Life Jackets Work.” *HowStuffWorks*, HowStuffWorks, 14 Mar. 2008, adventure.howstuffworks.com/outdoor-activities/water-sports/life-jacket1.htm.

<https://adventure.howstuffworks.com/outdoor-activities/water-sports/life-jacket1.htm>

“Competitive Swimwear.” *Wikipedia*, Wikimedia Foundation, 8 Jan. 2019, en.wikipedia.org/wiki/Competitive_swimwear.

https://en.wikipedia.org/wiki/Competitive_swimwear

“High-Technology Swimwear Fabric.” *Wikipedia*, Wikimedia Foundation, 18 Jan. 2019, en.wikipedia.org/wiki/High-technology_swimwear_fabric.

https://en.wikipedia.org/wiki/High-technology_swimwear_fabric

Life Jacket

“Personal Flotation Device.” *Wikipedia*, Wikimedia Foundation, 30 Nov. 2018, en.wikipedia.org/wiki/Personal_flotation_device.

“Personal Flotation Device.” *Wikipedia*, Wikimedia Foundation, 30 Nov. 2018, en.wikipedia.org/wiki/Personal_flotation_device.

https://en.wikipedia.org/wiki/Personal_flotation_device

History

iSUIT

Reporter, Dailymail.com. "How Men's Swimwear Has Evolved in the Last 100 Years." *Daily Mail Online*, Associated Newspapers, 8 June 2016, www.dailymail.co.uk/news/article-3632169/Hoyears.htm.

<https://www.dailymail.co.uk/news/article-3632169/Hoyears.htm>

Bellis, Mary, and Bellis. "An Introduction to the History of Swimsuits." *Thoughtco.*, Dotdash, www.thoughtco.com/history-of-swimsuits-1992446.

<https://www.thoughtco.com/history-of-swimsuits-1992446>

"History of Swimwear." *Wikipedia*, Wikimedia Foundation, 25 Nov. 2018, en.wikipedia.org/wiki/History_of_swimwear.

https://en.wikipedia.org/wiki/History_of_swimwear

Reporter, Dailymail.com. "How Men's Swimwear Has Evolved in the Last 100 Years." *Daily Mail Online*, Associated Newspapers, 8 June 2016, www.dailymail.co.uk/news/article-3632169/How-men-s-swimwear-evolved-100-years.htm.

<https://www.dailymail.co.uk/news/article-3632169/How-men-s-swimwear-evolved-100-years.htm>

Sensors

EngineersGarage. "Sensors: Different Types of Sensors." *SuperAdmin*, www.engineersgarage.com/articles/sensors.

<https://www.engineersgarage.com/articles/sensors>

Oxygen levels Sensors

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EngineersGarage. "Sensors: Different Types of Sensors." *SuperAdmin*,
www.engineersgarage.com/articles/sensors.

https://www.howequipmentworks.com/pulse_oximeter/

Oxygen Saturation

<https://www.quora.com/How-do-Samsungs-heartbeat-sensor-and-oxygen-saturation-sensor-work>

AI

"Artificial Intelligence Facts for Kids." *Wicca for Kids - Kiddle*,
kids.kiddle.co/Artificial_intelligence.

https://kids.kiddle.co/Artificial_intelligence

"Artificial Intelligence and Its Applications." *Valluri*,
www.valluriorg.com/blog/artificial-intelligence/artificial-intelligence-and-its-applications/.

<https://www.valluriorg.com/blog/artificial-intelligence/artificial-intelligence-and-its-applications/>

Store Oxygen

"Scientists Create Crystals That Absorb and Store Oxygen." *Sciencenordic.com*,
sciencenordic.com/scientists-create-crystals-absorb-and-store-oxygen.

<http://sciencenordic.com/scientists-create-crystals-absorb-and-store-oxygen>

Andrew, Elise. "New Crystal Can Absorb Huge Amounts Of Oxygen And Store It For Later." *IFLScience*, IFLScience, 20 Mar. 2018,
www.iflscience.com/chemistry/new-material-absorbs-oxygen-stores-it-later/.

<https://www.iflscience.com/chemistry/new-material-absorbs-oxygen-stores-it-later/>

Communication

iSUIT

“WIFI Wireless Communication System.” ~,
wireless-communications-systems.blogspot.com/2013/04/wi-fi-wireless-communication-system.html.

<http://wireless-communications-systems.blogspot.com/2013/04/wi-fi-wireless-communication-system.html>

Buoyancy

http://spot.pcc.edu/~kidlogic/Aquatics/AqEx/Water_Buoyancy.htm

Web Design Images

Water filter image

<https://images-na.ssl-images-amazon.com/images/I/41NQK-vzjL.jpg>

Image for compressed air jacket

<http://imgur.com/PpBT6.jpg>

Deflibator image

<https://www.oars.com/blog/the-evolution-of-the-pfd/>

Web Design Images

Swimmer image

<https://www.sports-fitness.co.uk/blog/professional-swimmer-training/>

Button image

<https://www.flickr.com/photos/raster/5697652862>

IV. Web Design

Page 1

Home **Present Technology** Future Technology Breakthroughs Design Process Sources

Present Technology



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Home Present Technology **Future Technology** Breakthroughs Design Process Sources

Future Technology

Swimsuit Design

SPECIAL EFFECTS: when you click on these pictures it will show you information about these technologies.

Click on the Technology to learn more.

Not inflated

Crystals

Sensors

Inflated

HELP

Radio wave Communicate

SENSORS

AI

Oxygen crystals to inflate

Radio wave communicate

Home Present Technology Future Technology **Breakthroughs** Design Process Sources

Breakthroughs

We need breakthroughs in Artificial Intelligence and oxygen crystals. Artificial intelligence is still being worked on, so it is not perfect yet. We need it to be reliable because life is going to depend on it. The oxygen crystals need to work with the sensors and AI to release the oxygen and inflate at the right time. We need to do studies on how to store the crystals in the suit . A future breakthrough for our suit would be to use the oxygen to inflate the suit and to use it to breathe. We would have to redesign the suit so we can use the oxygen to breathe and inflate the suit.

Oxygen crystals that store and release oxygen.



SPECIAL EFFECTS: when you click on the pictures it will show bubbles coming out of the crystals to show the release .

Home Present Technology Future Technology Breakthroughs **Design Process** Sources

Design Process

Our swimsuit initially had many ideas to help save people. We researched how we could inflate the suit using compressed air but decided on crystals that can store and release oxygen.

Compressed Air

Oxygen Crystals

We thought it should do CPR or act like a defibrillator if you had a heart attack but it would be too dangerous to have an electric shock in the water.

CPR

AI

We discussed having buttons to inflate it, but then we learned about AI. If you are passed out you could not press a button but AI could do it for you.

Button

Radio Waves

Water Filter

SPECIAL EFFECTS: when you click on these pictures it will show you information about these technologies.

