Abstract Section

Our future technology vision is to invent a wearable cardiac device: our device can be attached to a shirt that can monitor and resolve any cardiac issues. According to the CDC, one person dies every 36 seconds in the United States from cardiovascular disease. Coronary disease is the leading cause of death in the United States with about 655,000 Americans dying each year and many people don't even know they have cardiac issues.

Present Technology

Your heart has electrical signals which can be monitored through different types of devices like electrocardiograms or monitors. “An electrocardiogram records the electrical signals in your heart. It's a common and painless test used to quickly detect heart problems and monitor your heart's health. Electrocardiograms — also called ECGs or EKGs — are often done in a doctor's office, a clinic or a hospital room.”

“Implantable cardiac monitors (ICM) are small electrophysiology (EP) devices that are used for long-term monitoring of a patient's heart electrical activity to detect arrhythmias. ICMs can be inserted under the skin during an office visit and record cardiac data continuously for up to 4.5 years.”

A pacemaker is a small device that's placed in the chest or abdomen to help control abnormal heart rhythms. This device uses electrical pulses to prompt the heart to beat at a normal rate. Pacemakers are used to treat arrhythmias. Arrhythmias are problems with the rate or rhythm of the heartbeat.”

The main limitation of present technologies requires a person to know they have cardiovascular disease or need to be monitored. Some cardiac monitors are very big and bulky and not portable whatsoever.

Footnote:

“Electrocardiogram (ECG or EKG).” *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 9 Apr. 2020, www.mayoclinic.org/tests-procedures/ekg/about/pac-20384983#:~:text=An%20electrocardiogram%20(ECG%20or%20EKG,attached%20computer%20monitor%20or%20printer

https://www.dicardiology.com/channel/implantable-cardiac-monitor-icm#:~:text=Implantable%20cardiac%20monitors%20(ICM)%20are,leads%20attached%20to%20the%20patient

History

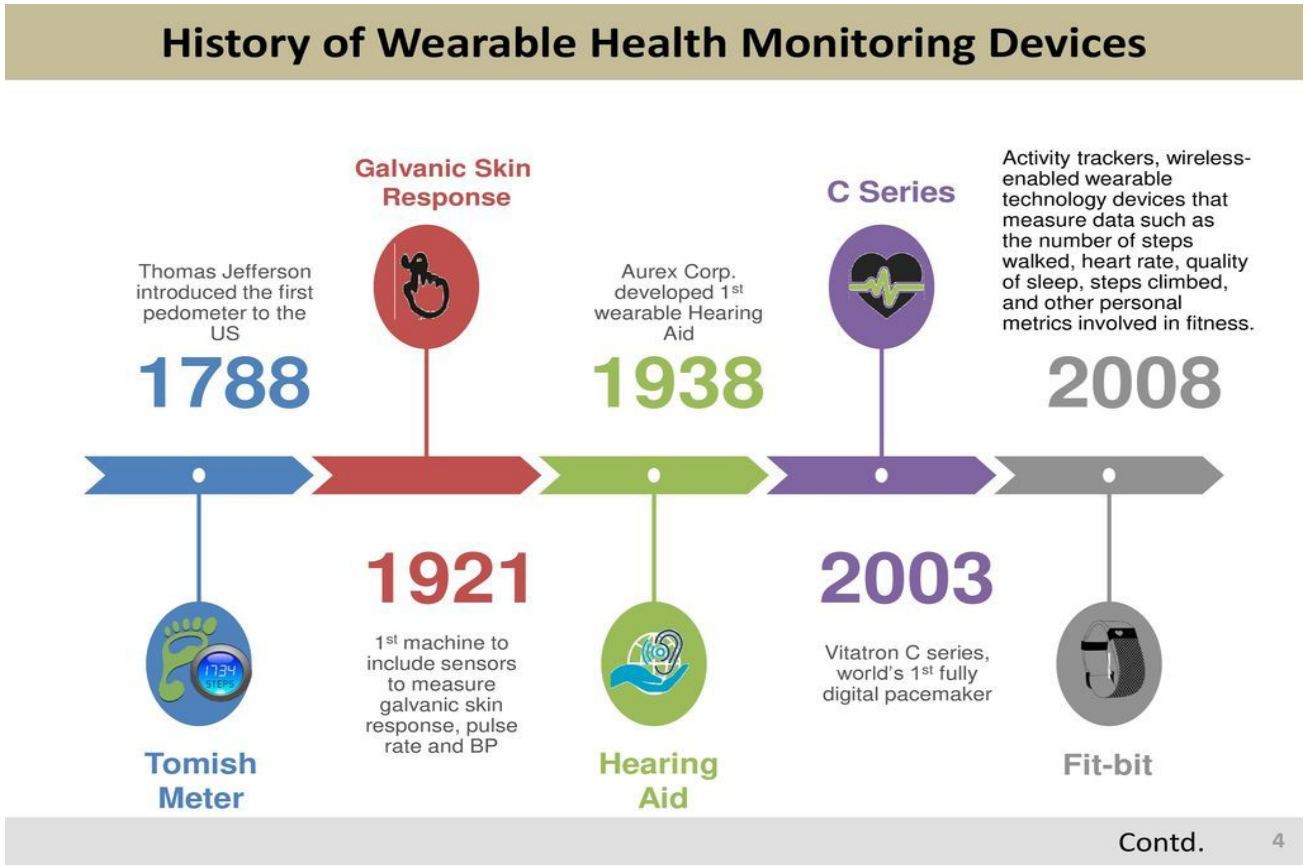

Figure 1 - Wearable History Picture

Source for Image:
https://slideplayer.com/slide/12358033/

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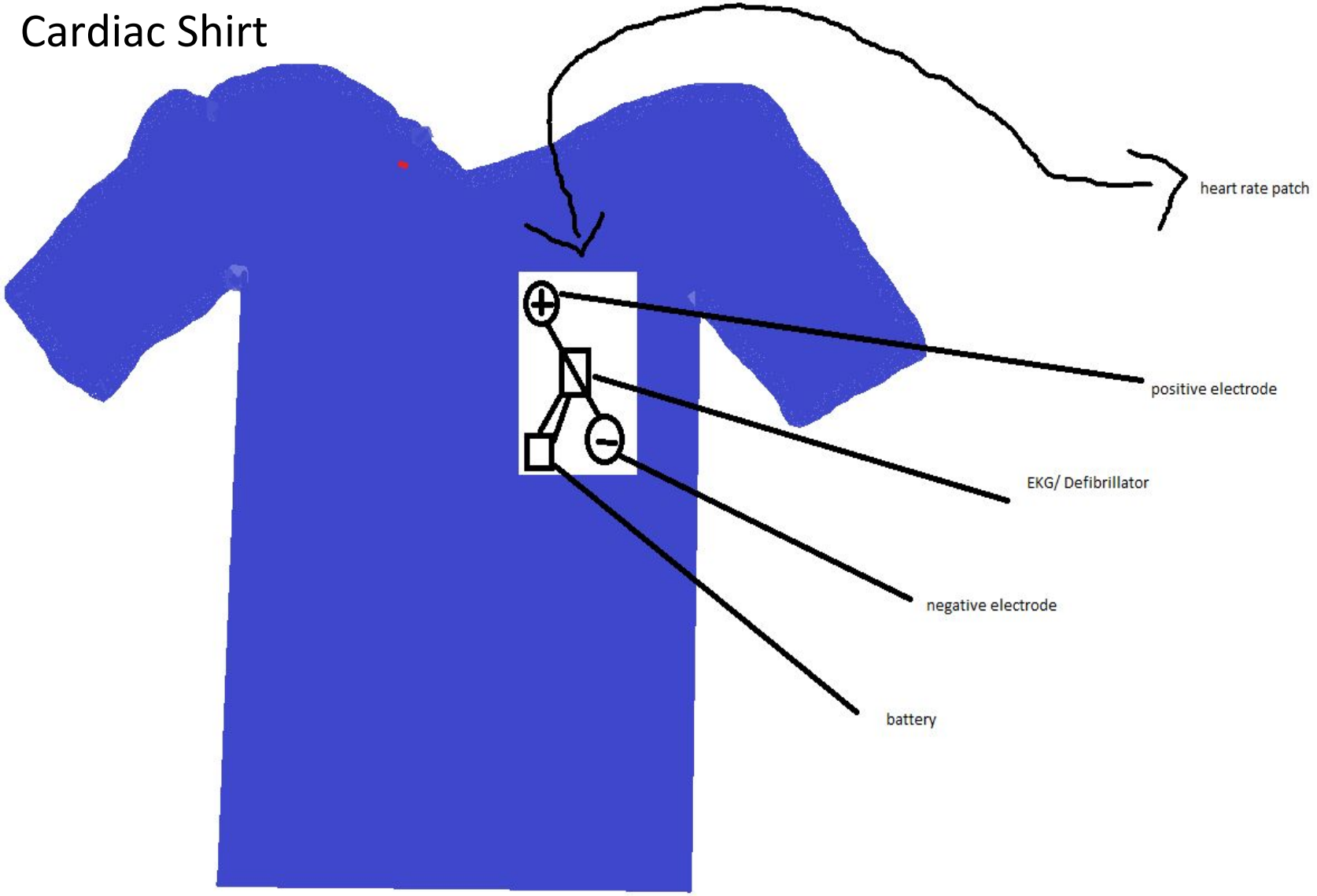
In 1981, the American Health Association realized that cardiovascular tech was useful and could benefit people who were unsure about their cardiac situation. The first wearable health monitor was made in 1788 as shown in Figure 1.

Future Technology – Slide 1

Our future technology is a wearable every day shirt with a heart rate monitor, a device that can send electrical pulses to temporarily stabilize your heart rate. A built-in heart rate monitor patch can be removed to wash the shirt. There are two electrodes that go across the heart, allowing it to deliver electrical pulses {shock} to put your heart back into its normal rhythm. Also, we will monitor the heart through electrical pulses that let the defaulter pads know when to shock the heart. This way we save more lives and, of course, know when to do the pulse.

Future Technology – Slide 2 (optional)

Cardiac Shirt



Future Technology – Slide 3 (optional)

Not Applicable

Breakthroughs– Slide 1

In order to create a wearable cardiac monitor that is comfortable and lightweight, breakthroughs in nanotechnology are necessary. Nanotechnology is a very big topic in the science community today. With advancements in nanotechnology, we can make a cardiac monitor smaller, lighter and more comfortable. In using nano tech, we are trying to propose an extremely small cardiac monitor built into a shirt.

According to heart.org, most cardiac arrests are caused by an abnormal heart rhythm. We can test our device by putting subjects on a treadmill and monitor their heart rate because 5% of cardiac arrest is caused by exercise and the majority are from coronary heart disease.

Breakthroughs– Slide 2 (optional)

N/A

Insert image here
(optional)
no videos or gifs

Breakthroughs– Slide 3 (optional)

- **N/A.**

Insert image here (optional) no videos or gifs

Design Process – Slide 1

We initially were designing a belt that tracked the heartbeat, but then we realized that we need the monitor to be higher on the torso so designed a shirt instead. We also took a while to decide whether or not to have a defibrillator to resolve cardiac issues.

Design Process – Slide 2 (optional)

N/A

Design Process – Slide 3 (optional)

- **N/A**

Consequences

It would be positive because people have not seen a product like ours, and we believe that it could be revolutionary to have the defibrillator and a monitor in one. The negative is that it could be too heavy, even with nano tech, or its price would be too high for some people.

Bibliography easybib.com

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"Michelle Maloney Thomas Berry Colloquium, Amberley 0 November Ppt Download." *SlidePlayer*, slideplayer.com/slide/4052057/.

www.mayoclinic.org/tests-procedures/ekg/about/pac-20384983#:~:text=An%20electrocardiogram%20"Electrocardiogram (ECG or EKG)." *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 9 Apr. 2020, www.mayoclinic.org/tests-procedures/ekg/about/pac-20384983#:~:text=An%20electrocardiogram%20.

https://www.avidhrt.com "Heart Health Right At Your Fingertips." *Avodart*, www.avidhrt.com/.

https://slideplayer.com/slide/12358033 /Armour, et al. "Technology Landscape - Wearable Health Monitoring Devices - Ppt Download." *SlidePlayer*, slideplayer.com/slide/12358033/.

Bibliography – 2 (optional)

Bibliography – 3 (optional)

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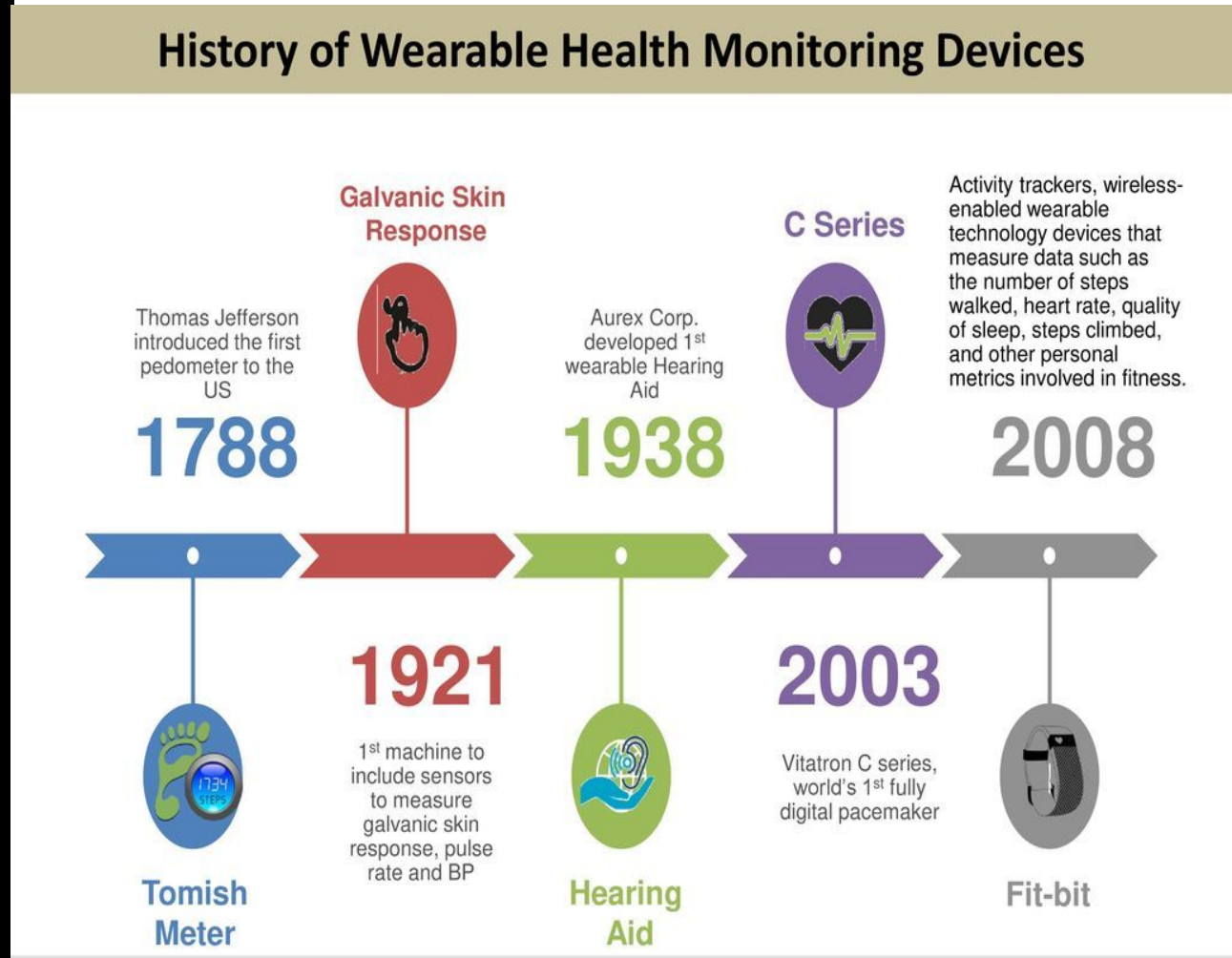
smart-shirt

Our future technology vision is to invent a wearable cardiac device called, smart-shirt. According to the CDC, one person dies every 36 seconds in the U.S.A from cardiac disease. Our cardiac device can be attached to a shirt that can monitor and resolve any cardiac issues. Cardiac disease is the leading cause of death in the United States with about 655,000 Americans dying each year, and many people don't even know they have it.

History

In 1981, the American Health Association realized that cardiovascular tech was useful and could benefit if you were unsure about your cardiac situation. The first wearable health monitor was made in 1788.



Contd.

Present Technology

Your heart has electrical signals which can be monitored through different types of devices like electrocardiograms or monitors.

“An electrocardiogram monitors the signals in your heart. It's a common and painless test used to quickly detect heart issue and watchr your heart's health.

Electrocardiograms are often done in a doctor's office, a clinic or a hospital room.”

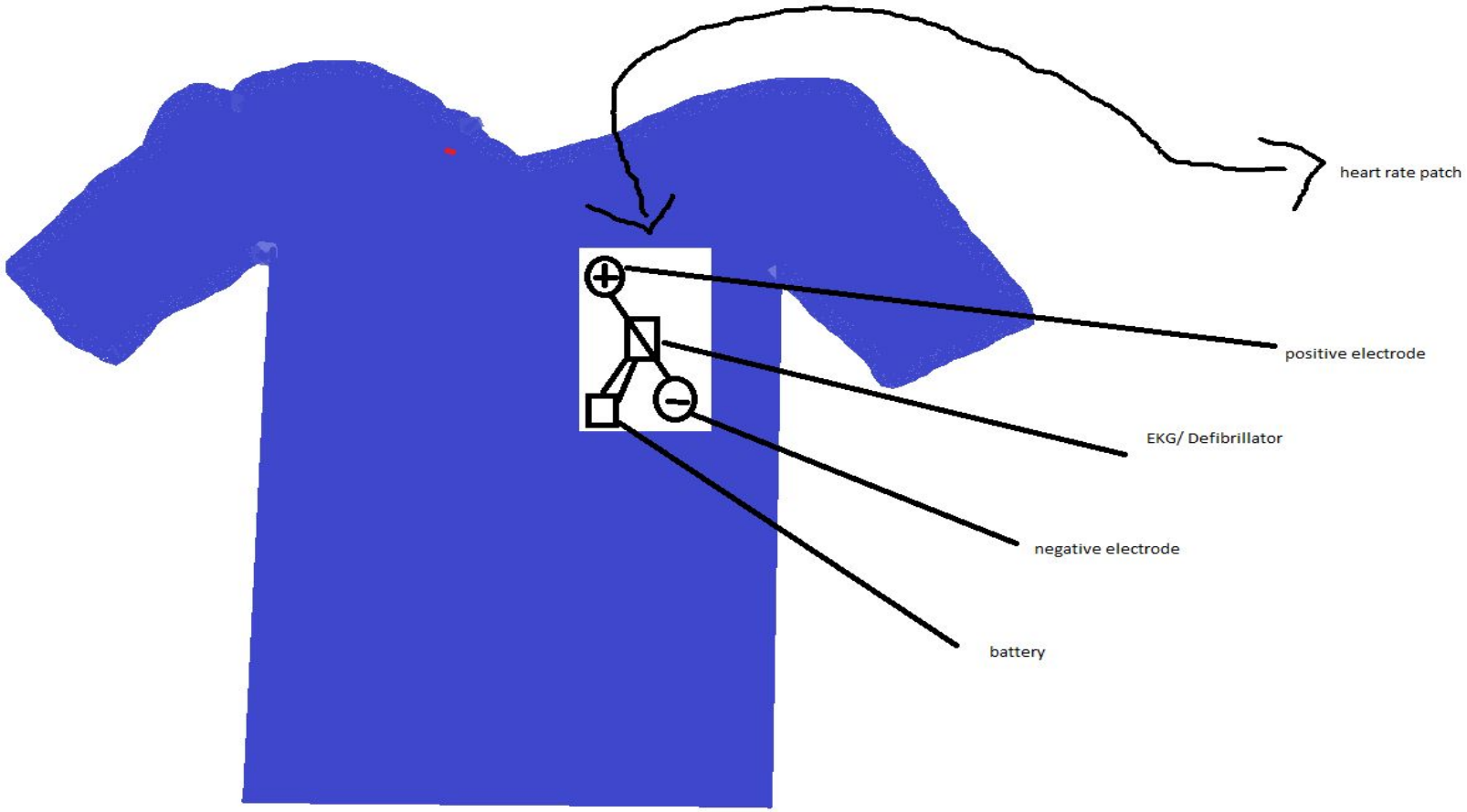
“Implantable cardiovascular monitors are small electrophysiology tools that are used for long-term monitoring of a your heart electrical activity to detect arrhythmias. ICMs can be inserted under the skin during an office visit and record cardiac data continuously for up to 4.5 years.”

A pacemaker is “a small device that's placed under the skin in your chest to help control your heartbeat. It's used to help your heart beat more regularly if you have an irregular heartbeat particularly a slow one. Implanting a pacemaker in your chest requires a surgical operation”

The main limitation of these present technologies, is that they require a person to know they have cardiovascular disease, or that they need to be monitored.

Future Technology

Our future technology is a wearable every day shirt patch, with a heart rate monitor, and a device that can send electrical pulses to temporarily stabilize your heart rate. A built-in heart rate monitor patch can be removed to wash the shirt. There are two electrodes that go across the heart, allowing it to deliver electrical pulses, using a defibrillator thats can make electricity and then "shock" you, to put your heart back into its normal rhythm.



Breakthroughs

In order to create a wearable cardiac monitor that is comfortable and lightweight, breakthroughs in nanotechnology are necessary. As CPU's and battery units shrink, we think we need to do the same for a cardiac monitor. According to heart.org, most cardiac arrests are caused by an abnormal heart rhythm. About 5% of cardiac arrest is caused by exercise, while the majority are from coronary heart disease. We can test our device by putting someone who is at risk of heart disease on a treadmill and monitoring their heart rate. We then could use our device to put the heart back in its normal rhythm.