



UNIVERSAL BI-WHEEL GENERATOR

BY: JOSHUA ARMA

LITHIUM POLYMER BATTERY

WHEEL GUIDE

FRAME CLAMP

STABILIZER HOLES
(RUBBERBAND ATTACHES
HERE TO FRAME)

MOTOR GENERATOR

BICYCLE APPLICATION

Universal Bi-
Vehicle Dyn

By: Joshua Arma

Going Nuts! The Research and Development of Acorn Bioplastics

My research on bioplastics led to the discovery that acorns can be utilized in order to create non-petroleum plastics which is beneficial for the environment.

The main ingredient in this plastic is the acorn nut of the White Oak. I also added cornstarch, water, acetic acid (vinegar), and other chemicals in order to create a functioning polymer.

Throughout this process, the cost of producing this plastic is relatively low, and the price of producing 1 kg of this plastic equals to \$13.35 worth of chemicals, starch, and vinegar.

Acorns are numerous in quantity throughout the world, and by using this natural resource for the production of bioplastics, carbon dioxide emissions into the atmosphere can be reduced.

Going Nuts for Plastics
 Brandi Dean
 Timber Creek
 TCI

Compounds Used in the Experiment

 Polyethylene with n	 Sodium Bicarbonate	 Methanol
 Hydrochloric Acid	 Sodium Hydroxide	 Cellulose
 Glycerol		





FRUITS AND VEGETABLES WITH THE HIGHEST VITAMIN C

Fruit/Vegetable	Amount of Vitamin C (mg)
Guava (1 fruit)	200
Red Bell Pepper (1/2 cup)	150
Orange (large)	100
Kale (1 cup)	100
Kiwi (1 piece)	100
Green Bell Pepper (1/2 cup)	100
Broccoli (1/2 cup cooked)	100
Brussels Sprouts (1/2 cup cooked)	100
Grapefruit	100

* We can extract vitamin C from sources containing the highest highest vitamin C content, like guava or red bell pepper to create the vitamin C vaccine

Recycle for a Cause



Research:

- Bottled water is currently the second largest beverage category in the United States. The most recent studies from 2015, indicate that the total volume of bottled water consumed is 11.7 billion gallons, a 7.6% increase from 2014.
- Many people don't know that plastic water bottles cost between 5-10 cents. How can this money be put to use?

Proposal:

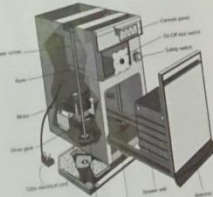
- Custom made recycling machine
- Built in screen (ipad mini – around \$400)
- Plastic scanner (S-B Powertool GMS120)
- Electric Wall scanner – around \$80)

Process:

- Consumer places bottle in machine
- Selects which charity to donate to
- Machine acknowledges consumer's choice of charity by showing the amount donated in the form of a bar.

Process(cont.):

- While the consumer is waiting for the donation to be processed, the trash compactor is squishing the bottles to create more availability for other bottles.
- For these machines to be created and put to use, we would team up with various organizations to get grants to place machines in public areas.



Recycle for a Cause
Ashley Hopkins
Timber Creek
TC6



iPhone Solar Panel Framework

Sunlight

Solar Panel in iPhone

Charge Controller

Powering the Battery

Will it be durable?

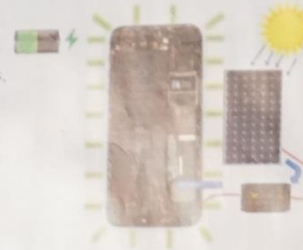
- ❖ Yes, the iPhone will have a tough frame. Solar panels are made to withstand high winds, falling trees, etc.

Will it overheat?

- ❖ No, the solar panel frame will be kept cool by the vents. The vents will be placed between the panel strips and will contain micro heat sink fans.

Will it be too bulky?

- ❖ No, the charge controller will be micro which means it will make the iPhone slightly thicker, but not too big.



Process

- 1) The solar energy will be absorbed by the panel
- 2) Then will flow to the charge controller
- 3) The usable energy will then be sent to the lithium-ion battery through a dual charging process. This means it can be powered by solar energy and a charger simultaneously





CAMDEN
COUNTY
COLLEGE

Social Media Limitation Program

Problem: As a simple distraction, social media provides an escape from reality and responsibilities. While utilizing social media, people are unaware of how quickly time passes, and how many crucial hours of the day are wasted. Social media addiction is as detrimental as any other addiction is to human beings, and it is very real. Living in the digital age, it is common for people to become engulfed in their online personas and lose sight of reality.



Solution: I have designed a voluntary app that regulates social media usage. Once the willing user manually customizes their information/app controls, the app will only allow the usage of social media to the amount of time specified in the settings. After the time is up, the apps will be shut down temporarily. In using this app, people will become more aware of how often they check their phones. People will gradually break social media addictions and learn to connect more to people and environmental factors.

Statistics

- Over 75% of all internet users utilize social media.
- In 2018, it is estimated that 1 out of every 3 people will be an Instagram user.
- 189 million FaceBook users are mobile only, as of 2012.
- 93% of marketers use social media as a means of advertisement.
- Social Media use can lead to issues with self control and self esteem.
- 22% of the world's population uses social media.
- 76% of girls and 54% of guys check their phones at least ten times while out with friends.
- 67% of America's population uses social media.

Survey Results



How Often Do You Go On Social Media?

Multiple times a day Once a week Does not use social media
 Once a day A few times a month
 A few times a week Less than the choices given

Social Media Restrictions
Rebecca Green
Timber Creek
TCS



The Magnator

- What is it?
A device that attaches to the rim of a bike that turns mechanical energy into electrical energy.
- How does it work?
Turns a regular electric motor into a power generator by disturbing the magnetic poles inside the electrons to flow from the generator into the 5 volt battery.
- What is the use?
Hooking up a USB charger to the portable battery you can charge your electrical device while legs.
- Does it work?
See for yourself! Spin the pedal and look for the red light in the battery.
- The graph below is a simplified visual of what is going on inside the gray cone





Easy Runner: Knee Joint Enhancement

Parkston, Ohio, resident, Emily, who has a physical weakness in her right knee, designed a prosthetic knee joint for a person with a physical weakness.

Design:

- 2 secure velcro holds
- Microfiber straps
- Rubber spine bend for resistance

Features:

- adjustable foot
- flexible microfiber straps
- rubber spine bend for resistance



REMind

What is REMinder?

REMind is a mobile application that helps you track your sleep quality and duration. It is designed to be used by anyone who wants to improve their sleep quality and duration.

How REMinder will measure sleep quality...

REMind will measure your sleep quality and duration by using a combination of sensors and algorithms. It will track your heart rate, breathing rate, and movement during the night. It will also track your sleep duration and quality.

DESIGN

REMind is designed to be a simple and easy-to-use application. It will have a clean and modern interface that is easy to navigate. It will also have a variety of features that will help you track your sleep quality and duration.

REMind App

REMind is a mobile application that helps you track your sleep quality and duration. It is designed to be used by anyone who wants to improve their sleep quality and duration.

Key Features

REMind has a variety of features that will help you track your sleep quality and duration. These features include a sleep tracking algorithm, a sleep duration tracker, and a sleep quality tracker.

How to Use REMinder

REMind is easy to use. Simply download the app from the App Store or Google Play. Once you have downloaded the app, you can start tracking your sleep quality and duration.

Conclusion

REMind is a mobile application that helps you track your sleep quality and duration. It is designed to be used by anyone who wants to improve their sleep quality and duration.



Trach-X
A pediatric tracheotomy that has been enhanced by a camera, new fabric, and...

Interesting Facts:
In average, there are about 100,000 tracheotomies performed annually in the U.S. and 10,000 in the rest of the world.

Our Product:

<http://modelunhighland.wixsite.com/trach-x>

Curious? Visit:
<http://modelunhighland.wixsite.com/trach-x>

Enhancements:
1. Sensor App
2. Microscopic Camera
3. New Fabric


The Children's Hospital of Philadelphia
Hope lives here.

Our personal experiences have inspired us to enhance the tracheotomy.

Elephant Habitats In Zoos


Problem:

- Nails grow continuously
- Nail and foot tissue is worn down in the wild.
- Foot infections occur
- Foot infections is the leading cause of death in elephants in zoos.
- If the elephant gets an infection they will have to have surgery and will most likely die.



Solution:

- There will be a conveyor belt/ moving walkway.
- The walkway would be made of nylon polyester. Sand would be put on top of the walkway.
- The walkway would be able to hold up to 6000 pounds.
- The walkway would be 20 ft by 9 ft.
- Estimate that it will cost \$15680.



Elephant Habitats in Zoos
Cambria Johnson
Timber Creek
VCU



WATER CONSERVATION IN THE DESERT

Did you know that a freshly hydrated plant stem is almost 100 percent water?

- Most of them have a global shape – the best shape for maximum water storage.

Did you know that a cactus can live for weeks without food, but only 3 to 4 days without water?

Solar stills are an excellent way to capture water with limited supplies in the desert.

Solar still

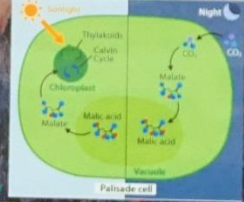
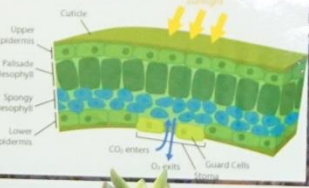

Solar still is a simple device created to purify rainwater using vegetation and crushed cacti to produce more water.

Step 1: Make a hole that is wide enough to hold a container and place it in the center.

Step 2: The sun's radiation will create vapor. It condenses which makes it switch into a liquid.

Step 3: By placing a plastic bag we can see that the water will evaporate. Securing it with rocks on the side will prevent extra air from getting in.

Step 4: Vegetation and crushed up Cacti definitely help increase the productivity of the water supply.



Water Conservation in the Desert
Ashley Sahy
Timber Creek
11.10



REMiner

WHAT IS REMinder?

Eliminate loud noises from alarms by simply vibrating at the set time and provide sleep feedback to encourage improved sleep quality.

It solves problems for those who are immune to alarm clocks, to partners who wake at different times, those who endlessly snooze alarms, and even for the deaf community.

REMiner continuously vibrates in intervals at the set time and also will be able to track sleep quality based on time spent in NREM and REM sleep, calculated from heart rate and body temperature.

	Total Sleep	NREM sleep	REM sleep
Infant	16 hours	12.8 hours	3.2 hours
Children	7-11 hours	8.4 hours	2.1 hours
Teenagers	9 hours	7.2 hours	1.8 hours
Adults	7-8 hours	6 hours	1.5 hours

ARE YOU GETTING ENOUGH SLEEP?

How REMinder will measure sleep quality...

During NREM sleep, the individual's heart rate slows down, but during REM sleep it increases due to rapid eye movement and activity of internal body systems.

During NREM sleep, body temperature drops, but even more so during REM sleep.

DESIGN

Similar to a nicotine patch, the REMinder will be constructed of flexible polyvinyl chloride, allowing it to be flexible and durable on skin.

A medical grade, pressure-sensitive adhesive will be used, such as acrylate polymers, because they (1) have a low level of allergenicity, (2) are water resistant, (3) cleanly remove from skin but still stick without losing bond.

REMiner App

Set Alarm

Heart rate & Temperature

Sleep Quality

Near Field Communication

NFC is designed for use by devices within close proximity of each other. An individual SIM card or microSD card with an NFC chip will be installed in REMinder.

REMiner would use Tag Type 4: it contains more memory and faster exchange speed.

The 'passive' device, the REMinder patch, would contain information that other devices can read. The 'active' device is the smartphone; it is able to collect information from the NFC tags and even alter that information.

The reader/writer relationship is the type of role that the REMinder will enact.



REMiner
Erica Critten
Timber Creek
TC11





BioEd

Edible and Environmental

What is BioEd?

A line of biodegradable plastics derived from a seaweed known as agar.

- Edible
- Decomposes quicker than regular plastics
- It is beneficial for the environment as it decreases plastic waste in the oceans and landfills.



Plastic

Plastic is a material consisting of any of a wide range of synthetic or semi-synthetic organic compounds that are malleable and can be molded into solid objects. Plastics are typically organic polymers of high molecular mass, but they often contain other substances. Most plastics are made from polyethylene terephthalate (PET) (C10H8O4).

Plastic is also notorious for its resistance to decomposition, with estimates placing its life cycle somewhere between 500 and 1,000 years. Plastic actually decomposes quicker in the ocean at cooler temps., however when plastic decomposes, it releases toxic chemicals such as bisphenol A into the water.



Agar

Agar is a jelly-like substance, derived from a seaweed called, algae. It is traditionally used as a food thickening agent and vegan gelatin replacement, and/or various applications throughout the medical and scientific fields.

It can be disposed of in an environmentally friendly way, as agar absorbs and retains water quite well. Should the agar plastic end up in the oceans, it wouldn't be harmful to the environment, given its original incarnation as marine material. It is also safe for human consumption.

Algae are an interesting natural resource because they proliferate quickly. They are not impinging on food production. And they need nothing but sunlight and a bit of waste-water to grow on.



BioEd

Edible and Environmental

AGAR CUPS



These cups are very similar to the average, everyday, cups we use during parties and mundane use. The cups are made from agar agar, which is a seaweed extract used in Asian cuisines to thicken jellies, sauces and desserts. It is vegetarian alternative to gelatin. The recipe is pretty simple; utilize 5 tablespoons of agar agar powder for every 2 cups of liquid you use. Then let it boil in a pot until it becomes super thick and pasty.

While it's boiling, get a hot water bath set up going. Agar agar hardens at a much higher temperature than gelatin does, so keep it as hot as you can for as long as you can. After it reaches the wallpaper-paste phase, transfer it into your hot cups.

To create the form of a cup, combine the water and agar, heat the mixture, pour it into a mold, and cool it down quickly. The H2O binds and thickens the agar when it cools, so it keeps the shape of the mold. What makes agar the ideal material is the fact it is an organic compound. Which means it will eventually become rotten and go bad like normal foods.

When the plastic is left sitting in open air, it takes about a week for it to shrink down and can sustainably decompose in soil. A plastic water bottle, on the other hand, takes more than 1,000 years to biodegrade, and in the U.S. more than 2 million tons of the containers are wasting away in landfills.



Design

REMiNder

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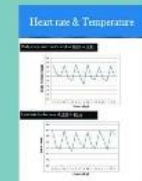
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Common Knee Injuries:

Anterior Cruciate Ligament (ACL) Injury:
This is damage to the anterior cruciate ligament in the front of the knee joint. The ligament damage ranges from a slight stretch to a full tear, which could require simple physical therapy or surgery. This injury can be caused by abrupt stops, quick shifts in direction, direct contact, or awkward landings.

Osteoarthritis:

This disease develops with age as the cartilage in the knee deteriorates. Bone spurs grow slowly in the knee which wears down the cartilage. Stiffness and tenderness develop in the knee joint as the bones become closer leading to joint immobility. This disease advances with age.

Osgood Schlatter Disease:

This is a common knee injury for active adolescents during growth. The area where patellar tendon connects to the tibia, the tibia tubercle becomes inflamed. With strenuous activity and stretching of the quadriceps, the growth plate connected to the tendon swells causing tenderness.



mBrace

Often with knee pains and injuries there is too much pressure in an area compensating for a lack of pressure in another area. This brace will be able to adjust pressure to be a universal brace. It can be applied to any injury, age, or activity.



Materials-
Spandex
Elastic
Adhesive
Rubber Pockets
Rubber Inflation Valves

Future Adaptations-
This brace could receive prescriptions from doctors to apply the pressure as seen fit. Sensors will be built into the brace to monitor the pressure in activities, which will provide data on an app wirelessly. The app could transfer this data over to doctors directly for their diagnosis.

mBrace

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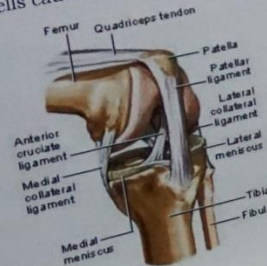
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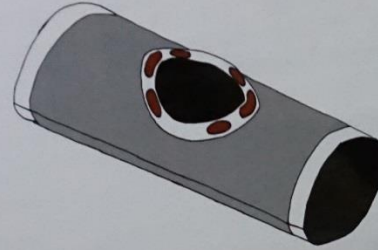
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mBrace
Madison Allen
Timber Creek
TCA

