Sustainability Presentation

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Project Introduction

- The purpose of this project is to research, design, and fabricate an autonomous drone that will aid firefighters when there is an emergency

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Main Issues Related to Sustainability Identified in our project

- Battery
- Nonrenewable Materials
  - Zinc, Copper, Fiberglass, ferrite

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Environmental Issues

Material Processing

- Zinc (Zn)
  - Processing impacts water, soil, and crops
  - Pollution can be hazardous to humans
- Copper (Cu)
  - Easily Recyclable without performance lost
  - Not generally harmful to the environment
- Carbon Fiber Reinforced Composite (CBRC)
  - Recyclable with chemical, mechanical, and thermal methods
  - To recover clean fibers and depolymerized matrix in monomers
  - Commonly disposed of with incineration and landfill

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Energy Use Issues

- Use of proper propellors
  - Large propellors draw too much current
- Proper disposal of LiPo battery
  - Make sure to completely discharge battery
    - Battery charger/discharger
    - Light bulb

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Renewable Energy Use

- LiPo battery are rechargeable
  - Could potentially implement solar energy to recharge batteries

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Use of Materials Issues

- Fire extinguisher grenade
- Drone frame refabricated
- Motors Repurposed

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Waste of Materials Issues

- Balloons:
  - Latex balloons can take anywhere between six months to four years to biodegrade.
- Batteries:
  - 12-18 months for a noticeable drop in performance
  - 100 years to degrade for some components

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Pollution Related Issues

- Due to the balloon popping, pieces of it could drop off.
- Biodegradable balloons can take up to 4 years to degrade but that could be too late.
- This liter could be scattered around and/or kill animals
- Who will pick up all the pieces?

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SOCIAL AND POLITICAL

- Target audience are Firefighters and victims of a fire
- Less Resources are used to prepare firefighters
  - Injuries are less apparent
  - Humans not in as much risk fighting fires
  - Drones focus on fires
  - Humans focus on victims

Safety Issues

- Bystanders may be injured
- Autonomous Vehicle
- Propellers

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Constituencies (People Affected)

- Firefighters
- Bystanders

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Social Impact

- Firefighters will be able to focus on other tasks
- Less Resources used while extinguishing fires

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Health Issues

- Preparing the fire extinguishing solution could cause health related issues if not done properly.

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ECONOMIC IMPACT

- Human Capital: A drone Pilot
- Manufactured Capital: Factories
- Natural Capital: Power source, Frame, motors, sensors.

EXPERIMENT COST AND EARNINGS

Prototype

- Zinc - $3.85 per kg
- PLA - $0.05 per g
- Fiber glass - $1.2-3 per kg
- Wood - $1 per sqft

Product

- Copper - $10.25 per kg
- Li Ion battery - $5.40 per battery

Profiting

- Specialty vehicles and vehicle body manufacturers profit
    - Oshkosh , E-one, and Kovatch Mobile Equipment Corp

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Project Footprint

- How much of the Earth's resources does your project require?
- .454 kg of zinc alloy
- .35 kg of PLA filament
- 4 dc motors with 40 g of copper

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People, Planet, Profit Relationship

- In other words, the triple bottom line of the project:
  - Planet means factoring the climate change and climate effect the project has.
  - People means considering employees' well-being and factoring stakeholders and societal impact into the project's choices.
  - Profit, means the financial performance that we are looking for, such as to maintain an economic solution.

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QUESTIONS?

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