

Risk Assessment Safety Plan

Project information:

Drone Disabling Device		3/1/2018
Name of Project		Date of submission
Team Member	Phone Number	e-mail
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Faculty mentor	Phone Number	e-mail
Dr. Camilo Ordonez	850-410-6365	cordonez@eng.famu.fsu.edu

I. Project description:

The objective is to develop a device to secure a specified air space from unmanned flight vehicles. The key goals of our project include detecting and neutralizing unmanned flight vehicles, also known as drones, within a specified air space of a 30-foot radius dome. The device must be portable, environmentally safe, and comply with FCC guidelines. Drones targeted for this project are the typical household drones.

II. Describe the steps for your project:

1. Initiate background research on drones and understand which parts are most vulnerable
2. Generate concepts
3. Select a couple of concepts that match customer needs
4. Conduct small scale testing
5. Begin prototyping
6. Procure necessary parts
7. Build and test prototype
8. Make necessary iterations to prototype

III. Given that many accidents result from an unexpected reaction or event, go back through the steps of the project and imagine what could go wrong to make what seems to be a safe and well-regulated process turn into one that could result in an accident. (See examples)

- Human injury (internally and externally) due to both the electrical and mechanical attacks.
- Property damage due to drone neutralization.
- Pipe failure in mechanical attack.
- Trigger valve failure due to excess pressure.
- Air compressor failure.

IV. Perform online research to identify any accidents that have occurred using your materials, equipment or process. State how you could avoid having this hazardous situation arise in your project.

Online research shows that the weighted net launcher should not be made with PVC pipes as it cannot hold the pressure flowing in from the compressor at high ratings. Use stainless steel pipes and parts instead. Depending on the size and weight of the drone there could be property damage. This also depends on what is in the specified air space and its surroundings. To avoid this scenario ensure that there be nothing that could be damaged within that space. Only allowing the operator within the dome area can prevent human injury. The operator should only operate the device for a period of maximum 2 hours to prevent any internal injury such as rise in body temperature and heating of tissue. It should be noted that individuals with medical devices should be cautious when near or operating the device as it could interfere with their implanted medical device. Humans should be aware of their surroundings to know if the drone is being neutralized in their area. Air compressor explosions go hand in hand with the trigger valve failure as they are attached in the prototype. Explosions can be prevented by maintaining the device that it attached and ensuring that there are no punctures in the air line. Electric shock can occur therefore take precautionary measures.

V. For each identified hazard or “what if” situation noted above, describe one or more measures that will be taken to mitigate the hazard. (See examples of engineering controls, administrative controls, special work practices and PPE).

The use of PVC pipes should be minimized completely when creating the launcher to avoid explosion. Remove all property that can be damaged by the drones from the specified air space. Only allow the operator of the device to work for 2 hours at a time to avoid human internal injury and if individuals have medical devices implanted inside them it is suggested that they do not operate or be near the device. Air compressors should be maintained to specific standard. They should be inspected prior to use and after completion of use. In order to prevent electric shock proper handling of air compressor is necessary. All users of this device are to undergo training and read the operations manual to understand fully how to use the device.

VI. Rewrite the project steps to include all safety measures taken for each step or combination of steps. Be specific (don't just state “be careful”).

1. Initiate background research on drones and understand which parts are most vulnerable
2. Generate concepts
3. Select a couple of concepts that match customer needs
4. When conducting small scale testing avoid testing with electrical components for longer than 1 hour for those without medically implanted devices. For those with medically implanted devices it is suggested to not perform small scale testing for the electrical attack. For the mechanical weighted net attack use stainless steel pipes. Follow proper operations when using the air compressor.
5. Begin prototyping
6. Procure necessary parts
7. When building the prototype any individual may participate. When testing the prototype the same safety measures should be taken as they were for small scale testing (refer to #4). When attaching the trigger valve to the compressor be sure that it is airtight and that all other parts are fastened tightly.
8. Make necessary iterations to prototype using precautionary measures. Iterations should not be made while the prototype is in use. The device must be shut off when the iterations are being made to ensure human safety.

VII. Thinking about the accidents that have occurred or that you have identified as a risk, describe emergency response procedures to use.

If the compressor sparks and initiates a fire, emergency response is to be called immediately and the faculty mentor is to be notified. An individual present that is near the scene should call 911 and step away from the scene with all team members so that no one is injured. If necessary pull the fire alarm to evacuate the building. If the fire is small enough to put out attempt to use the fire extinguisher to stop the fire. If individuals incur small injuries a first aid kit is available for use and he or she will be taken care of. If there is a pressure explosion and an individual gets hurt emergency response, 911 will be called.

VIII. List emergency response contact information:

- Call 911 for injuries, fires or other emergency situations
- Call your department representative to report a facility concern

Name	Phone Number	Faculty or other COE emergency contact	Phone Number
Emergency	911	Dr. Shayne McConomy	850-410-6624

IX. Safety review signatures

- Faculty Review update (required for project changes and as specified by faculty mentor)
- Updated safety reviews should occur for the following reasons:
 1. Faculty requires second review by this date:
 2. Faculty requires discussion and possibly a new safety review BEFORE proceeding with step(s)
 3. An accident or unexpected event has occurred (these must be reported to the faculty, who will decide if a new safety review should be performed.
 4. Changes have been made to the project.

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Report all accidents and near misses to faculty mentor.