Risk Assessment
Safety Plan

Project information:

Design an Unmanned Tilt-Rotor Aircraft for Multi-Mission Applications	2/22/15
Name of Project	Date of submission

Team Member	Phone Number	e-mail
Patrick McGlynn	305-877-1006	pam09e@my.fsu.edu
Kade Aley	850-294-4317	ka11d@my.fsu.edu
Christian Mard	239-822-3589	kam11y@my.fsu.edu
Daylan Fitzpatrick	321-474-6878	df12b@my.fsu.edu
Jake Denman	727-226-2165	jad13h@my.fsu.edu
Kikelomo Ijagbemi	850-300-9121	kikelomo1.ijagbemi@famu.edu

Faculty mentor	Phone Number	e-mail
Farrukh Alvi	850-410-6336	
Chiang Shih	850-410-6321	
Nikhil Gupta	850-410-6201	

I. Project description:

Every year the Seafarer Chapter of The Association for Unmanned Vehicle System International, also known as AUVSI, host a student design competition. This competition is known as the Student Unmanned Air Systems (SUAS). This year's competition will be hosted in Webster Field, Patuxent River, MD from June 15th -19th. This competition is intended to stimulate and foster interest in the innovative technology and encourage careers in the field. This competition requires the students to design, manufacture, and demonstrate a system capable of completing a specified aerial operation autonomously, whilst ensuring safe application and execution of Systems Engineering principles. This competition is a college level competition, and will be supervised by multiple sources such as, government agencies, contractors, engineering firms, and universities.

II. Describe the steps for your project:

1. Manifest and complete a VTOL vehicle design
2. Purchase, gather, or manufacture components
3. Integrate and test mechatronics via firmware development
4. Assemble prototype and conduct benchmarking
5. Test both manual control and autonomy
6. Develop and test sensor package and telemetry
7. Quantify and improve vehicle performance
8. Compete at competition (June 15-19, 2016)

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.

Manufacturing components requires the use of heavy machinery often consisting of spinning pieces, sharp edges, and/or high energy systems.
Mechatronics use could involve dealing with live wires during maintenance and testing.
Assembly of the vehicle will likely involve multiple types of hand tools that could cause harm.
Testing flight capabilities will involve allowing the aircraft to fly while untethered.

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.

A senior design group last year had a member slice their hand open due to leaving the props on while testing indoors. Team 8 will NEVER have props on the craft unless we are flying at a safe location.
Lithium-Polymer batteries have been known to ignite when improperly stored. Team 8's Li-Po batteries will ALWAYS be stored in an approved Li-Po battery bag.

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).

Only trained individuals wearing the proper personal protection equipment will be allowed to use heavy machinery.
Verification that the electrical system is disconnected from power sources and wires are not active will be done before any time mechatronics work is done.
Any work done with hand tools will be done by experienced users or supervised by experienced users wearing the proper PPE.
A minimum safe distance of 15 feet will be observed whenever the vehicle is active. In addition the vehicle firmware will incorporate a return to launch protocol in case of loss of communication to the vehicle controller.

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. Manifest and complete a VTOL vehicle design
2. Purchase, gather, or have an experienced team member manufacture components while wearing the proper PPE.
3. After disconnecting power sources and verifying thesystem isn't energized, integrate and test mechatronics via firmware development
4. Assemble prototype using proper hand tool procedures and under supervision if needed then conduct benchmarking
5. Test both manual control and autonomy from a safe distance of at least 15 ft and verify the return to launch system is operational before any flights
6. Develop and test sensor package and telemetry
7. Quantify and improve vehicle performance
8. Compete at competition (June 15-19, 2016)

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

For personal injury emergencies, which covers all our safety risks, team members will:

1. Ensure any system (vehicle, milling machine, laser cutter, etc) is in a safe mode to prevent any more injury, before going to assist the injured party.
2. Ask the injured party if they desire medical attention, if they can't respond medical attention will be contacted immediately. Team members hold the right to contact medical services even if the injured party discourages it.
3. Whether medical attention was issued or not contact will be made to the team instructor, advisor, and sponsor.
4. Team members present at the time of the incident will make a report on what they witnessed
5. A meeting between the team and faculty will be held to discuss safety changes to be applied before going forward with the project

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
		Nikhil Gupta	850-410-6201
		Farrukh Alvi	850-410-6336
		Chiang Shih	850-410-6321

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.

Team Member	Date	Faculty mentor	Date

Report all accidents and near misses to faculty mentor.