



UNC CHARLOTTE

The WILLIAM STATES LEE COLLEGE of ENGINEERING

## Senior Design Project Description

<b>Company Name</b>	Armament Research, Development, and Engineering Center (ARDEC)	<b>Date Submitted</b>	July 24, 2017
<b>Project Title</b>	Field Expedient Capabilities Program Projects (ARDEC_WEST)	<b>Planned Starting Semester</b>	Fall 2017

### Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project. 250 hours are expected per person.

Complete the following table if this information is known, otherwise the Senior Design Committee will develop based on the project scope:

<b>Discipline</b>	<b>Number</b>	<b>Discipline</b>	<b>Number</b>
Mechanical	3	Electrical	2
Computer		Systems	
Other ( )			

### Project Overview:

The U.S. Army Armament Research, Development and Engineering Center (ARDEC) is an internationally acknowledged hub for the advancement of armament technologies and engineering innovation. As one of the specialized research, development and engineering centers within the U.S. Army Materiel Command, ARDEC has the responsibility for meeting this critical demand. The ARDEC's workforce provides life-cycle support for nearly 90 percent of the lethal Army systems used by U.S. Warfighters.

The ARDEC strives to support the Army's efforts to ensure Soldier survivability and enhance platform and area protection by providing engineering, design and development support. This support is essential to the rapid delivery of critical technologies to U.S. Warfighters.

This project will have a similar project being conducted at the same time by engineering cadets at the United States Military Academy. Beyond the work product produced, this project can help to build the relationship between UNC Charlotte's William States Lee College of Engineering, ARDEC and USMA-West Point.

### Initial Project Requirements:

During active duty deployments, Special Operations forces can be placed in challenging situations and forced to improvise equipment from locally available items to be able to fulfill the mission. Due to constraints of time and circumstances, operators may have to utilize locally available materials from: Urban, Sub-Urban, Rural and Remote locations, in a unique way to build a



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capability(s) that can deliver the required performance. The TV Series “MacGyver” had frequent examples of this concept in operation. As an example, a past project was to create a welding and field power supply by modifying a car’s alternator. This modification required basic hand tools, a paper clip and a copper wire. Although a potential source for many concepts are potentially possible, as denoted in “You Tube” and shows like “MacGyver”, part of the objective is to combine important traits from various sources, validate performance, record instructions to build the capability and most importantly address a critical operational gap.

For this project, the student team of veterans will be asked to consider their experience(s) in the Military and define Field Expedient Projects that they think would be useful to deployed Special Operators. The deliverable(s) will be a method to use common items in a unique way to deliver a capability that will be required on a mission. Rather than designing bespoke parts to make this equipment, the students will be asked to use existing parts that may be found in other devices as a warfighter may be forced to do in an austere operating environment. The work product that results will be: designed, built and demonstrated. Testing will validate the performance against the specification. An “Instruction Manual” must be included to show an Operator how to use the improvised parts to create the desired apparatus and deliver the required performance. As local people may be involved, the instructions must be simple to comprehend and execute. The Instruction Manual should be geared toward that of an 8<sup>th</sup> grade education

At the first Design Review, the team will provide ideas/concepts to ARDEC and selections will be made for the candidate (s) to implement. Students will be required to not only describe the concept, but also the operational gap(s) that are being addressed. The resultant may be more than one challenge for the project, but the scope will be achievable within the 2 semester project.

### **Expected Deliverables/Results:**

- Improved device for each Project challenge (May be 1 or more than 1)
- Instructions manual with pictures that illustrate how the parts can be improvised together to provide the desired function
- Host counter-part USMA team at UNC Charlotte for intermediate meetings, reviews and presentations
- Team to travel to Ft. Bragg to meet with Special Operations staff, if desired by ARDEC.

### **Disposition of Deliverables at the End of the Project:**

Hardware will be delivered to ARDEC representatives after the conclusion of the May 3 Expo at UNC Charlotte

### **List here any specific skills, requirements, knowledge needed or suggested (If none please state none):**

- Participants must be Veterans of the United States Military.
- Team members must be US Citizens
- Entire team must be available for travel to Ft Bragg, Travel costs will be re-imbursed from Project budget.



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- Team must be available to host USMA team at Charlotte when required