



**PEO STRI**

# **US Army PEO STRI Community Support with Engineering Mentors for STEM**

**(STEM= Science, Technology, Engineering, and Mathematics)**

**Abdul Siddiqui**

**407-405-6125**

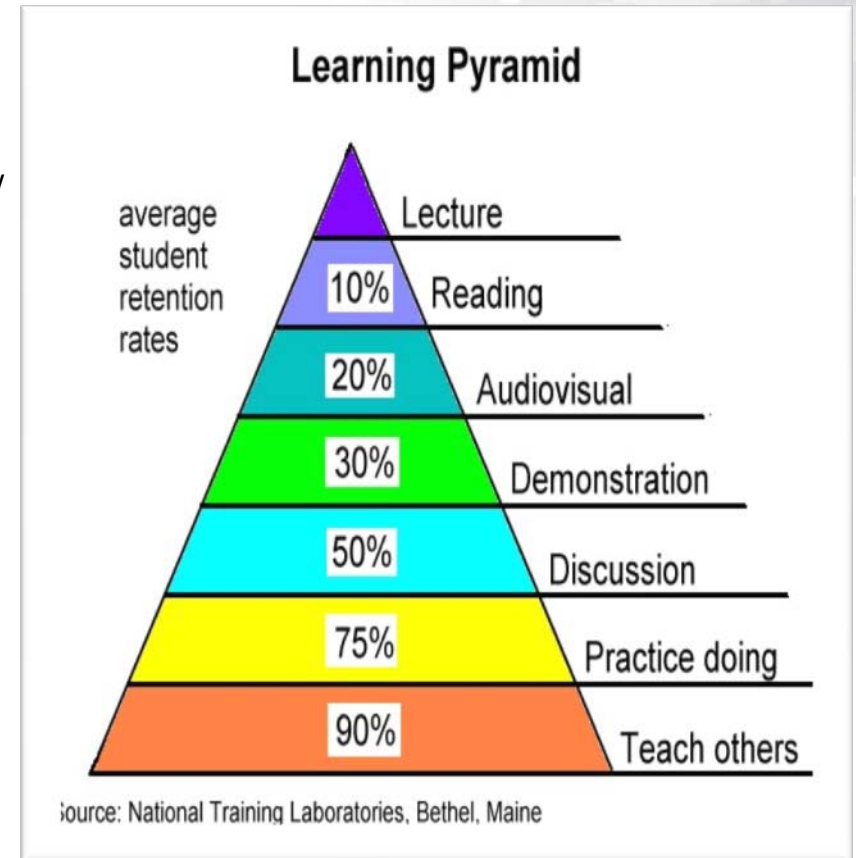
**Abdul.M.Siddiqui@us.army.mil**

## STEM Mentorship is a success for all involved:

- Facilitates the increase in Engineering /Math / Science caliber for both students and mentors.
- Provides a well defined road map from schooling to the work force.
- Facilitates the sharing of best success oriented practices.
- Facilitates the tailoring of education to best meet industry trends.

### The Engineering Internship Projects – Life Tools

- Project 1: Technical Evaluation
- Project 2: Program Management
- Project 3: Individual Development



## National Science Education Standards

### Content Standard A - Science as an Inquiry

Ability necessary to do scientific inquiry  
Crosses disciplines and grade levels

### Content Standard E – Science and Technology

Abilities of technological design  
Understandings about science and technology

### Content Standard F – Science and Personal Perspectives

Science and technology in local, national, and global challenges

### Content Standard G – History and Nature of Science

Science as a human endeavor  
Nature of scientific knowledge



## Florida Department of Education Curriculum Framework

### Pathways to Engineering 2012

Program Title: Pathways to Engineering

Career Cluster: Engineering & Technology Education

Program Number: 9400300

CIP Number: 0821010102

Engineering Internship will focus on the Digital Electronics and Computer Integrated Manufacturing

- Matching up with the Florida Department of Education Curriculum Framework - Pathways to Engineering 2012
  - Program Title: Pathways to Engineering
  - Career Cluster: Engineering & Technology Education
  - Program Number: 9400300
  - CIP Number: 0821010102
  - [http://www.fldoe.org/workforce/dwdframe/eng\\_tech\\_frame12.asp](http://www.fldoe.org/workforce/dwdframe/eng_tech_frame12.asp)

Recommended Grade	Course Number	Course Title	Course Length	Level
9	8600550	Introduction to Engineering Design	1 credit	3
10	8600520	Principles of Engineering	1 credit	3
11	8600530	Digital Electronics	1 credit	3
	8600560*	Computer Integrated Manufacturing or	1 credit	3
	8600590*	Civil Engineering and Architecture or	1 credit	3
	8600620*	Aerospace Engineering or	1 credit	3
	8600630*	Biotechnical Engineering or	1 credit	3
12	8600650**	Engineering Design and Development	1 credit	3

\* Note: Students should select at least one of these courses to take in addition to the Digital Electronics course (8600530).

\*\* Note: This course is intended to serve as a capstone course.

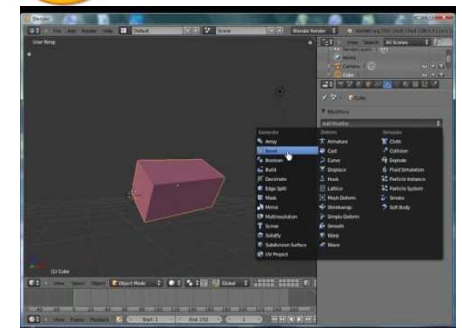


# PEO STRI – Proposed Program



- Project incorporated in the Internship:

- SeaPearch underwater robotics
  - (<http://seaperch.org/index> )
    - Water proofing
    - Electronics / Manufacturing
- Prototype development
  - (<http://www.makerbot.com/> )
    - CAD model development
    - Prototype manufacturing per design
- Software Development
  - (<http://www.blender.org/> )
    - Game Engines – Unity 3D
    - CAD model design – Blender
    - Assets – models and scripts



- SeaPerch
  - Curriculum designed in 2003 by MIT
  - Funded by ONR as part of the NNRNE
  - AUVSI Foundation will manage program
- MakerBot
  - MakerBot Industries brings the future to the desktop with affordable, open source 3D printers.
  - The MakerBot can prototype almost anything you can imagine using your CAD design.
  - MakerBot Industries Awards - CNET's Best Emerging Technology 2012 ; Popular Mechanics Editor's Choice Award 2012 Popular Science Product of the Future Award 2012

- **Students learn design and engineering principles by building an underwater ROV (Sea Perch) and learn design modification and prototyping using the MakerBot.**
  - Fun, educational, challenging
  - Varying levels of sophistication allow broad appeal
  - Integrates engineering & technology into the classroom
  - Introduces maritime, robotics, STEM careers into the classroom
  - **Facilitate STEM Competency**

**This project will facilitate the “Concept to Implementation” experience for the engineering interns.**



# PEO STRI – Internship Results



- **Matrix from our internship:**

- The teams successfully modified the ROV controller design electronics to support the LED lights.
- The teams designed, fabricated and verified **17** propeller designs.
- The final propeller designs were very comparable to the propeller that was part of the kit. The kit propeller was optimized for the low torque motors that were part of the kit.
- We started with **14** students and had **100%** retention.
  - Seminole and Orange County
  - 4 High Schools represented (University/Lyman/Timber Creek/East River)
  - 10 boys / 4 girls
- All the learning objectives were met.
- All of the participating students will be receiving their certificates, internship and community service hours for their effort. **The Internship Certificate Award Ceremony was on 5 Sep 2012**



<http://www.handhgraphicsorlando.com/STEM>





# PEO STRI – Internship Path Forward



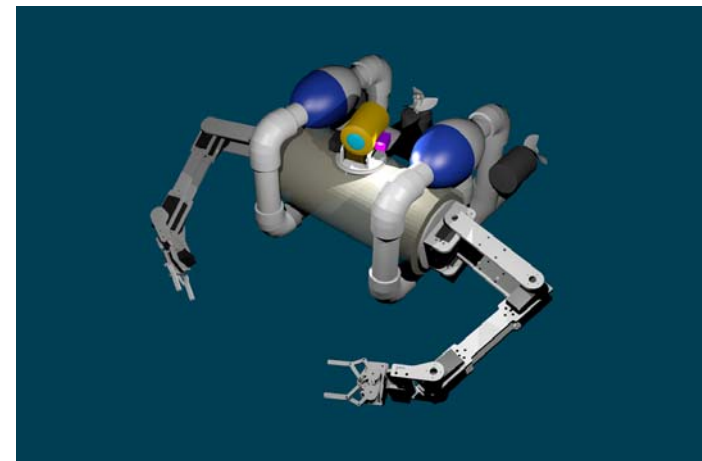
- **Fall 2012-2013:**

- 22 Students completed their requirements
- Virtual Internship – 3 Projects
  - Project 1: Technical Evaluation
  - Project 2: Program Management
  - Project 3: Individual Development



- **Summer 2013:**

- 24 Students – 4 High Schools
- UCF-IST facilitating the lab space for our internship.
- Tentatively the following is the schedule of the engineering sessions:
  - June 17
  - June 24
  - July 8
  - July 15
  - July 22
  - July 29 (make-up session)
  - Aug 5 (final testing)
- New Project Expectation
  - Design the controller electronics to support 4<sup>th</sup> motor and switch
  - Design a Robot Claw for the Sea Perch using Arduino and Raspberry Pi



# PEO STRI – Special Thanks



- **Program Executive Office Simulation, Training and Instrumentation (PEO STRI)**
  - Pete Marion, Assistant Program Executive Officer for Customer Support (retired)
  - Traci Jones, PEO STRI Assistant Program Executive Officer for Project Support (APEO PS)
  - Robert Miller, Chief Systems Engineer/ Director of Engineering
- **The Institute for Simulation and Training (IST)**
  - Dr Randall Shumaker, Director - IST
- **Simulation and Training Technology Center (STTC)**
  - H. Michelle Kalphat, Chief Engineer/DARPA Agent RDECOM STTC/ARL
- **Naval Air Warfare Center Training Systems Division**
  - Robert Seltzer, Deputy Director, Research & Technology Programs, AIR-46T
  - Asuncion (Sunny) Simmonds . Program Manager
  - Marianne Paulsen, Mentor
  - Charles Tucker, Mentor
- **Team Awesome**
  - Maxwell Greenspan, MakerBot Expert, UCF Student
  - Hassan Siddiqui. CAD / Software Expert, UCF Student
  - Ro Lopez. Mentor



# Safety Brief



- Safety Brief Shared with students
- Tools overview