NPS’ Field Laboratory @ McMillan Assault Strip, Camp Roberts, CA
by Ray Jackson,

"The mission of the Naval Postgraduate School is to provide relevant and unique advanced education and research programs to increase the combat effectiveness of commissioned officers of the Naval Service to enhance the security of the United States. In support of the foregoing, and to sustain academic excellence, foster and encourage a program of relevant and meritorious research which both supports the needs of Navy and Department of Defense while building the intellectual capital of Naval Postgraduate School faculty.

To accomplish this mission the NPS seeks to provide students with unique, militarily relevant opportunities to relate practical and operational activities with their theoretical and classroom work. The NPS Field Laboratory at McMillan Field enables the application of theory to practice in a field environment that enables the participation of other military units in an extremely realistic tactical and operational environment. It also serves as the mechanism to enable the request and utilization of the many ranges and resources available on Camp Roberts.

Camp Roberts provides NPS students and faculty with a convenient field environment in a remote setting with varied topography and vegetation to enable experiments over diverse terrain in more realistic real-world conditions in which the latest technologies and concepts of operations may be evaluated.

Camp Roberts California Army National Guard Training Site is located on the central California coast roughly 110 miles south of Monterey off of Highway 101 approximately 15 miles north of Paso Robles, CA.

- Camp Roberts Army National Guard Training Site consists of 42,784 acres. Twenty-three training areas sites are suitable for a variety of training, and consist of vastly divergent terrains of lightly wooded rolling hills, rugged and heavily wooded mountains or open grass lands.
- Live fire ranges
- A Combined Arms Collective Training Facility (CACTF)
- A Forward Operation Base (FOB)
- Rubble sites
- Urban Assault Course
- Full time staff that can help students/faculty with scheduling and logistics
- Dedicated facilities
- Camp Roberts’ weather pattern allows for a high number (250 or more) of flight days per year
- Unique site for interoperability training with UAVs and ground units conducting training
- Flexible/adaptable ‘air based’ range that facilitates NPS’ UAV/UAS research, test and evaluation
- The airfield is remote from populated areas and priority flights
- Minimum frequency interference and restrictions
- Potential exist to coordinate research and testing activities with existing National Guard or other military activities

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Director's Corner by Dr Brian Bingham, CRUSER Deputy Director

I am honored to be selected as the Deputy Director for the SECNAV’s Consortium for Robotics and Unmanned Systems Education and Research (CRUSER). I am a recent addition to the NPS faculty, having joined the Mechanical and Aerospace Engineering Department in September 2015. My prior experience has focused on the design, development and deployment of autonomous ocean systems.

As part of my transition to NPS, I’ve enjoyed learning about the wide variety of ongoing research and education activities related to robotics and unmanned systems. The breadth and depth of these activities is truly amazing, reflecting the pervasive influence of these new technologies and the hard work of the CRUSER community.

Dr. Tim Chung has left extremely large shoes to fill. His enthusiasm and dedication have been central to the success of CRUSER. In his farewell notice he said, "conversation leads to collaboration, and collaboration leads to innovation." I couldn't agree more with this sentiment. As Deputy Director I hope to work with the community to encourage these conversations, collaborations and innovations.

Finally, as a new member of NPS and CRUSER, I realize I have a lot to learn. The support and advice I’ve received thus far has been indispensable in adapting my own research and teaching to support the NPS mission. Similarly, I hope to be able to continue to learn from the you, the CRUSER community, so that I may better serve you as the Deputy Director.

Resources on Site:
- Paved airfield
- Fully functional Operations Center
- Offices
- Briefing/class Room
- Material Handling Equipment on site
- Field vehicles available for use
- Generators available for use
- Internet
- POL Storage
- SIPRNet and Classified storage can be made available
- Communications Radios available for use
- Full cellular coverage
- Collaboration Office
- Hanger and Storage Facilities
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- Hanger and Storage Facilities

In 1998, McMillan was an unimproved dirt assault strip used for C-130 landings.

CIRPAS upgraded the strip and added the initial facilities to make it acceptable for use for their Reconnaissance Infrared Surveillance Target Acquisition (RISTA) sensor demonstration for the Joint Precision Strike Demonstration Office and flew the Altus UAV (an early high altitude derivative of the Predator). Several flights by both Altus and NAVAIR’s Predators were conducted between FY98-FY03 for Naval Air Systems Command (NAVAIR) PMA-263’s Tactical Control System (TCS) project. This was the driving force for the CIRPAS Predator program, runway and facilities upgrades.

The Naval Postgraduate School (NPS) Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS) has aircraft that are available for UAV payload research and experimentation. These aircraft are not normally on site and do require a reimbursement fee.

- Sentry UAV—The Sentry HP is an internally operated runway launched day/night multi payload capable UAV. The Sentry is capable of fully autonomous flight and can be programmed with customizable, waypoint specific activities. The Sentry HP airframe is a modular design of composite construction and is optimized for payload flexibility.
- Pelican Surrogate UAV—A highly-modified Cessna O2 Skymaster configured to operate as a Predator UAV surrogate. Pelican is a manned aircraft with Predator avionics making it idea for integrating payloads designed for potential use in a Predator.

Historical Usage by NPS:

In 1998, McMillan was an unimproved dirt assault strip used for C-130 landings.

Three NPS research centers played significant roles in the FX program. From the beginning, FX leveraged the unique research capabilities afforded by the Center for Autonomous Vehicle Research (CAVR) and the Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS). The Center for Network Innovation and Experimentation (CENETIX) directly emerged out of the STAN/TNT programs.

NPS FX continues today under new sponsors and is now known as Joint Inter-Agency Field Experimentation (JIFX). JIFX addresses the S&T gaps of all COCOMS, interagency organizations, as well as federal, local, and international first responders.

For information about the facility or to schedule use contact Ray Jackson @ 805-227-1313 x1 or rpjackso@nps.edu
RoboEdu Launch Event and Update
By Lyla Englehorn, CRUSER Associate Director, laengleh@nps.edu

NPS RoboEdu-2016 is an eight month process to address a fleet challenge to design the future of robotics and autonomous systems education offered within NPS and the Navy – Marine Corps Training and Education community writ large. RoboEdu will employ a design process that will immerse participants in current curriculum offerings and training opportunities available to warfighters; and then task teams to explore the problem space, scope the challenge, identify opportunities, then present their recommendations to complete the challenge. The RoboEdu 2016 design challenge launch event was the afternoon of Tuesday 22 March 2016 during NPS Thesis & Research Week. Those who attended were given the challenge by CRUSER Director Dr. Ray Buettner, and were introduced to the design process by CRUSER Associate Director Ms. Lyla Englehorn. NPS Faculty representative Mr. Steve Iatrou gave an overview of curriculum development within the NPS academic system, and Mr. Stephen Kracinovich gave the first of several expected Perspective Statements sharing where NAV AIR believes autonomy is heading in the near future. Over the next several months of the discovery phase, CRUSER representatives will travel to fleet concentration areas to gather more stakeholder Perspective Statements and observe the real needs of the greater Naval enterprise in terms of robotics and autonomy education of junior officers and civilian engineer counterparts. CRUSER has also tasked a few USN reservists with archival discovery tasks involving a survey of currently available education in robotics and autonomy throughout U.S. academia, civilian and military.

As we head into the ideation phase, CRUSER will tap a core design team to review the discovery findings and surface key insights to inform their proposed solutions. Do we need to develop a full NPS curriculum focusing on robotics and autonomy? Could it be an elective tract to add to existing curriculums? Would a short course, or series of distance seminars meet stakeholder needs? Once a few good ideas rise to the top, the core design team will prototype and test possible solutions, and get feedback from stakeholder representatives. The design process is iterative, but we hope to complete this initial design process in November and have recommendations to present by December 2016.

CRUSER was established in 2011 by the Secretary of the Navy to shape generations of naval officers through education, research, concept generation and experimentation in maritime application of robotics, automation, and unmanned systems. RoboEdu is intended to specifically address the SECNAV’s robotics and unmanned systems educational intent.

Librarian’s Corner

http://smallwarsjournal.com/printpdf/42473

Unmanned Aerial Systems (UAS) in the Local Public Safety Environment: A Review
http://christianregenhardcenter.org/pdf/racers%20wp%201601.pdf

Autonomous Weapons and Human Control
http://www.cnas.org/autonomous-weapons-and-human-control
STUDENT CORNER

Student: LT Robert T Fauci III, USN
Title: Power Management System Design for Solar-Powered UAS
Curriculum: Systems Engineering

Link to Completed Thesis: https://calhoun.nps.edu/handle/10945/47867

Abstract: Drone technology has catapulted to the forefront of military and private sector research. Of particular interest are unmanned aerial systems that are able to stay airborne for extended periods by absorbing energy from the environment. This requires extreme aerodynamic efficiency in order to minimize the power required to maintain flight, and a recognition that every sub-system in this system of systems must operate at optimal levels in order to achieve this nearly perpetual flight. A critical component of a drone is the electrical hardware that optimizes solar energy absorption and manages energy storage. In particular, weight-to-power consumption demands consideration as inefficiencies quickly equate to additional power requirements. While off-the-shelf components are available for many of the individual pieces, none of these parts is optimized with size and weight in mind. Therefore, the impetus of this thesis is to examine the power management system within a systems engineering framework. This study includes maximum power point tracking, battery management, energy storage and flux tracking by the batteries, propulsion, avionics and payload components. The results drove the design and development of a compact single circuit that optimally integrates these sub-systems into a lightweight module for particular mission sets.

Short articles (up to 500 words) for CRUSER News are always welcome submit to: cruser@nps.edu

CRUSER Calendar

2 May (1200 PST)
CRUSER Colloquium

9-13 May
CRUSER Field Experimentation

26 May (1200-1500)
CRUSER TechExpo

6 Jun (1200 PST)
Monthly Meeting

details at http://CRUSER.nps.edu