

Biometrics High School Outreach: Summer Seminar and Internships at the US Naval Academy

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1. Introduction

The United States Naval Academy Summer Seminar is a one week summer program that offers the opportunity for top high school seniors to visit the Naval Academy. They experience all aspects of the Naval Academy including the academic program. For one week, they live as midshipmen and receive an overview of Navy and Marine Corps services into which the graduating midshipmen are commissioned. The program is actually run by midshipmen with oversight provided by active duty Navy and Marine Corps officers assigned to the faculty and staff. This is a large agenda, with approximately 1800 students from around the world each year [1].

The Summer Seminar is focused primarily on academics, and each student attends eight 90-minute workshops of their choosing. Some of the workshop topics include modern computing, physics, seamanship and various disciplines of engineering, including electrical engineering. It was within this latter area that high school students were introduced to biometrics.

In addition, the Science and Engineering Apprentice Program (SEAP) is a program for academically capable high school students with interest and abilities in science and mathematics. Funded by an Office of Naval Research (ONR) grant to the George Washington University, it places selected students in one of a number of Department of Defense (DoD) laboratories/research facilities for an eight week internship during the summer in an area of their interest. These interns are mentored by scientists, engineers or professors. The program gives the students exposure to science and engineering. DoD locations currently participating in the program are located throughout the US, and include the Army Research Lab, the Navy Research Lab, Stennis Space Center, and the US Naval Academy [2,3]. During the summer of 2004, the Naval Academy sponsored a total of five apprentices, two of which were selected for internship with our Center for Biometric Signal Processing. To support underrepresented minorities in science and engineering, we selected two female high school students as our interns.

2. Summer Seminar

Students selected to the USNA summer seminar program who choose to attend the workshop on electrical engineering were introduced to biometrics in the form of a 45 minute mini-workshop in our Biometric Signal Processing Laboratory. A typical schedule of their time in the lab is displayed in Table 1. To begin they receive a short presentation on some of the major forms of biometric identification, including iris, fingerprint, facial and voice recognition. This included a PowerPoint presentation on the general methodology, current uses of biometrics, and privacy/policy issues. After this presentation, the students were introduced to the equipment currently available in our lab. This includes an LG Iris-3000 iris recognition system that controls access to the lab door, an A4-Vision 3-dimensional facial recognition system, and an Access Veraport 2D facial recognition system. The lab contains 11 Dell Dimension 4600 computers that use the SecuGen ® Hamster fingerprint identification system for logon, and the Panasonic Authenticam & PrivateID iris recognition system for further demonstrations of iris recognition technology. Each of the computers is provided with an internal Sound Blaster® Audigy™ 2 (D) with DVD Audio and a high quality microphone to capture and analyze voice signals.

With the biometric equipment in the lab, the students received hands-on experience with state-of-the-art technology. Each student had the opportunity to practice

Table 1: Summer Seminar Schedule

Activity	Duration
Introductory Presentation	9 min
Enroll/identify fingerprints	12 min
Enroll/identify iris system	12 min
Enroll/identify 2D or 3D facial system	12 min
Total	45 min

enrollment and identification with three types of recognition systems to demonstrate their capabilities, advantages and disadvantages, and ease of use. These systems were: the 3D facial recognition system (see Fig. 1 (left)), the iris system that controls the lab door (see Fig. 1 (right)), and the fingerprint recognition systems for computer log on. The informal atmosphere promoted many good questions from the students and generated some quality discussions. Based on the students' feedback, the biometrics mini-workshop was both informative and interesting.

3. Apprentice Program

Our apprentices were engaged in many activities to support the development and growth of our Center for Biometric Signal Processing. These activities were both administrative as well as technical, and provided a rewarding introduction to functioning as an engineer in general, and working with biometric signals in particular. Some of the tasks they performed included:

- web page development for the lab
- web searches for biometric databases
- web searches for biometric references/publications for the lab
- development of "ground truth" for iris locations in the images of the CASIA iris database
- collected a database of voice signals and processed them in MATLAB
- developed an inventory of lab equipment
- prepared a brochure on our lab
- developed a database of university/industry biometrics activities
- created posters on biometrics for use in encouraging students to become electrical engineers
- assisted with enrollment/identification of the students involved with the Summer Seminar program
- attended a technology demonstration from the AcSys Biometrics Corporation
- attended meetings with representatives of Sarnoff Labs and the Identix Corporation

Overall, they were given an in-depth introduction to all facets of biometrics and engineering.

4. Rewards

The outreach to high school students has benefited both our lab and the students involved. The summer seminar students came from very diverse backgrounds, with a wide range of interests and little idea of how biometrics currently affect and will affect their lives in the future. First-hand experience with our equipment and research provided dramatic evidence of some of the most current technologies available today, as well as their uses. While many graduating high school students who enter college may have no idea what they may want to major in, these students at least have an idea of what is possible in this area of electrical engineering.

The same rewards seen by the Summer Seminar students were realized many times over by our summer interns. Their exposure to biometrics in this environment was something no high school could offer, and reinforced their interest in science and engineering.

Naval Academy Summer Seminar, <http://www.usna.edu/Admissions/nass.htm>.

Science and Engineering Apprentice Program (SEAP), <http://www.gwseap.net/seap.asp>.

Science and Engineering Apprentice Program (SEAP), http://www.onr.navy.mil/sci_tech/industrial/363/seap.asp.



Figure 1: Summer Seminar. Exploring 3D face recognition (left) and iris recognition (right).