Biometric Standards, Performance, and Assurance Laboratory

Department of Industrial Technology
Purdue University

Implementation of Hand Geometry in Recreational Sports Center

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Abstract

With the potential uses of biometric technology expanding rapidly, it is important for students to become experienced in planning, developing, and implementing biometric systems. This project describes continuing research in biometric technologies, which evaluated the need and feasibility of implementing a biometric solution for entrance to Purdue University's Recreational Center.

The recreational sports facility on campus currently uses magnetic stripe cards as the primary method of access control for students, faculty, and staff. One drawback of this token based technology is that the cards may be lost or stolen, thus permitting unauthorized access to those who are in possession of the token. The current system only checks the card being used, not the person using the card.

The primary goal of the course work and project were to give the students an opportunity to conduct a testing and evaluation of how a chosen biometric could provide secure access points for students. Secondary goals were to strengthen the partnership with Purdue and Recognition Systems and, to provide an example of how biometric applications might be applicable throughout Purdue University.

This class project serves as a model of introducing innovative method in a class project in many instances. First, all lectures were video taped to allow students to review them at a later point; WebCT was used to allow the professor, and project manager to communicate effectively with students in the class. Finally, the class was broken into four teams to perform the tasks of administration, networking, implementation and project management. This method forced cross-functional team cooperation and interaction as the teams worked together to complete the project.

This project is an example of how collaboration between education and industry can produce symbiotic relationship, while maximizing the student's educational experience.

Class Structure

A crucial part of the School of Technology's vision at Purdue University is to become a benchmark institution for technology education. To move from vision to reality, there is a priority to foster discovery partnerships with industry and engage students in applied research opportunities in the classroom1. Within the school, the graduate level biometrics course is comprised of both graduate and undergraduate students wanting an academic focus in biometrics. The course has three basic components to ensure the school's expectations are met and exceeded.

Classroom Instruction

The classroom experience is enhanced by the video taping of each lecture to allow students to review any material they may have missed or did not understand completely.

- **Biometric Device based Laboratories**

  To give students a hands-on learning opportunity, they are required to complete a battery of labs using biometric devices. Technologies covered include fingerprint, voice, keystroke dynamics, face, hand geometry and iris recognition.

- **Class Research Project**

  The class project is set up as an applied research opportunity that allows the students to work with an industry partner to implement a biometric technology. WebCT was also used as a tool for communication between students, instructors and industry partners.

Project Teams

A strong emphasis is put upon teams and project teams at Purdue University. It was this ideology and the size of this project required the use of project teams. The class was broken into four functional teams with a head project manager. The project required an implementation, administration, networking and project management team.
Team leaders were to function as a point of contact between the team and management; team liaisons worked to facilitate any communication between other teams. This structure was designed to allow information to be passed as quickly and effectively as possible. Figure 1 shows the management structure for the project.

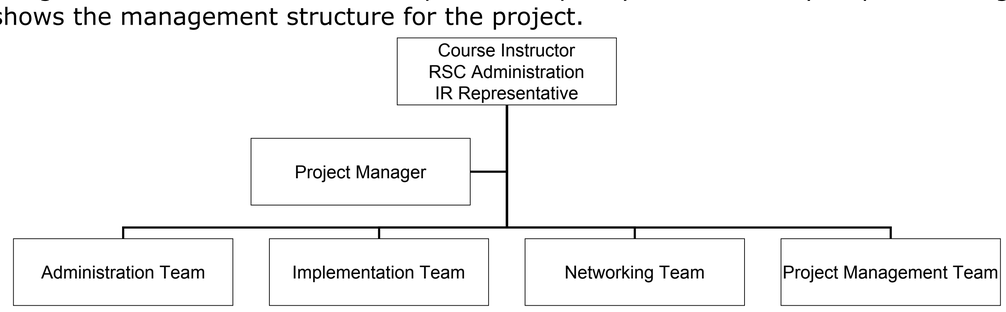

Figure 1. Project Management Structure

Site Visit/Overview

The RSC is a multi-use exercise facility open to students, staff and registered guests. It has a front door magnetic stripe entry point monitored by an attendant that is activated with a University identification card and. The rear door access is also a magnetic stripe access point but is monitored by the front door attendant by video. The center has an average throughput of about 5,000 users per day, many of which enter the facility illegally. It is the desire of the RSC to limit the number of illegal users and limit the liability associated with such users.

The biometric device chosen to be tested was Recognition System's HandKey II with the Hurricane enclosure. This technology was chosen because of its ease of use and reliability. However, any device mounted at the rear access point would be subjected to inclement weather and require protection from the elements. This gave Recognition Systems the opportunity to allow the teams to gather usage data on their Hurricane enclosure. The H Hurricane enclosure protects the device from drastic temperature swings as well as dirt and grime that may otherwise harm the device. Data to be collected will include False Accept Rates (FAR), when an imposter is accepted as a valid user, and False Reject Rates (FRR), when a valid user is incorrectly rejected by the system. This data allows researchers to assess the performance of the device. Figure 2 shows the devices to be used.

Figure 2. IR HandKey II and Hurricane enclosure

Project Team Recommendations

The site visit gave students the opportunity to as a team, inspect the facility and determine how building layout and procedures would affect their portion of the project; it was videotaped and streamed on the course website for future analysis. Following the visit each team was responsible for generating team specific tasks necessary for project completion. It was the task of the project management team to calculate the project's critical path and timeline for completion.

At this point in the project the student's presentation and marketing skills would be tested. The RSC administration was invited to attend a presentation of the teams' biometric solution. Each team, based upon research and data collected regarding their portion of the project, prepared a presentation to give their recommended solutions.

The project management and administration teams generated documentation for the facility and personnel to implement the proposed system. This included training materials and operating procedures. The networking team worked closely with the implementation to recommend system recommendations and the process for implementation. Figure 3 shows the proposed front and rear entryway installations as well as an illustration of the network system necessary to serve the RSC needs.

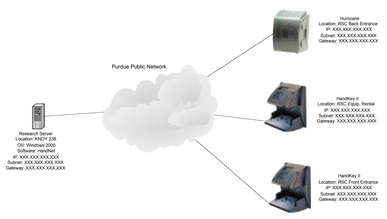

Figure 3. Front and rear RSC installation sites/network configuration

Conclusion

This project has proven beneficial to all parties involved with students benefiting the most. Students will enter the workforce with the ability to plan, test and evaluate a biometric application; skills marketable in any industry, not just biometrics. Through the collaboration with the School of Technology, the Recreational Sports Center was given the services of researchers, providing them with possible solutions to an existing problem. This data, if collected from an independent consulting firm would have been costly, but with the help of eager students they have a future alternative with supporting data to their current system. Ingersoll-Rand/Recognition Systems was not only given an opportunity to gain valuable usage data for their product, but built a partnership with Purdue University and the School of Technology.

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