

# **Ethics Across the Curriculum Final Report**

## **Ethics and Biometrics**

### **Background:**

A biometric is any physical, physiological or behavioral trait that can be used to identify a person. A person's fingerprint, face, and iris are physical traits whereas voice, gait, and handwriting are behavioral traits. In recent decades, large volumes of biometric data have been recorded and stored. These data are used extensively in the field of forensics. More recently, they have been adopted to enhance security as evidenced by the introduction of biometric passports in many European countries and the US-VISIT program for foreigners entering the USA. The course ECE377 Biometric Signal Processing teaches students the fundamentals of the technology used in a number of biometric systems. The ExC grant provided an incentive to introduce a segment into this course which would have the students consider the important ethical and societal issues involved in deploying these systems.

### **Implementation:**

As the course is open to both junior and senior level students who have had varying degrees of exposure to ethics in their coursework, I first introduced the topic of ethics in engineering through the well-known example of the Challenger disaster which is extensively covered in [1].

In the next session, we considered two case studies that were tied to biometric technology. The first case study is an adaptation of a case study detailed in [2] and examined a situation where a company produces defective chips that are used in an iris recognition system. This case study looks at the question of failure rates and some questions an engineer faces with the knowledge that no system is perfect. How much testing should be done? What are the costs? These are particularly important when safety is a concern. The second case study considered the deployment of a facial recognition system at the Superbowl held in Tampa in 2001 [3]. We looked at a number of ethical questions involved in deploying such a system including overt vs. covert systems, data storage and data security, and possible misuse of data.

In the third session, students were assigned to read a background papers on the conflicting goals of security and privacy in implementing a biometric system [3]. Biometrics are used to secure personal data and prevent identity theft and are increasingly used in border control and transportation systems. The benefits of greater security are clear in these applications. However, a biometric identifier is unique and, once this data is obtained by another person, it becomes possible to become the person based on the convincing data in a biometric. Furthermore, people can be tracked through every transaction they make using biometric identifiers. While initially this would be used for security purposes, there is the possibility of using this data for other purposes. The "Big Brother" scenario is that biometrics will become a technology of surveillance and social control. We discussed the two sides of this debate in the context of several deployed systems.

## **Conclusion:**

I am very grateful to the ExC committee and the award of the grant. I would not have thought of including this segment in the course if I had not attended several ExC lunch meetings and would have concentrated solely on the technology. However, the incorporation of these wider issues greatly enhanced the course and students were keen to discuss these issues in class sessions. Several of the senior-level students had already seen some details of the Challenger case so this is something which I will modify in the next offering. Almost immediately after the end of term, the controversy over the use of body scanners at airports erupted with questions asked about the security of the data collected and the safety of these devices. I have gathered several articles about this and intend to include this in the next course offering.

[1] Michael Davis, *Thinking Like an Engineer: Studies in the Ethics of a Profession*, 1998

[2] Texas A&M Engineering Ethics Cases with Numerical Problems, "Allowing Defective Chips to go to Market", <http://ethics.tamu.edu/nsfcases/elen/02/ee02.htm>

[3] John D. Woodward, Nicholas M. Orlans, Peter T. Higgins, *Biometrics*, Chapters 12-15, McGraw-Hill, 2002