

Advanced Biometrics for America's Borders

✦ The Issue

At more than 65 land border crossing sites, the U.S. Department of Homeland Security processes a large number of people entering and exiting the United States via foot and car each day. Homeland security officials are charged with simultaneously facilitating convenient travel for legitimate visitors and identifying and stopping those who wish to do harm or engage in illegal activity.

Ideally, border crossings would be equipped with biometric technologies—which identify individuals by their physical or behavioral characteristics—that could allow officials to identify people crossing the borders without stopping every individual or car. Such a system, however, requires biometric technology beyond what is currently available.

✦ The RENCi Project

RENCi, in collaboration with Cambridge Intelligent Systems (CIS), a Raleigh-based technology company specializing in image analysis technologies, is researching next generation biometric systems that can reliably identify people of interest under challenging, real-world conditions.

During phase one of the project, RENCi and CIS will define the requirements for a land-border-crossing biometric system, evaluate a wide array of existing and near-future biometric technologies against those requirements, and develop an architecture for deploying the best technologies in a robust, reliable biometric system for day-to-day use at border crossings.

The project team is evaluating the many data capture challenges involved in applying biometric technologies in real-world conditions. Based on information about how close video cameras can be placed to subjects and at what angles, the modes by which people cross the border, and environmental factors such as ambient noise and traffic congestion, RENCi and CIS will outline requirements for a field-based biometric identification system. In addition, RENCi and CIS will create a reference biometric architecture and evaluate leading video identification technologies to determine the gap between current capabilities and future needs.

✦ The Expertise

RENCi and CIS have assembled a team of computer scientists and technologists with extensive industry and academic experience in the research, development and application of new analytical and computational approaches aimed at operational requirements. The project involves team members with expertise in intelligent video processing, machine learning algorithms, software engineering, data mining and technology architecture.

✦ The Partners

Cambridge Intelligent Systems
Institute for Homeland Security Solutions
RTI International
Duke University
UNC Chapel Hill
North Carolina Military Foundation

✦ The Impact

The continued possibility of terrorist activities that directly threaten the United States highlights the need for rapid development of new threat identification approaches that can be put into day-to-day practice.

Although there have been significant advances in fingerprint, iris, and face recognition technologies in recent years, currently available systems provide accurate results only under tightly-controlled conditions. To meet the needs of officials at land border crossings for efficient and effective identification systems, new technologies are needed that require neither contact nor consent of subjects and that can accurately identify people from video under a variety of real-world conditions. Such advanced biometric identification technologies would also have applications in other contexts, including airports.

This in-depth analysis of system requirements and available technologies will provide the groundwork needed to ensure the Department of Homeland Security invests in the most promising and robust biometric research and technology to meet its needs.