# Weakly Identifying System for Doorway Monitoring

# Can biometrics identify people passing through doorways ?


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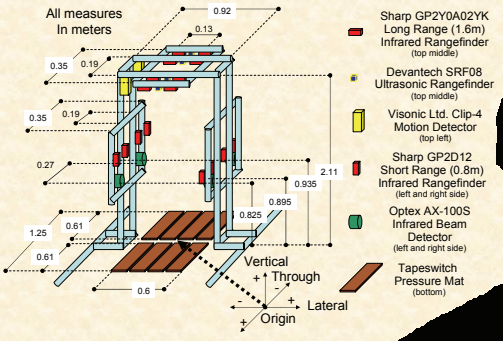


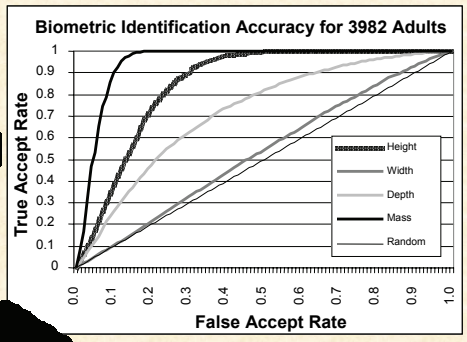



## How are biometrics obtained?

The instrumented doorway above has a variety of sensors and switches for detection and identification. The rangefinders measure the distance from the top and sides of the door. The height biometric is measured by taking the minimum distance measured by the top ultrasonic rangefinder and subtracting it from the height of the door. The width biometric is measured by subtracting the minimum distance from the side infrared rangefinders from the width of the door. The body mass biometric is measured by averaging the ground reaction forces generated during normal walking. The remaining switches and sensors within the doorway serve to detect sensor failures. This combination of sensing media makes evading detection hard to achieve.

## How is this system better than using face recognition, iris scans, or fingerprints?

Each of these methods is obtrusive in some manner. Face recognition requires the use of cameras, which some view as privacy invasive. Iris scans and fingerprints are very accurate, but they make the task of walking through the door more cumbersome by requiring active submission to identification and/or verification. Biometrics such as body mass, height, waist depth and waist width can be measured while a person walks normally through the doorway, without the person carrying any device.

## Would it not be simpler to use RFID tags or some other proximity identification device instead?

RFID tags are great for identification, but how is it possible to ensure that the credentials on the tag are not stolen or duplicated? Matching the known biometrics to those measured within the doorway are effective in detecting false matches. The body mass biometric alone detects 4/5 false matches while achieving almost a zero false rejection rate.

## Which biometrics are the most identifying?

The identification accuracy depends on the accuracy and precision of the measuring method and the distribution of the biometrics within the population. The above graph shows the expected identification accuracy over approximately 3,982 adults in the ANSUR88 anthropometric database of army personnel. The horizontal axis describes the likelihood of accepting someone using a false identity. The vertical axis describes the likelihood of being recognized when claiming one's true identity. The horizontal axis describes the level of desired security and the horizontal axis describes the usability of the system.

**Most to least identifying:**

1. Body Mass
2. Height
3. Waist Depth
4. Waist Width

## What about changing clothes, gaining weight, and wearing different shoes?

All of these changes would indeed change the measures taken within the doorway, but how much really changes over the course of a day? If the enrollment data for the measures are updated daily, then the changes from day to day are largely insignificant. What about changes like carrying backpacks and briefcases, would this not change the measured body mass? Yes, this would reduce the identification accuracy, but the biometrics can also be combined to boost the identification accuracy. Using the body mass and height biometrics together would yield better results than using one measure alone.

## What types of applications would use the Weakly Identifying System for Doorway Monitoring (WISDOM) ?

WISDOM could be used for building surveillance, taking attendance at public schools, clocking in and out at the workplace, and in location aware systems which require either verification of proximity identification devices or deviceless identification.