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Your Physical Access Control Cheat Sheet

Here's a breakdown of some of the pros and cons of the more commonly used physical access control solutions available on the market today.

By Robin Hattersley Gray, William Perkins and Robert Dolph

SOLUTION	STRENGTHS	WEAKNESSES	APPLICATION COMMENTS
KEYS	· Most traditional form of access control · Easy to use · Don't require power for operation	· Impossible to track if they are lost or stolen, which leaves facility vulnerable · Potential for unauthorized sharing of keys · Difficult to audit their use during incident investigations · Difficult to manage on large campuses with multiple doors · Re-coring doors when a key is lost or stolen is expensive	· Several solutions are currently available on the market to manage keys and keep key holders accountable
LOCKS **Maglock**	· Easy installation · Economical · Easy retrofit · Quiet operation	· Power always on (fail-safe) · Typically requires exit device to break circuit · Requires backup power supply for 24-hour service	· DC only · Always check with AHJ before installing · Comes in different "pull" strengths · Check extra features, such as built in door sensor
Electric Strike Photo courtesy Schlage	· Can be either fail-secure or fail-safe · Does not need constant power · Door knob overrides for safe exit	· Door/lock hardware experience needed · Can be complicated when specifying	· Requires more door hardware experience than maglock · Specify for life-safety requirements · Can be both AC and DC (DC lasts longer) · Fail-safe must have power backup · Fail-secure most popular · Choose AC version if you need buzzing sound
CARDS Photo courtesy HID	· Access rights can be denied without the expense of re-coring a door and issuing a new key · Can limit access to a building to certain times of the day · Systems can provide audit trails for incident investigations	· Prone to piggybacking/tailgating (when more than one individual enters a secure area using one access card or an unauthorized person follows an authorized person into a secure area · Users can share cards with unauthorized persons · Cards can be stolen and used by unauthorized individuals · Systems are more expensive to install than traditional locks · Require power to operate	· Can incorporate a photo ID component · Can be used for both physical and logical access control · Card readers should have battery backup in the event of power failure · Tailgate detection products, video surveillance and security officers can address tailgating issues · Can integrate with video surveillance, intercoms and intrusion detection systems for enhanced security
Magnetic Stripe (magstripe)	· Inexpensive to issue or replace	· Not as secure as proximity cards or smart cards · Can be duplicated with relative ease · Subject to wear and tear	· These are the most commonly used access control cards by US campuses
Proximity	· Durable · Convenient · More difficult to compromise than magstripe cards · Less wear and tear issues	· Cost more than magstripe cards · Easier to compromise than smart cards	· Are widely used for access control (although not as widely as magstripe)
Smart Card	· Multiple application functionality (access, cashless vending, library cards, events) · Enhanced security through encryption and mutual authentication · Less wear and tear issues	· Currently the most expensive card access option on the market	· Not as widely adopted as magstripe or proximity cards due to cost · Widely adopted in Europe · Can incorporate biometrics
PINS (passcodes)	· Easy to issue and change · Inexpensive	· Can be forgotten · Difficult to manage when there are many passwords for different systems · Can be given to unauthorized users · Prone to tailgating/piggybacking	· Should be changed frequently to ensure security · Often used in conjunction with other access control solutions, such as cards or biometrics
DOOR ALARMS	· Provide door intrusion, door forced and propped door detection · Reduce false alarms caused by unintentional door propping · Encourage staff and students to maintain access control procedures	· Will not reach hearing impaired without modifications · Will not detect tailgaters · Door bounce can cause false alarms	· Appropriate for any monitored door application, such as emergency exits and resident halls · Used in conjunction with other access control solutions, such as card readers or keys · Can be integrated with video surveillance for enhanced security

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TAILGATE/ PIGGYBACK DETECTORS	· Monitor the entry point into secure areas · Detect tailgate violations (allow only one person to enter) · Detect when a door is propped · Mount on the door frame · Easy to install	· Not intended for large utility cart and equipment passage (which could cause the system to go into false alarm) · Not for outdoor use	· Appropriate for any monitored door application where a higher degree of security is needed, such as data centers, research laboratories, etc · Used in conjunction with other access control solutions, such as card readers · Can be integrated with video surveillance for enhanced security
PUSHBUTTON CONTROLS Photo courtesy DSi	· Many button options available · Normally-open/Normally-closed momentary contacts provide fail-safe manual override · Time delay may be field adjusted for 1-60 seconds	· Anyone can press the release button (unless using a keyed button), so button must be positioned in a secure location (for access control, not for life-safety) · Some can be defeated easily · Can open door to stranger when approaching from inside	· Used to release door and shunt alarm · Used for emergency exits when configured to fail-safe · May be used in conjunction with request to exit (REX) for door alarms and life-safety · Required by many AHJs · Still may require mechanical device exit button to meet life-safety code and/or AHJ · With REX, careful positioning and selection required
MULTI-ZONE ANNUNCIATORS Photo courtesy DSi	· Display the status of doors and/or windows throughout a monitored facility · Alert security when a door intrusion occurs · Many options available: zone shunt, zone relay and zone supervision	· 12 VDC only special order 24 VDC option · Door bounce can cause false alarms · Requires battery backup in case of power failure	· Designed to monitor multiple doors from a single location · May be used in conjunction with door alarms, tailgate detection systems and optical turnstiles · No annunciation at the door; only at the monitoring station
FULL HEIGHT TURNSTILES	· Provides a physical barrier at the entry location · Easy assembly · Easy maintenance · Available in aluminum and galvanized steel	· Physical design ensures to a reasonable degree that only one authorized person will enter, but it will not detect tailgaters	· Designed for indoor/outdoor applications · Used in parking lots, football fields and along fence lines · Use with a conventional access control device like a card reader
OPTICAL TURNSTILES Photo courtesy DSi	· Appropriate for areas with a lot of pedestrian traffic · Detects tailgating · Aesthetically pleasing and can be integrated into architectural designs · Doesn't require separate emergency exit · Provides good visual and audible cues to users	· Can be climbed over · Not for outdoor use	· Used in building lobby and elevator corridor applications · Use with a conventional access control device like a card reader · To ensure compliance, deploy security officers and video surveillance
BARRIER ARM TURNSTILES (Glass gate or metal arms) Photo courtesy DSi	· Appropriate for areas with a lot of pedestrian traffic · Provides a visual and psychological barrier while communicating to pedestrians that authorization is required to gain access · Detects tailgating · Reliable	· Units with metal-type arms can be climbed over or under · Not for outdoor use · Most expensive of the turnstile options · Requires battery backup in case of power failure	· Used in building lobby and elevator corridor applications · Use with a conventional access control device like a card reader · To ensure compliance, deploy security officers and video surveillance · Battery backup is recommended
BIOMETRICS Photo courtesy Schlage	· Difficult to replicate identity because they rely on unique physical attributes of a person (fingerprint, hand, face or retina) · Users can't forget, lose or have stolen their biometric codes · Reduces need for password and card management	· Generally much more expensive than locks or card access solutions · If biometric data is compromised, the issue is very difficult to address	· Except for hand geometry, facial and finger solutions, biometric technology is often appropriate for high-risk areas requiring enhanced security · Can be used for computer access control (finger)
INTERCOMS Photo courtesy Aiphone	· Allow campus personnel to communicate with and identify visitors before allowing them to enter a facility · Can be used for emergency and non-emergency communications	· Will not reach hearing impaired without modifications · Not appropriate for entrances requiring throughput of many people in a small amount of time	· Appropriate for visitor management at residence halls, K-12 campuses, after-hours visits, loading docks, stairwells, parking ticket stanchions · Use with conventional access control solutions, such as keys or access cards · Video surveillance solutions can provide visual verification of a visitor

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PROTECTING OUR MOST VALUABLE ASSETS: OUR STUDENTS

Bi-directional barrier arm turnstiles installed at the University of Pennsylvania's high-rise dormitories provide improved access control while increasing pedestrian throughput.

By Carl Clopton

Campus at a Glance

The University of Pennsylvania is a historic, Ivy League school situated near the heart of Philadelphia. Founded in 1740, Benjamin Franklin and U. of Penn's first trustees purchased its first campus in 1750. More than 24,000 students currently attend the university, and more than 4,000 faculty and 2,000 staff are employed there.

Who is entering our residence hall? Are they authorized? Could they be a threat? How do I maximize throughput during peak times AND improve security? Every campus security executive must be able to answer these questions. Additionally, students and parents need the peace of mind that only comes when every person entering the dorms can be identified and screened.

Typically, this would be a slow, tedious and expensive process employing a large guard force to verify the identities of all who enter. Alternatively, card access systems can be utilized; however, tailgating or piggybacking can be a problem as students invariably allow unauthorized friends to enter, not to mention a potential criminal who patiently awaits an opportunity to slip through a closing door.

Prior to its dorm security upgrades, the University of Pennsylvania (U of Penn) used mechanical turnstiles with one lane in/one lane out and a security officer posted at each entrance. The entry process required a student approach the officer and present an ID card. The guard would then match the photo to the face, swipe the card through a card reader, and allow the person entry.

With this system, a tremendous amount of traffic lined up at the doors of the four 25-story, high-rise dormitories as students gathered for security screenings. The challenge was to eliminate large queues of students standing outside the dorms for 20 minutes or more (sometimes in inclement weather), yet increase security.

AESTHETICS, THROUGHPUT AND SECURITY IMPACT DECISION

Security Services & Technologies (SST) began working with U of Penn in 2000, and as Area Manager Remo Patitucci describes it, "We started looking into optical turnstiles with barrier arms three years ago. We had a few manufacturers bring their products to U of Penn and set them up for beta testing. We put them through the ringer."

U of Penn ultimately chose the DSI ES831 series to protect the entrances of nine of its 13 dormitories. Several factors contributed to this decision, including the turnstile's aesthetic appeal, its fast action barrier arm that allowed the quickest throughput, and the fact that it was the most secure from a sensor standpoint. "Our comparisons proved the optical array on the ES831 alarms quicker than its competition," says Patitucci. The other systems required a person to be further into the lane before an alarm was generated.

"Since we have set the lanes up in the ingress path, rather than in a path of egress, we can have a locking barrier arm and still meet all fire/life safety codes," Patitucci explains. This means that when an unauthorized person enters the unsecured side of the lane, the alarm sensor detects the person. An audible alarm sounds, and the barrier arm locks into place so the individual cannot force his or her way through the lane. A security officer then directs the person out of the lane, resets the lane and then guides the person through the proper procedure. The flow of traffic continues with minimal interruption.

"The three lanes into each of our high-rise building dorm entrances will process a few thousand students several times a day. On the weekends we have a massive rush on the dorms around 2:30 a.m. as the nightclubs close!" Patitucci explains.

These high-security turnstiles use

U. of of Penn installed DSI ES831 turnstiles in nine of its high-rise dormitories. Now, when an unauthorized individual enters the unsecured side of the lane, the turnstile's alarm sensor detects the person. An audible alarm sounds, and the barrier arm is locked into place so the person cannot force his or her way through the lane. A security officer then directs the student or visitor out of the lane.

Turnstile Layout and Operation:

When a person approaches the turnstile, a red LED light reads "STOP." The card reader also has an LED screen that reads "STOP." Once a person swipes his or her card, a green flashing arrow appears in the direction of the lane indicating that the invidual is allowed to enter.

There are two sensor arrays at the front of the turnstile that detect a person as they enter the lane. There is also a crawl sensor array just a few inches off the ground in the middle of the turnstile. If someone was to crawl under the first set of sensor arrays, he or she would be picked up by the crawl sensor array. There are a total of five sensor arrays throughout the lane, and they must all be tripped in a sequential order to avoid an alarm condition.

Highlights of the DSI ES831 for Dormitory Security:

1. **At least double the security level of any dorm access control solutions.** Some individuals will try anything to circumvent a security system to get unauthorized people into the dorms. The DSI product virtually eliminates this problem.
2. **Dramatically increase throughput.** During peak times, a university can have large numbers of students gathering while trying to get through a security checkpoint. Long delays can lead to safety incidents. DSI turnstiles make this a non-issue.

card readers and keypads to allow for a dual-technology entry system. The first step is to swipe the access card. Then a unique, four-digit code is entered. The card reader/keypad is tied into the university's access control system. In addition, two CCTV cameras with opposing views are aimed at each lane, and all video is recorded 24/7. In the event of an alarm, the associated camera frame rate increases.

OPTICAL TURNSTILES HAD TO BE DURABLE, CUSTOMIZABLE

"We presented U of Penn with several finish options, and they selected a solid stainless steel finish," says Patitucci. "Students use these large tubs during move in, and the turnstiles take some pretty good hits. So far we haven't had to replace any of the DSI turnstile stainless steel panels," he explains. "On the rare occasion we have had a service issue; DSI has promptly sent someone to take care of it.

"DSI gave us the most flexibility on the size of the turnstiles. Some of the other manufacturers' turnstiles are much longer and wider, and physically would not fit in the building lobbies. Also, some manufacturers would only customize the color of the Corian® top; but DSI gave us the options to customize the entire turnstile," says Patitucci.

Bill Campbell of Access Management Solutions, a manufacturer's rep for DSI, says "The ability of DSI to customize based on the specific needs of the customer make them really stand apart from their competition."

There were a couple of custom modifications U of Penn requested for added security and to increase the area of detection: If you don't have a valid card read prior to entry within six inches to a foot into the lane, the first array is activated and the lane will alarm immediately.

In addition, the locking arm was a custom modification for U of Penn. The arm is normally extended, but unlocked, and retracts only on a valid card read. Interestingly, while the arm is normally extended, the locking mechanism remains disengaged unless the first array picks up an unauthorized entry. If you hit the array without a valid card read, this fires the solenoid into the locking mechanism. You can easily push the arm open on loss of power or a fire alarm condition.

SECURITY IMPROVEMENTS LEAD TO CLERY RECOGNITION

U of Penn has always been on the forefront of security. Many other universities visit U of Penn to see its dorm security. As as result, SST was recently awarded a project for John Hopkins University. Additionally, U of Penn was given the prestigious Jeanne Clery Campus Safety Award for its security upgrades.

"We have a lot of parents to answer to, and installing the DSI turnstiles has been the most secure method we have found to keep students safe and security incidents to a minimum," says Patitucci. "Safety is the first and foremost goal for campus security. Dedicated to ensuring the safety of students, DSI is willing and ready to partner with college security programs for a customized solution to fit your needs."

CARL CLOPTON is an independent security consultant with 18 years of experience in the campus safety industry.