



LEVERAGING THE INTERNET OF THINGS FOR A SMARTER, SAFER CAMPUS

Campuses are becoming connected — leveraging a combination of big data and analytics and Internet of Things (IoT) technologies like sensors. These campuses are reaping the benefits, including better learning outcomes, stronger retention rates and more informed decision-making to improve the student and employee experience.

Beyond these benefits, IoT can make a significant impact in another important area: campus safety and security. Take the example of a commuter student during her first week of evening classes. A sensor-enabled parking service could steer her to a space close to her academic building; a mobile mapping app with location intelligence could point her to her classroom; smart lighting could

keep her path well-lit; and ID-card access control could vet her credentials to let her enter the building. If at any point in that journey trouble arose, the student could use a first responder alert system with geolocation assistance — a personal “blue light” to get help fast.

Fulfilling the potential of that scenario, however, means higher education institutions must address numerous digital transformation challenges, such as data privacy concerns and inadequate networking infrastructure. In this paper, we further define the connected campus and share ways leaders can overcome common challenges and leverage the IoT to keep their campuses safe, while improving the overall student, staff and faculty experience.



DEFINING THE CONNECTED CAMPUS

The term “connected campus” describes environments where various forms of IT — devices and applications — are integrated to enable more informed decision-making. Colleges and universities throughout the country are at various stages of the journey toward a connected campus.

A recent Center for Digital Education (CDE) survey of 138 higher education officials found nearly half (48 percent) of respondents would consider their campuses connected. When asked about the smart technologies they use, 59 percent said they have intelligent classrooms; 56 percent said they have collaborative learning spaces; and 55 percent use digital signage.

Respondents agreed that connected campuses have a positive impact on the student and faculty experience. Potential for cost savings (48%), higher student retention (43%) and improved student learning outcomes (38%) were the top drivers for adopting smart technologies, but respondents also labeled enhanced campus safety as an important benefit. In fact, respondents to the CDE survey identified campus security as their No.1 area in need of investment over the next year.

SAFETY AND SECURITY USE CASES FOR THE CONNECTED CAMPUS

By leveraging IoT technologies, the connected campus can boost security in numerous ways.

Asset protection. Universities invest millions in specialized equipment, but keeping track of assets can be difficult. By placing beacons on high-value resources, security staff can track the location of assets.

Facility access control. Smart locks allow the facilities department to control who has access to specific buildings on campus and when that access is allowed. When integrated with other technologies such as smart ID cards and video surveillance, security staff can monitor who’s coming and going in real time. Geofencing enables the campus to demarcate areas where motion will alert security personnel to intruders and trigger video recording to capture potentially suspicious activities.

Interactive signage and kiosks. During an emergency, networked displays can communicate pertinent information. Behind the scenes, applications can feed alerts to the right displays, based on location. A byproduct of this technology is that it has become a conduit for community awareness and participation. While touchscreen displays can help

with general wayfinding, adding facial recognition allows smart displays to personalize the experience by welcoming new students by name and giving them appropriate directions.

Location intelligence and wayfinding tools. Smart pathfinding can help students lay out the best route to their classes via their smartphone. If a student is wary of walking by herself, particularly at night, she could set an alert that connects with a trusted contact as well as campus police. If she doesn’t arrive by the scheduled time or turn the alert off, those connections will be signaled, fed her photo and personal details, and supplied with her smartphone’s current geolocation for immediate follow up.

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Connected Campus in Action

According to EDUCAUSE, before George Mason University upgraded its digital signage — to enhance its emergency messaging, highlight important campus issues and events, and increase student engagement — its displays ran about 30 static images a month. Now the institution curates more than 3,000 social posts, videos and flyers monthly. Student-developed content, such as Snapchat or Twitter feeds, has particular appeal, turning subjects into broadcast celebrities for the short time their posts appear. Smartphone interaction lets viewers respond to polls, text for information or sign up for events.¹

Parking, transportation and street crossing management.

Parking sensors direct drivers to available spaces. Because drivers are less distracted when parking, the risk of accidents declines for both pedestrians and vehicles. Collision warning systems also prevent accidents by helping shuttle drivers augment the monitoring of blind spots. And crosswalks can feature embedded LEDs that change colors and light up depending on the situation. If a pedestrian is paying more attention to the screen in his hand than the car on the road and steps into the crossing, red lights can flash to signal the danger to both parties.

Push alerts and notifications. Multi-modal alerts that go out to the entire community during an emergency are fairly common, but new applications can locate, target and contact individuals specifically in the path of harm or signal their presence in an emergency evacuation. Similarly, people with



Connected Campus in Action

At Colorado State University, parking planners have found that the smart guidance system they've installed — in which each parking space has its own sensor — has minimized how long drivers spend looking for spaces, reports College Planning and Management. This decreases how much fuel is used and lowers the amount of vehicle exhaust emitted into the structure. The sensors collect useful data about timing and length of stay, which will help inform parking policies and capital construction planning.²

health conditions can use wearables to help first responders pinpoint their location during medical emergencies.

Smart lighting. Smart nodes can set appropriate levels of lighting and detect occupancy to deliver lighting only where people are present. When bulbs are about to fail, smart lights can send an alert to maintenance for quick replacement.

Video surveillance with large-scale camera analysis. While traditional closed-circuit cameras require cabled connections and proximity to power, the connected campus can deploy tiny, smart IP video cameras almost anywhere, with the video image itself streaming over Wi-Fi for remote access by public safety staff. Video analytics can use facial recognition to identify individuals who aren't part of the official campus community or tally the number of people passing by sensors over designated time intervals.

LAYING THE FOUNDATION OF YOUR CONNECTED CAMPUS

Higher education institutions can't realize these safety and security enhancements without first laying the proper foundation for a successful connected campus. Doing so will require heading off challenges involving people, processes and programs.

Making the case for investment and finding the funding. In the CDE survey, nearly one-third of respondents (31 percent) said there were opportunities to implement IoT technologies on their campuses, but it was difficult to prioritize funding. Showing how your efforts will improve student safety and security can go a long way in proving their practical use. In some cases, these projects can fund themselves. Smart parking can help you fine-tune your parking permit fee structure; relevant advertising can help cover the cost of digital signage installation; and reduced energy costs can pay back investment in smart lighting. In addition, some providers offer program management services that can help

scope, budget and plan your IoT initiatives to help you obtain buy-in from decision-makers.

Implementing ample bandwidth and a robust network infrastructure. Only a quarter of respondents (23 percent) to the CDE survey said their current infrastructure was ready to support emerging connected campus technologies for the next five years. To address this, 39 percent of campuses expect to improve bandwidth in tandem with their connected campus projects, and 36 percent expect to modify their networks. Working with a network and technology vendor with experience in the higher education space can help bridge infrastructure gaps.

Gaining stakeholder buy-in. It's important to communicate connected campus plans to all stakeholders to build support. It makes sense to start with the people you would work most closely with on IoT initiatives, including leaders in facilities, physical and cybersecurity, and information technology. From there you need to build support among the campus community — the people who will be both activating the data collection and benefiting from it: students, staff and faculty. An IoT partner with program management services can help lead communication and awareness efforts to ensure the various teams give input into the project and have a shared vision for the project outcomes.

Only 23% of CDE survey respondents said their current infrastructure is ready to support emerging connected campus technologies for the next five years.

Connected Campus in Action

A major university is running a pilot that combines smart lighting with video cameras along a major student housing thoroughfare with the goals of understanding the overall solution capabilities, challenges and technical viability. CenturyLink is the solution integrator on the project, overseeing installation and integration with the university's existing LAN/WLAN infrastructure. In the next phase, project deployment will expand the safety and security solution to other parts of the campus.

Overcoming privacy concerns. The community needs transparency. They need to understand what's at stake, how data will be collected, what safeguards are in place and how it will be used to benefit them. The gathering of student, faculty and visitor information comes with a certain amount of responsibility. Your IoT partner should be able to guide you through standard industry

data privacy regulations, along with clear opt-in/out options that protect your students as well as the university.

Choosing the right partner. For many institutions, it is difficult to find in-house expertise to manage connected campus initiatives. Partnering with a vendor that understands higher education's unique needs; has ample experience with technology integration, networking and communications; and has already been involved in smart IoT projects can help fill this need.

Making campus technologies smarter. By analyzing the data generated from your programs and solutions, you can monitor the impact of your connected campus projects, measure the results and tweak operations for continuous improvement. Partnering with an organization with data science consulting expertise can help you identify and prioritize use cases, and decipher your collected data for easier visualization and decision-making based on factual data points.

CONCLUSION

Fifty-six percent of the CDE survey respondents said the top reason their institutions are pursuing connected campus plans

56% of CDE survey respondents said the top reason their institutions are pursuing connected campus plans is to address safety and security issues.



is to address safety and security issues. There's a reason for this. Families are often sending their children away from home and on their own for the first time. Non-traditional students are trying to find their way around in a new setting. Staff are called on to work schedules outside of ordinary business hours to accommodate changes in programming. Campuses have become centers of activity at night and on weekends. Until recently, safety and security at institutions called for good lighting, regular patrols and 24-hour coverage of the dispatch desk. That's no longer enough. A successful connected campus environment, utilizing IoT technologies, can significantly boost safety and security. Along the way, it will also improve campus operations and the overall experience for students, teachers and faculty.

This piece was developed and written by the Center for Digital Education Content Studio, with information and input from CenturyLink.

ENDNOTES

1. <https://er.educause.edu/articles/2017/8/digital-engagement-for-campus-communication>
2. <https://webcpm.com/articles/2016/04/01/parking-program.aspx>

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