

What's the Maker of Post-it Notes Doing in the Ankle Monitor Business? Struggling

Technology glitches are putting people in jail and driving law enforcement crazy.



Photographer: Hannah Whitaker for Bloomberg Businessweek

by **Lauren Etter**

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From

The law enforcement community in Massachusetts had a deal. In 2012 the state entered into a contract with the leading manufacturer of electronic ankle monitors, the small GPS devices strapped over the socks of parolees and people awaiting trial to make sure they didn't skip town or otherwise show up in places they weren't supposed to.

There were problems from the beginning, according to corrections officials, offenders, and attorneys. For example, the battery on the bracelets was prone to dying suddenly and without warning. The internal antenna didn't always perform well underneath certain clothing or in certain buildings. The devices sometimes relayed inaccurate navigational coordinates, leaving offenders in technical violation of the conditions of their release. Some offenders found themselves having to walk outside in the middle of the night or stand in the middle of a street to establish a satellite connection and prove to authorities that they were where they were supposed to be. A July 2015 article in *Massachusetts Lawyers Weekly* recounted a criminal defense attorney's tale of his client's device showing that he had walked across a lake.

What's unusual about this chapter in Massachusetts law enforcement history is not the heavy reliance on ankle monitors, which are in wide use around the world, or even that there were some glitches in the technology. What's especially notable is that the devices themselves were made by 3M Co. Yes, that 3M. The Post-it Notes and Scotch tape company, a Fortune 100 mainstay with a market value of \$115 billion, is also one of the world's largest makers of GPS ankle monitors, a field it entered in 2010.

Corrections agencies around the world are desperate for cost-effective alternatives to overcrowded prisons, which is why 125,000 people are being monitored with ankle devices in the U.S. alone. Peru is considering putting ankle bracelets on more than 20,000 inmates. In Norway, the Ministry of Justice and Public Security is examining the use of ankle monitors for asylum seekers. Germany recently passed legislation allowing them to be used to track *Gefährder*, or potential terrorists.

A Brief History of Offender Tracking



Robert Gable's belt-mounted transceiver, capable of sending and receiving tactile signals.
Source: Robert S. Gable

3M's operations and sales in 200 countries have allowed it to draw on deep networks to win government contracts and move quickly into the top ranks of the \$6 billion offender-monitoring business, as it's called. But there's evidence that the company's reach has at times exceeded its technical capabilities, with sometimes disastrous results. Parolees and people awaiting trial have been sent to jail because of false violation alerts generated by 3M monitors; equally troubling, authorities are sometimes so overwhelmed by alerts that they can't tell who's in violation and who isn't. You don't have to be a coddler of criminals to understand that this is a problem.

3M says it's finally gotten a handle on it, but the struggle to master this business has left the company bruised. The company says it can't comment on specific cases in which wearers claim their bracelets falsely placed them in violation. In a written statement, it adds, "while many offenders violating the terms of their probation claim innocence, their guilt, along with the effectiveness of the system, has been proven in various violation of parole hearings almost every day."

"We have a great business and a wonderful technology," says Raymond Eby, public security business director at 3M's Traffic Safety & Security Division, which oversees the electronic monitoring division. "But it's complicated—it's probably the most complicated thing that 3M does, to be honest with you."

And also the thing with the highest human stakes. It's one thing to turn out simple but ingenious solutions for consumers and businesses. People love you for that. It's quite another to be at the center of matters of public safety and civil liberties. When people go to jail with your product bound to their bodies, you attract an entirely different kind of attention.

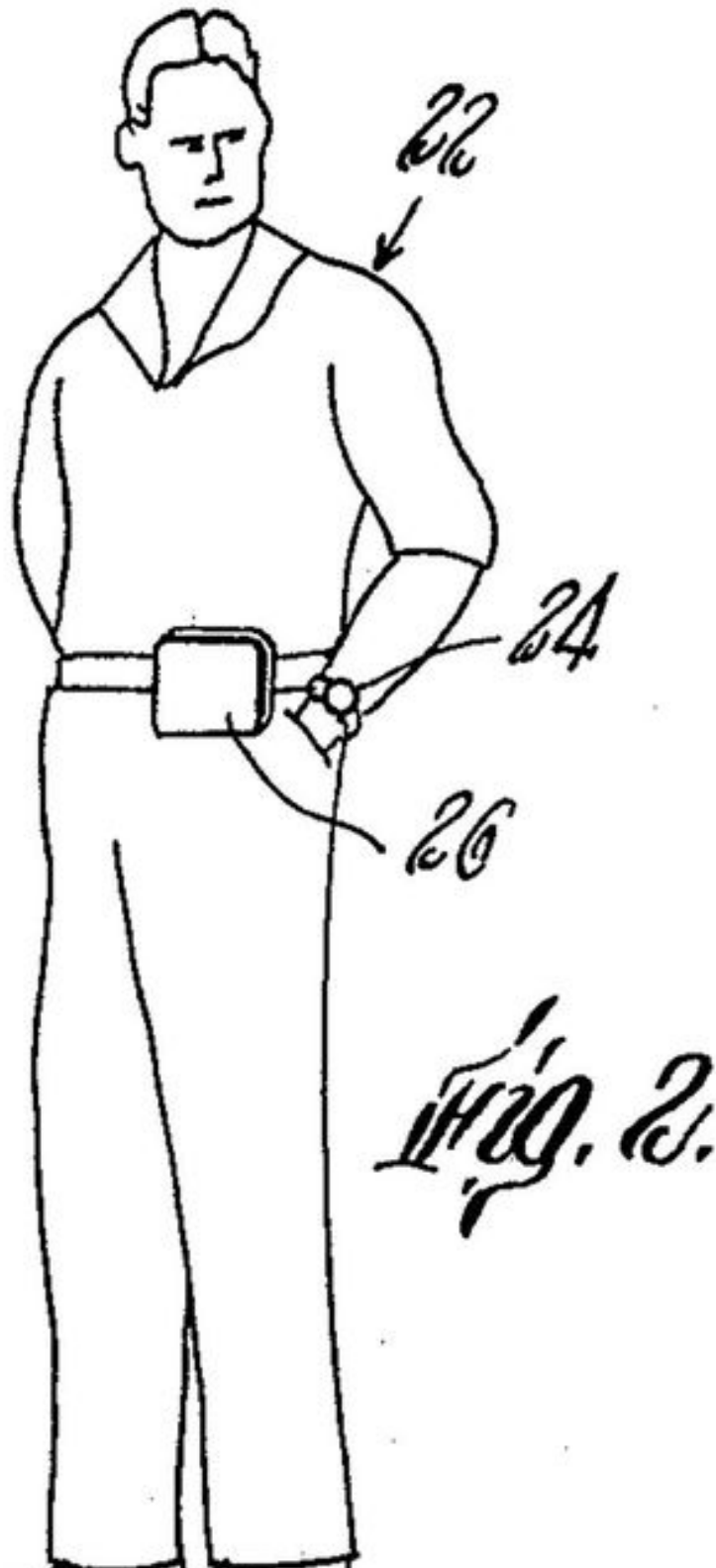
“There was no Orwellian fantasy here. This was a market ... that we thought we could add innovation to”

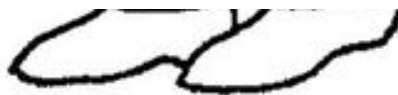
Long before 3M employee Arthur Fry delivered to the world the sticky note in 1980, 3M had endured several near-ruinous mistakes. In the early 1900s the founders almost bankrupted the company by mistakenly digging up anorthosite, for which they had no use, instead of corundum, a tough-as-diamonds mineral they planned to sell for grinding wheels. Then the

company imported 200 tons of Spanish garnet to manufacture sandpaper, but discovered the rock had been rendered useless after a load of olive oil spilled on it during an ocean crossing. Eventually a factory superintendent discovered that the oil could be roasted off, salvaging the shipment and redeeming the company.

Even Fry's sticky note materialized only after a colleague was unable to find a purpose for a not-so-sticky adhesive. Fry, the oft-told story goes, was looking for a way to keep slips of paper from falling out of his hymnal at church. It turned out the adhesive was the perfect solution, and Post-it Notes were born.

1969





Ralph Schwitzgebel is awarded patent No. 3,478,344 – a “Behavioral Supervision System with Wrist Carried Transceiver.”
Source: U. S. Patent Office

This quality of renewal and a proud embrace of failure became central to 3M’s identity. Encouraging tinkerers and dreamers became so ingrained in the 3M culture that in 1948 the company introduced its “15 percent program,” in which employees are encouraged to use company time to pursue risky ideas. The concept is now widely used in corporate America—think Google Inc.’s “20 percent time.”

All of this has made 3M an archetype of innovation, featured in Harvard Business School case studies and lauded by management gurus. So when George Buckley, an engineering Ph.D. and former head of boats-and-billiards maker Brunswick Corp., took over as 3M’s chief executive officer in December 2005, he was dismayed to learn that the company he called “an engineer’s heaven” was floundering. 3M’s New Product Vitality Index, an internal measure that tracks the share of sales that come from products introduced in the previous five years, was at about 20 percent, down from about 30 percent in the 1980s, Buckley recalls.

Five months after taking the job, Buckley stood before analysts at the Waldorf Astoria in New York City. He vowed to breathe “3M imagination” back into the company and boost R&D spending. And, saying that no company can ever be the sole fount of ideas, he promised to make complementary acquisitions, a tool he’d used to turn around Brunswick.

He also identified a set of new “emerging business opportunities” that aligned with what 3M called “the mega trends of society,” including energy extraction, pollution control, and food safety. Early on as CEO, Buckley identified as uniquely promising a trend he called “track and trace.” It already had deep roots at 3M. In the 1970s the company introduced its magnetized “Tattle-Tape” strips, which were tucked inside the spines of library books to prevent theft. In the early 2000s, 3M developed radio-frequency identification tags, or RFIDs, to track file folders, buried utility lines, and other assets. It had also toyed with fleet-tracking software, installing it in the cars of some company salespeople. Buckley believed so strongly in the future of tracking and tracing the world’s things that he preached to investors gathered at the Waldorf: “It is my belief that within 10 years, every single thing of value on the surface of the Earth is going to be tracked and traced, including you, your dog, your children, your car, and anything that you own which is of value.”

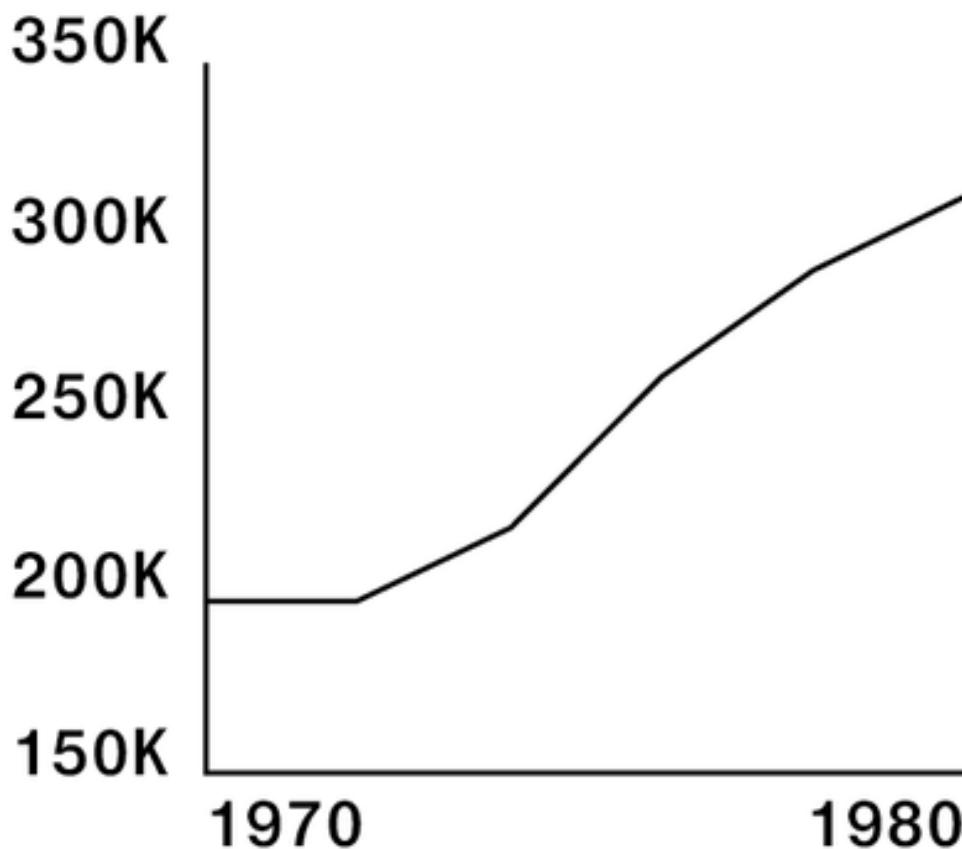
Almost three years later, 3M was staggering through the recession—fourth-quarter profits fell almost 40 percent in 2008, and the company laid off 4,000 employees. Buckley turned to the *Markets of the Future* reports prepared annually by the company’s strategic planning group. Ideas generated for the report have included a smart device for dispensing pills, reflective bicycle tires, reusable plastic Post-its, and “anti-fatigue shoes,” according to an internal 3M presentation. In one of the reports, Buckley noted a trend: “We concluded that security is unlikely to get better, so border crossings, tracking of criminals—you can make rough estimates of where markets are going,” he says.

1970s





Nixon announces the war on drugs.
Source: The Richard Nixon Presidential Library and Museum



Prison populations begin a long rise.
Data: Bureau of Justice Statistics

1980s

Jack Love, a New Mexico judge, markets a radio-frequency tracking device inspired by a *Spider-Man* comic.

Offender monitoring had come of age by then. In 2010 authorities in the U.S. were electronically monitoring almost twice as many accused and convicted offenders as they had just five years earlier, according to the Pew Charitable Trusts. Some were being monitored by RFID devices, but more were wearing GPS monitors, which typically comprise an ankle-affixed device with a built-in wireless modem programmed to record and store an offender's location points at selected intervals. The modem wirelessly transmits the information to a data center—essentially by placing a wireless phone call—where it's downloaded and analyzed by corrections officers or contractors.

More and more states began passing laws allowing for judges to release pretrial detainees or parolees if they wore a monitoring device. The Department of Homeland Security began electronically monitoring immigrants to ensure they would show up for court hearings. Some people, mainly sex offenders, were sentenced to wear an ankle monitor for the rest of their lives. Groups along the political spectrum, from the American Civil Liberties Union to the Heritage Foundation, embraced the use of ankle monitors. Advocates argued that the devices gave defendants freedom to work and raise their families while under court supervision; they would also reduce the more than \$50 billion in annual costs associated with mass incarceration.

Inside 3M, executives grappled with whether tracking people was ethical and whether it conflicted with the wholesome brand 3M had cultivated for a century. They decided the technology ultimately made society safer and fit nicely within the company's track-and-trace and security businesses.

“There was no Orwellian fantasy here,” says Buckley, who stepped down as 3M’s CEO in 2012 after reaching the mandatory retirement age of 65. “This was a market that was growing, that was attractive, and that we thought we could add innovation to. This is a typical 3M approach, and it is what 3M is very, very good at.”

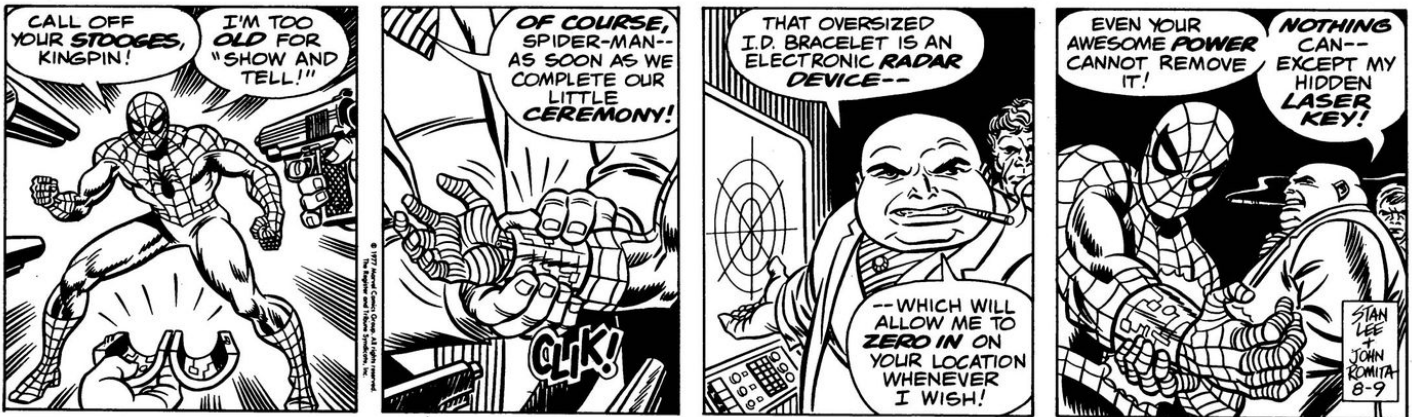
In August 2010, 3M announced the \$230 million acquisition of Tel Aviv-based [Attenti Holdings SA](#). Founded by three former Israeli Air Force pilots, the company was one of the world’s largest manufacturers of GPS trackers; its devices were used in Israel, the U.S., and several other countries, including Australia, Singapore, and Sweden. “This acquisition will position our track-and-trace business as a leader in the high growth electronic offender monitoring market,” 3M said in a news release announcing the deal.

On an investor call two months later, a stock analyst questioned Buckley on how exactly Attenti fit into the DNA of 3M, saying the newly acquired company seemed far from the material science-related companies that have been “the core strength and bailiwick of 3M.” Buckley reminded the analyst of his track-and-trace philosophy. “You might remember that we got that library equipment business that tracks library books,” he said. “This is kind of in a way a lateral extension of that—instead of tracking a book, you’re tracking a person. So they’re not that different as you might think.”

Except they were.

the AMAZING SPIDER-MAN®

By Stan Lee and John Romita



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In 2011 the California Department of Corrections and Rehabilitation began conducting a series of field tests on 3M’s devices as part of a search for a single contractor to electronically monitor 8,000 parolees. Even though 3M came in as the lowest bidder, at \$23.2 million, corrections officials notified the company that it lost the bid “due to its GPS equipment failing” to meet state requirements, according to court records. Among other things, the state found that the device too often failed to obtain a GPS signal, was unable to map offender locations accurately, frequently ran out of battery power, and was easily manipulated by wrapping the device in foil. 3M sued, saying the awarding of the contract to Houston-based Satellite Tracking of People LLC, known as STOP, was illegal. After more than two years of litigation, the parties reached a settlement. The terms haven’t been disclosed.

In 2014, 3M won a contract in New Zealand worth a reported \$80 million. Within a year dozens of offenders had been able to cut off the devices, including some who went on to commit serious crimes. After 3M replaced the straps with supposedly stronger ones, a man cut through a new strap with scissors on a TV news broadcast. New Zealand’s prime minister called the situation “ludicrous.” 3M says the company’s bracelets are designed to be cut off in emergencies.

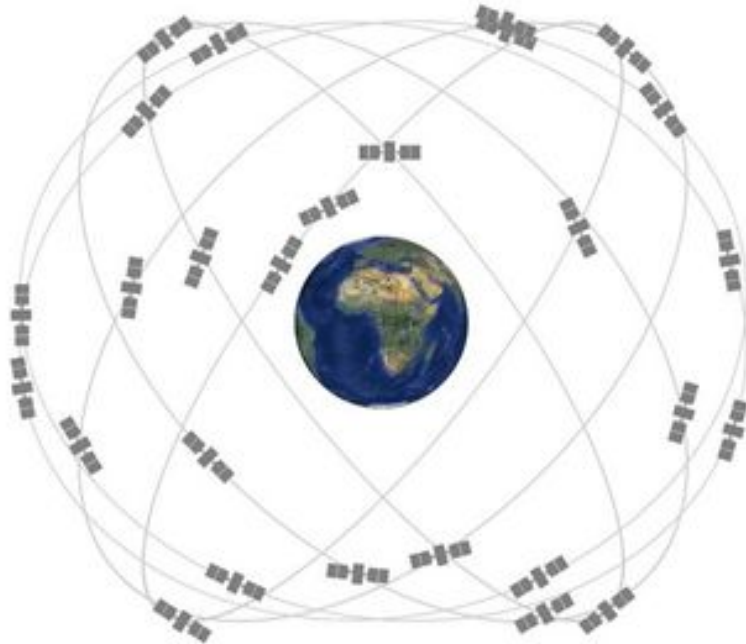
1990





Prison overcrowding reaches crisis level. State spending on corrections has tripled in just three years.
Photographer: Andrew Lichtenstein/Corbis/Getty Images

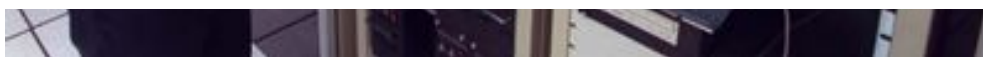
1994



The U.S. military's GPS system is completed. The government affirms that it will be available for commercial use.
Source: NASA

1998





Pro Tech Monitoring becomes an early user of GPS for offender monitoring.
Photographer: Scott Keeler/Tampa Bay Times/ZUMA Press

2010

3M enters the business. 200,000 people worldwide have worn 3M ankle bracelets.

In Germany, a report co-funded by the Criminal Justice Programme of the European Union concluded that the 3M software used for the country's electronic monitoring devices was "too inaccurate" and resulted in "false alarms or false zone transgressions." The report also found that in 2014, "a firmware installation error on behalf of 3M resulted in all active GPS-trackers being shut off simultaneously."

But nowhere have the deficiencies of 3M's monitors been as acute as in Massachusetts. One of the most serious flaws with the 3M device, according to numerous law enforcement officials and attorneys, was that it was originally designed to work only on T-Mobile and AT&T 2G networks, and it became even less reliable as carriers upgraded their networks to 3G. Because it wasn't designed to work with Verizon's network, offenders were left wearing a state-sanctioned monitoring anklet that couldn't communicate on the network of one of Massachusetts' largest and most effective wireless providers. If an offender's device was unable to connect to a network, that would trigger an alert. These "unable to connect" violations, as the state probation office calls them, became so numerous that it became difficult for authorities to determine whether an offender's device was simply being booted off the cell network, or the offender was interfering with the signal to avoid detection.

The sheer amount of data generated by GPS-tracking devices creates problems across the industry and in every state, but the number of alerts in Massachusetts has far exceeded the norm, experts say. Documents reviewed by Bloomberg show that in the 12 months ended in October 2015, 3M bracelets produced 612,492 violation alerts in Massachusetts—more than 50,000 per month, from about 2,800 individuals wearing the devices. Almost 40 percent of the alerts were due to a device not being able to connect to the network or the GPS not being detected. Roughly 1 percent of alerts resulted in an arrest warrant being issued. Tom Pasquarello, former director of the electronic monitoring program for Massachusetts, estimates that half those warrants were potentially based on faulty or incomplete data. That would be roughly 3,000 warrants. "There were people that were pulled from their house in the middle of the night, that lost their kids, people that lost their job," he says.

The problem of glitchy ankle monitors became so pronounced that the Massachusetts probation department set up an after-hours office in the lobby of a Boston police station so offenders could bring in their bracelets when problems occurred or batteries died. In August 2015, Massachusetts Superior Court Judge Heidi Brieger became so frustrated with the devices that she vowed to stop sentencing anybody to them. "It is simply administratively improper to run a system in this fashion," she said, according to a court transcript. "We don't lose liberty in this country because somebody's software is not working. It just isn't right."

Last May, nearly six years after entering the business, 3M began rolling out a new ankle monitor, the Tracking Device 4, or TD-4. It's designed to be compatible with multiple cellular networks, including Verizon's, and has better battery life and improved location accuracy. 3M's Eby says the company moved as quickly as it could. "Virtually everything we make, we have a reputation for the highest quality and always standing behind our products," he says. "It also means, unfortunately, we test, test, double-test, triple-test before it goes out the door." The product rollout in Massachusetts was completed in December; the state says 91 percent of the units in the field are TD-4s.

Probation Commissioner Edward Dolan says he's pleased with the new product. Before the upgrade, he says, "I couldn't distinguish whether an unable-to-connect was you affirmatively doing something to disrupt the signal, or it really was a signal issue. Now unable-to-connect is a nonissue, and only every once in a while we have one." The agency says unable-to-connect alerts have fallen to less than 2 percent of all alerts and resulted in only eight arrest warrants in February.

And yet Tyler J. Holdsworth was wearing a 3M bracelet when he died. Holdsworth, who'd been a student at Franklin Pierce University, was ordered by the Massachusetts Superior Court in 2015 to wear a 3M ankle monitor until he could face trial for rape charges. (He denied the charges.) He encountered constant technical malfunctions, including at least one that resulted in him being jailed. "He had to walk around the neighborhood for three hours because they couldn't locate him," recalls his mother, Cynthia Nelson, of South Dartmouth, Mass.

He quit a warehouse job because the monitor couldn't locate him inside, and he often received multiple calls a night from probation officers because the unit would lose its signal, she says. At around 2 a.m. on March 4, Nelson answered a knock at the

door and found two police officers. “They said, ‘We have a warrant for Tyler’s arrest,’ ” she recalls. The officers woke her son, handcuffed him, and booked him into the Ash Street Jail in New Bedford. The state of Massachusetts says an alert was generated because Holdsworth had earlier entered an exclusion zone.

The next day he was found hanging in his cell. “I believe that killed my son,” Nelson says. “Everything the bracelet put him through.”

“There were people that were pulled from their house in the middle of the night, that lost their kids, that lost their job”

The electronic monitoring business has proved perilous even for companies with deep roots in corrections.

Many of the bracelets on the market can be slipped off without detection. Some offenders will risk triggering an alert by cutting it off, or they’ll wrap it in aluminum foil to mask the GPS signal. Hackers can “spoof” a monitoring device—cause it to report that the wearer is one place when he or she is actually somewhere else. But the most vexing issue is the unmanageable number of alerts. Officers don’t want to be too lax in responding to them, because any given alert might be the signal that the offender is committing a crime. But they don’t want to respond so frequently that it becomes a nuisance to the offender or a civil liberties violation. There’s also the concern that the sheer volume of alerts emboldens criminals, who might know that authorities struggle to distinguish meaningful alerts from noise.

2017



Monitoring companies now incorporate Bluetooth, remote video, biometrics, and voice recognition to verify a person's identity and location. Buddi US has a bracelet that can track in some subway stations.

Source: Buddi

Many of the most innovative attempts to improve location accuracy and bring down the frequency of violation alerts come from smaller companies. Buddi US LLC, run by Steve Chapin, who was the CEO of Pro Tech when 3M bought the company and stayed with 3M’s electronic monitoring division for two years, sells a bracelet that remains charged for as long as five days and in some instances can track the wearer underground. Buddi recently signed a contract with the government of Colombia. Other companies have started using cell phones as a GPS-tracking platform, combined with Bluetooth, remote video, biometrics, or voice recognition to verify a person’s identity and location.

Eby says it’s one thing to develop a whiz-bang new technology and another to scale it, sell it to a government agency, and place it on thousands of people who want no part of it. “If the standard is you only want to use technology that has no limitations in terms of cellular connectivity and GPS, you’re not going to be able to have electronic monitoring at all,” he says. “There’s not a technology that will always stay connected to cell networks and will never have a GPS problem.”

Other people say that doesn't sound like a great American innovator talking, not with stakes this high. "Every business has hiccups," says George Drake, a former corrections officer and president of consulting firm [Correct Tech LLC](#) in Albuquerque. "But when it happens with an offender-tracking company, the consequences are magnified. If these people were making shoes, it wouldn't have made a difference to anybody."