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Spot-R by Triax

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SPOT-R BY TRIAX

THE NEED

Safety is a top priority and challenge for the construction industry. Jobsites are inherently chaotic and hazardous environments with heavy machinery and equipment; changing physical conditions; and dozens of trades working on site – often at great heights. Construction accounts for 20 percent of private industry fatalities, 40 percent of which result from a fall.¹

Construction also remains one of the least digitized U.S. industries, which manifests itself on the jobsite in two key ways: lack of total worksite visibility – automatically knowing which workers, equipment, and tools are active on site and where they're located - and the lack of effective solutions to collect and transmit field data in real-time. The majority of contractors still rely on manual headcounts, visual safety checks, and air horns to signal an emergency evacuation.

That is where Triax Technologies comes in with [Spot-r](#), the first-of-its-kind, non-GPS solution to automatically track real-time worker and equipment location and activity at the jobsite. Spot-r communicates over a proprietary wireless protocol that can cover nearly any jobsite to send designated supervisors automatic alerts in the event of a worker slip, trip, or fall or an unknown or unauthorized equipment operator.

FIGURE 1 THE SPOT-R CLIP, WORN BY EVERY WORKER ON SITE, AUTOMATICALLY CONNECTS TO THE SPOT-R NETWORK TO PROVIDE REAL-TIME LOCATION, ACTIVITY, AND SAFETY DATA

THE TECHNOLOGY

[Spot-r by Triax](#) combines a proprietary, scalable mesh network with compact hardware and a cloud-based dashboard to provide real-time, data-driven visibility into a project's most important resources and how they're interacting.

1. The Network: Network hardware (5"x4"x3" pods, see image on p. 3) are installed around a site according to its specifications to receive transmissions from the networked sensors worn by workers or tagged on equipment. Spot-r Pods operate in a 900 MHz network, with a subset using a cellular connection to forward data automatically to a cloud-based server, which integrates the Spot-r sensor data with Triax's custom software, making it easily accessible – and digestible – via the Spot-r dashboard.
2. The Hardware:
 - a. The [Spot-r Clip](#) is worn by every worker and automatically picks up the Spot-r network on site, automating worker headcounts and time and attendance. While at the jobsite, the Spot-r Clip provides real-time floor- and zone-based location, and the device's accelerometer, gyroscope and altimeter detect if a slip, trip, or fall event has occurred, triggering an immediate SMS or email alert to designated supervisors. Notifications, and safety incident data, which is stored in the cloud and available via the dashboard, tells supervisors who, when, and where the incident occurred as well as the distance of the fall. The Spot-r Clip has a button at the bottom of the device that workers can push to trigger an immediate "self-alert" to supervisors. In the event of an emergency, superintendents can activate an 80-decibel evacuation alarm, emitted by each worker's wearable device on site, signaling the need to evacuate.
 - b. Overcoming the limitations of traditional telematics solutions, [Spot-r EquipTag](#) is the first non-GPS solution to manage equipment, workforce and site safety without restrictions such as equipment size or indoor/outdoor location. EquipTags work exclusively with Spot-r Clips to detect who is in proximity of tagged equipment on site and whether or not they are certified to operate that specific piece of machinery. EquipTags mount onto any piece of equipment – large or small – to track real-time location, activity, and operator identity and certification, providing a comprehensive view of where resources are on site and how they're being operated. Aggregate utilization data, including active versus idle time within specific zones, helps minimize downtime, coordinate resources, and manage wear-and-tear.
 - c. The Spot-r EvacTag uses the Spot-r network to send high-decibel, visual evacuation alerts to an entire site simultaneously. The 100 dB siren and LED lighting emitted by the Spot-r EvacTag,

which is placed on every floor and near each staircase or exit, augments the alarm sent to the Spot-r Clip. The Spot-r dashboard provides real-time headcounts and worker location, which allows supervisors to monitor evacuation process, adding clarity and precision to a currently manual process.

3. The Dashboard: Spot-r's cloud dashboard enables site supervisors and off-site management to see and analyze construction site operations and safety in real-time. On-going and historical aggregate Spot-r safety and activity data can be filtered and analyzed by individual worker, subcontractor, trade, accident type, zone- or floor-based location, date range, or project site. The dashboard can be viewed from any device, at any point in time, to provide a comprehensive view of worker and equipment activity, site operations and safety incidents. System administrators can create – and save – custom dashboard reports, which can be easily shared with key stakeholders. Automatically captured Spot-r data can also be pushed into third-party software via the system's open API. Spot-r currently integrates with Procore and Autodesk to eliminate data double-entry and streamline the project set-up process.

FIGURE 2 THE SPOT-R SYSTEM, FROM LEFT TO RIGHT: NETWORK POD, SPOT-R CLIP, SPOT-R EQUIPTAP, SPOT-R EVACTAG, SPOT-R DASHBOARD

By automatically collecting previously unavailable data from workers and equipment – without technical limitations such as wireless internet, project site or remoteness - Spot-r enables unprecedented visibility into worksite activity and operations. Leveraging the cloud for real-time insights, Spot-r allows managers to respond to safety incidents, improve risk management practices, coordinate schedules to minimize downtime, and save time recording, sharing, and analyzing project data.

Built for construction

Spot-r is built specifically for the challenges of an active construction site or industrial environment. The proprietary communication protocol cuts through tough materials such as steel and concrete and requires minimal hardware as the project progresses and more structures go up. The Spot-r network overcomes traditional jobsite connectivity issues, including size and remoteness of the project, access to wireless internet, and overall power draw. The Spot-r system requires no daily maintenance (charging or turning on/off), and the Spot-r Clip and EquipTag use rechargeable batteries, which get roughly 6-months battery life. The Clips and Tags can be re-assigned to other workers, equipment, or projects at any time – allowing the hardware to be repurposed as one trade finishes at a specific project, for example, or allowing hardware to be reused upon project completion.

As the first plug-and-play, non-GPS solution, the Spot-r EquipTag overcomes the limitations of traditional telematics such as equipment size or indoor/outdoor location. The EquipTag easily mounts to nearly any piece of equipment, such as a scissor lift or skid steer, which traditionally don't come equipped with telematics. Legacy equipment that was manufactured before standard-equipped machine monitoring was available can also be tagged and connected to the Spot-r system without a technician having to come to the site.

Triax maps the site, installs the network, deploys all hardware, and handles on-site training and administrator on-boarding. In addition, dedicated account managers support clients throughout the project, helping to build custom reports ensuring they get the most value out of the system and data.

The Spot-r system is currently being used on more than 40 projects nationwide by general contractors including Turner Construction, Gilbane, and NYC-based Lettice Construction Corp.

Technical Specifications:

- Spot-r Clip:
 - Dimensions: 3.1" x 2.1" x 0.9"
 - Weight: 2.3 oz.
 - Auto on/off
 - Rechargeable battery, over 6 months charge in typical use case
 - 3-axis accelerometer, 3-axis gyro, altimeter
 - Water and impact resistant
- Spot-r EquipTag:
 - Dimensions: 3.1" x 3.1" x 0.8"
 - Weight: 2.4 oz.
 - Auto on/off
 - Rechargeable battery, over 6 months charge in typical use case
 - 3-axis accelerometer, 3-axis gyro
 - 4" infrared proximity sensor
 - Water and impact resistant

- Spot-r EvacTag:
 - Dimensions: 5.5" x 3.5" x 1.3"
 - Weight: 6.8 oz.
 - Auto on/off
 - 9V battery, replaceable in field
 - Water and UV resistant

THE BENEFITS

- Proprietary mesh network is the backbone of jobsite data collection:
 - Does not require Internet connection
 - Cuts through steel and concrete
 - Scales with project, requiring minimal additional hardware
- Rechargeable Spot-r Clips and EquipTags are auto on/off and require no daily charging
- Non-GPS system works indoors, outdoors, and in areas without clear line of sight to the sky and overcome "Big Brother" privacy concerns
- Spot-r Clips automatically collect worker badge-in and badge-out, eliminating need for manual headcounts and paper logs
- Historical and real-time worker and equipment location by project floor and zone
- Automatic slip, trip, or fall incident SMS or email alerts, eliminating need for visual safety checks
- Automatic safety incident data including who, when, where, and distance of fall, can be used to combat potentially fraudulent claims
- Worker self-alerts provide direct line of communication to supervisors
- Safety benefits overcome employee language barriers; eliminate need for workers to "leave post" to communicate an issue; and avoid worker cell phone privacy concerns or reliability concerns
- Evacuation alarms sent to each Spot-r Clip and EvacTag notify entire site simultaneously
- Worker profiles to document certification data and trigger automatic unknown or unauthorized equipment operator alerts, overcoming "one-key-fits-all" approach of modern machines
- Historical and on-going equipment utilization data, including idle vs. active time by location, trade, or subcontractor

Custom data dashboards and reports drill into man hours and safety incidents by worker, trade, sub, incident type, zone-based location, project, time period (see example below).

FIGURE 3 CUSTOM DATA DASHBOARD EXAMPLE

- Aggregate workforce, equipment and safety data can be used to:
 - Improve estimates and bids on future projects
 - Optimize equipment rental needs and schedules
 - Improve risk identification and response, helping to mitigate insurance risks and loss costs
- Unlimited user licenses
- Dedicated customer service/support

STATUS

- May 2017:** Spot-r by Triax officially launches.²
- August 2017:** Spot-r announces a two-way integration with Procore project management software, which eliminates manual double-entry of data and automatically sends accurate Spot-r worksite data, including man hours and safety incidents, to Procore for accidents, timecards, manpower and daily construction reports.³
- October 2017:** Spot-r wins a 2017 Innovation Award from Business Insurance Magazine, one of eight companies honored for creative risk management solutions and technological innovations.⁴
- November 2017:**
 - Triax announces the launch of the Spot-r EquipTag, the first-of-its kind, non-GPS solution to track operator identity, equipment location, and equipment utilization – indoors, outdoors and in areas without clear line of sight to the sky.⁵

- Triax and Autodesk announce a Spot-r integration with BIM 360, which allows Spot-r users to view the current location of workers on 3D BIM (Building Information Modeling) models.⁶

FIGURE 4 SPOT-R AND AUTODESK 360 BIM INTEGRATION, WHICH SHOWS REAL-TIME WORKER LOCATION ON EXISTING BIM MODEL

BARRIERS

As with anything new, particularly new technology systems, there is always some organizational and end-user hesitance. This is especially true for the construction industry, which has been historically slow to adopt new technology and has been doing things the same way for centuries. Across solutions, as technology and IoT momentum grows, decision-makers inquire about feasibility (technical specs, hardware requirements, battery life) and scalability of a solution, as a worksite is a fast-moving, physically extreme environment where change is the only constant. Managers are also generally concerned about price, ROI, training time, and lack of technological literacy amongst employees and end users.

System administrators and workers, in particular, want to know about their personal privacy and when they hear about worker monitoring or “tracking” tend to think of GPS, micro-targeting solutions. Once employees learn that the solution is not GPS, does not operate off their personal cell phone devices (i.e., does not invade their privacy on or off site, won’t be viewed as a distraction by management, and won’t drain their battery), and does not know where they are within inches, fears are generally alleviated. Spot-r by Triax provides floor- and zone-based location – and worker attendance data – information that is already collected manually by paper and pencil; the system does not collect anything that is not currently recorded, it simply streamlines that process. In addition, once a worker leaves the jobsite perimeter, and thus, the jobsite network, their Spot-r Clip automatically disconnects from the network and the only information known to supervisors is that they are off site.

In addition, both administrators and workers are concerned about the administrative burden of the new system – how much time will be required turning it on, charging it, turning it in at the end of the day, etc. Our low maintenance, plug-and-play solution – and dedicated account managers – overcome this issue, helping to connect a jobsite without encumbering the workforce/end users or adding technical complexity.

Finally, when system users learn about the robust safety features it provides, they are more interested in using the solutions. Workers, for example, feel peace of mind knowing that supervisors will immediately learn if they fall of a ladder in a remote part of the building – or that they can trigger a real-time self-alert to a specific location if they are having a heart attack or get a piece of metal in their eye and cannot move to get help. Crucially, the Spot-r system provides project leaders and crews with tools to actively participate in site safety, which is important for a worker buy-in perspective.

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REVIEWERS

Peer reviewed as an emerging construction technology

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