



● Knowing Where: Any Where



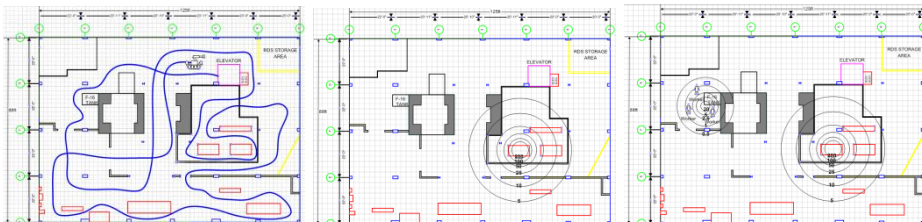
A LOCATION AWARE RADIATION MONITORING SYSTEM

Radiation exposure of nuclear workers is not only a serious health and safety issue, but also imposes substantial costs on nuclear utilities. Precise knowledge of the radiation environment within a nuclear facility is essential to minimizing personnel exposure. In recent years, there has been an emphasis on remote monitoring technology (RMT) in the nuclear industry. RMT often includes networks of fixed dosimeters. In many situations however, one would like to be able to monitor the radiation level using mobile robot-mounted-dosimeters or personal dosimeters. For this dosimeter information to be most useful, it must be correlated with location information.

THE SOLUTION: NFER® RTLS

Q-Track is the pioneer in Near-Field Electromagnetic Ranging or “NFER®” technology. NFER® systems operate in the MF band under Part 15 limits as low-power unlicensed transmitters. By using relatively low frequency, long wavelength transmissions, NFER® signals can propagate in complicated industrial environments with minimal impact from multipath. Under a Phase I effort sponsored by NIEHS, Q-Track demonstrated that NFER® systems can yield accurate real-time location even in the very difficult RF propagation environment of a nuclear industrial facility. We also demonstrated a proof-of-concept radiation map with the assistance of our subcontractor, Oak Ridge National Laboratory. The specific aim of Q-Track’s Phase II effort is to prototype and to evaluate a Location Aware Radiation Monitoring System with the following characteristics:

- 🔍 **Typical Location Accuracy:** 1m (3ft) or better in typical nuclear industrial environments.
- 🔍 **Update Rate:** 1Hz update rate for location and radiation dose rate.
- 🔍 **Hardware Integration:** Worker or robot tag with combined location and dosimetry function.
- 🔍 **Software Integration:** Radiological control and monitoring software providing real-time radiation mapping.



With a Location Aware Radiation Monitoring System, a robot could follow a preset path (left) surveying radiation levels and correlating location data to create radiation maps (center), that could be updated in real-time in the vicinity of workers (right) highlighting potentially hazardous changes in the radiation environment.



The QT™-500 Locator-Receiver localizes QT™-500 Tags to an accuracy of about 1ft. Requiring no synchronization, the QT™-500 Locator-Receiver can communicate wirelessly back to the Location Server for quick and easy installation.



The QT™-500 Tag provides industrial strength real-time location for the most difficult propagation environments, indoors or outdoors.



The Q-Track Location Server hosts the Q-Track Software Suite™ Position Integration Engine and can send data to other computers or devices.

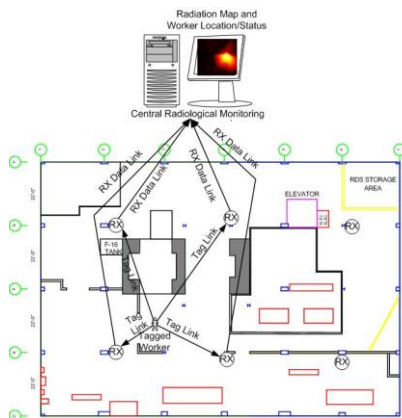
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Q-Track demonstrated the feasibility of the ALARMS concept with the help of the Oak Ridge National Laboratory at the Experimental Gas Cooled Reactor facility.



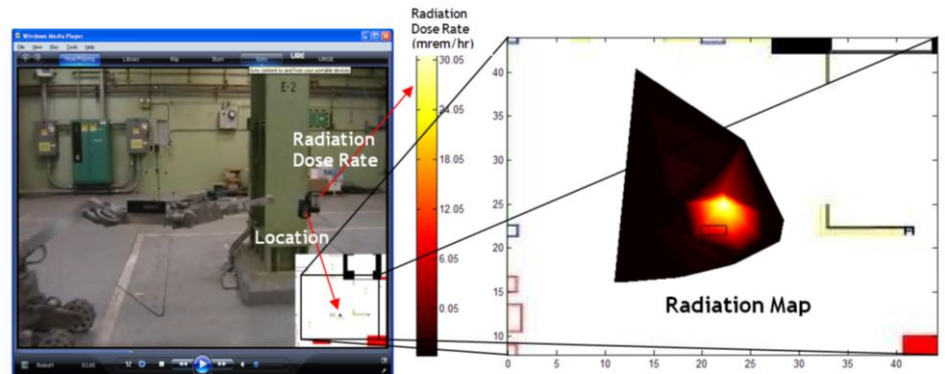
System architecture showing the Tag Link to the Locator-Receiver, and the Receiver Data Link to the Central Radiological Control Monitoring application.

“Startup Q-Track Corp. has homed in on an oft-ignored phenomenon of RF transmissions and leveraged it as the basis of what has been demonstrated to be an accurate but relatively simple tracking scheme. Called Near Field Electromagnetic Ranging (NFER), the technology has a resolution of 30 cm at 300 meters. That’s accurate enough to rival ultrawideband (UWB) and conventional time-of-flight and time-distance-of-arrival schemes, with their respective shortfalls.”



PROOF-OF-CONCEPT

In a Phase I SBIR effort, we demonstrated precision tracking of a robot to typical accuracies of 30cm-1m (1-3ft). We correlated location data from the NFER[®] tracking system with radiation dose data from a teledosimetry system to generate the radiation map shown below. This Phase I radiation map was generated by post-processing data gathered during our testing in the basement of the Experimental Gas Cooled Reactor (EGCR) facility at Oak Ridge National Laboratory.



In Phase I, we demonstrated precise location capability (left) combined with radiation monitoring to yield a radiation map of a nuclear environment (right). The specific aim of the Phase II effort is to develop a prototype integrated, real-time Location Aware Radiation Monitoring System capable of locating both nuclear workers and robots, correlating their measured location with their measured radiation dose rate, and generating real-time maps of the radiation levels in a nuclear environment.

Q-TRACK SEEKS INTEGRATORS

Q-Track seeks an integration partner to assist in merging the NFER[®] RTLS with a teledosimetry system and site radiation monitoring application software.

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