

## White-Label IoT Alarm Monitor & Battery Performance Tracking Service

Wireless IoT sensor is an economical and universal way to monitor power alarms and scientifically track lead-acid batteries in backup applications. The Battery on Discharge (BOD) sensor with its high-precision voltmeter-on-a-chip determines State-of-Charge (SOC) and uses the voltage-slope method\* to calculate *actual* Time-to-Empty (TTE) during discharge. The new metric *Calculated Reserve Time* (CRT\*) can warn of potential battery end-of-life (EOL) using 80% alarm threshold. State-of-Health (SOH) is a concern when voltage imbalance alarms or irregularities in slope occur.

**STATE OF HEALTH (SOH)**

- Calculated Reserve Time (CRT) below EOL threshold (e.g. 80%).
- Battery voltage imbalance threshold exceeded (e.g. 1.0 V).
- Bad slope or low CRT; check battery or straps to pinpoint cause.
- Battery missing or not connected.

**Slide-Switch Toggles Between SOC and SOH.**

**Digitally record discharges and rundown tests.**

**STATE OF CHARGE (SOC)**

- Charging at float > 24 hrs.
- Charging at float < 24 hrs.
- Charging below float voltage.

**BOD Time to Empty (TTE) Fuel Gauge.**

**2-WIRE CONFIG**

**5-WIRE CONFIG**

**Map and List DUAL PANE VIEW**

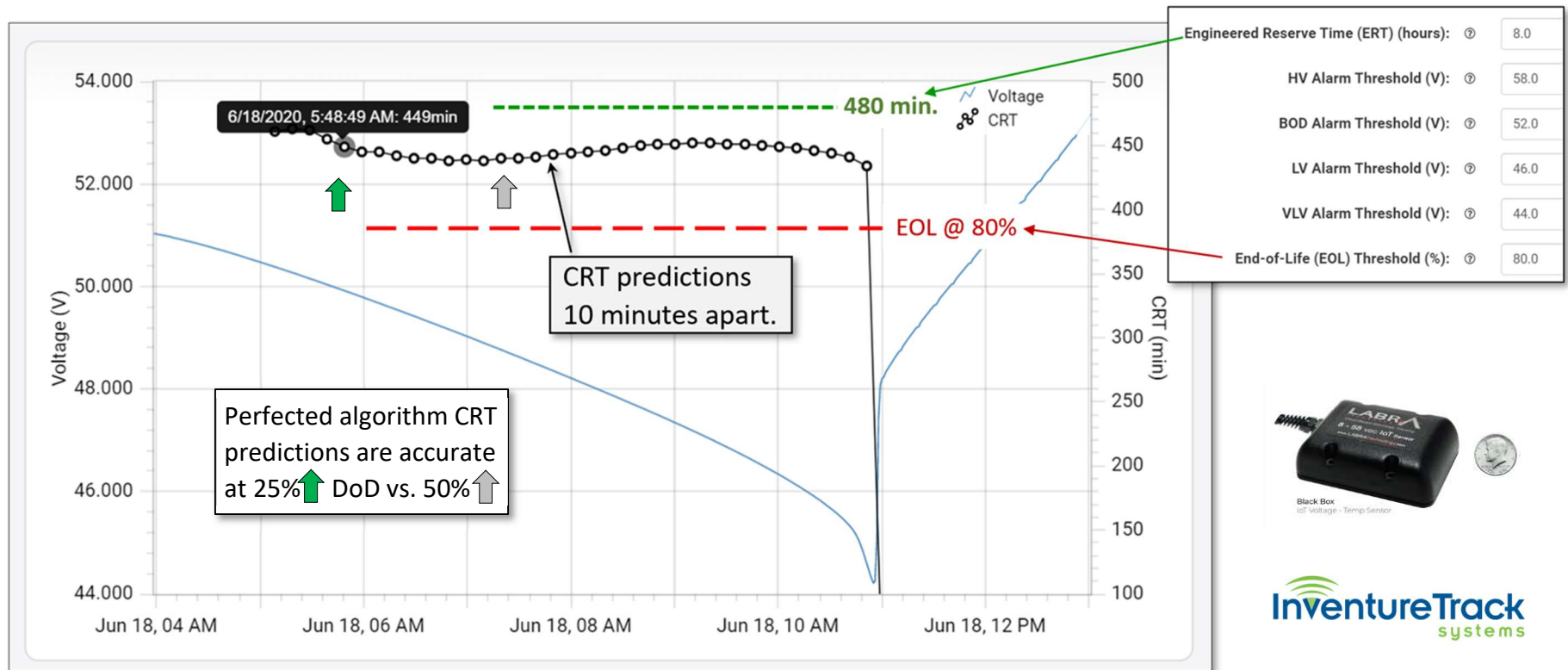
Name	Voltage	TTE	Last Report
Bailey		10:29	Aug. 14, 2018, 1:16:28 PM
Broomfield		10:58	Aug. 9, 2018, 4:57:37 PM
CastleRock	28.80		Aug. 9, 2018, 9:39:10 AM

Designed and made in the USA, LABRA Technology is a revolutionary IoT monitoring service for lead-acid batteries. It allows stakeholders to deploy a modern and uniform approach for tracking 6 battery metrics – from commissioning to EOL. Key is the highly secure Enterprise-grade server that fosters collaboration among the various stakeholders. With an open architecture, data can be pushed or obtained via a RESTful API.

\*Uses *perfected* ( $\pm 3\%$  accurate) off-patent  $dV/dt$  algorithm discovered at Bell Labs.

## How CRT Predictions Work

Battery settings include an Engineered Reserve Time (ERT, e.g., 8 hours) and an EOL threshold percentage (e.g., 80%). During normal float conditions, the sensor records the hourly average voltage and reports once daily to the cloud. Upon a BOD alarm, the sensor records the voltage every five minutes and reports it every 30 minutes to the cloud. At each report cycle, it also computes a new Calculated Reserve Time (CRT), as shown below. An EOL alarm occurs if the CRT value falls below 384 minutes, which is 80% of ERT preset (e.g., 80% x 480 minutes = 384 minutes).



**Economic Benefit:** A Battery VAR can now offer a 24x7 monitoring service along with annual PM visit to check impedance. A field-force multiplier, the labor-saving tool permits a VAR to grow revenue, while migrating from a preventive maintenance to predictive maintenance business model. Annual subscription includes AWS hosting, API (Application Programmers Interface) and Battery Dashboard “App” tracking 6 metrics including the new CRT metric. A partner OEM or System Integrator VAR can rebrand the service and create sub-accounts authorizing their own service resellers.