Reducing Excavation Damage in the Natural Gas Industry Using Real-Time GIS and Sensors

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How can excavation damage be reduced?

- What is excavation damage?
- Can technology help reduce excavation damage?
- Excavation Encroachment Notification Technology
- Pilot Project & Field Testing
- Results
- Next Steps
What is excavation damage?

• Damage occurring when an excavator *strikes* an underground utility

• Potentially resulting in *fatalities*, serious injury, property damage

• According to the Common Ground Alliance – *the leading causes of excavation damage are excavators that don’t utilize the one-call center and excavators that dig carelessly near underground pipes*
What is excavation damage?

- Over **91,000** damages occurred in 2016  

- Every **9** minutes an underground utility is damaged because someone didn’t call 811

- Excavation damage is estimated to have risen **20%** over the prior year

- Conservatively cost stakeholders **$1.5 billion**
Can technology help reduce excavation damage?

**Data Collection**
- Dedicated Device
- GPS/GNSS
- Motion Sensors
- Cellular

**Analysis**
- Data Management
- GIS Processing
- Activity Analysis
- Threat Analysis

**Awareness**
- Utility Dashboard
- Operator Alerts
- Cell Phone Alerts
GTI’s Excavation Encroachment Notification Technology

• Black Box Device
• Esri ArcGIS Server & GeoEvent Server
• Apache Kafka & Apache Spark
  • Machine Learning
  • Characterization Algorithms
• GeoFence Boundaries define areas to trigger alerts
Pilot Projects & Field Testing

• Initial Technology Development
  • Android phones and app
  • Proved concept of streaming data into GIS

• Pacific Gas & Electric/California Energy Commission Grant
  • 150 Dig-In Devices Deployed to Date
  • 13 Total Participants:
    • Five PGE Subcontractors, all Gold Shovel Standard Certified
    • Seven Third party participants (Agriculture, Municipality)
  • 12+ Months of Field Experience
  • 40+ million data points collected (April 2018)
Pilot Projects & Field Testing

- **Notification** of activity in project boundary
- **Warning** of activity in project boundary
  - alarm chirps
  - lights flash
- **Alert** of activity in project boundary
  - steady alarm
  - flashing lights
  - email/text message

- Project Boundary
- Gas Main
# Pilot Projects & Field Testing

- Devices Online
- Alerts Triggered
- Devices Issues
- Devices Digging
- Devices Registered with the Project
- Historical Data Counts

Main Map

Historical Data Counts

Devices Registered with the Project
Results

- Characterization Accuracy
  - Backhoe/Excavator – 86%
  - Agriculture – 78%
- No known dig-ins while devices utilized
- 40+ Million data points
Next Steps

• Pursue additional pilot project opportunities
• Discuss commercialization with potential partners
• Thank You!

For more information, contact:

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