# CASE STUDY

## Leveraging Augmented Reality for Underground Utility Detection

TILT LABS
A PRODUCT REALIZATION COMPANY

# EXECUTIVE SUMMARY

In the realm of construction and excavation projects, avoiding damages to underground utilities is paramount to ensuring safety, mitigating costs, and maintaining project timelines. Augmented Reality (AR) technology emerges as a transformative solution, offering real-time visualization of underground infrastructure to aid in detecting obstacles before digging commences. This case study explores the challenges faced, the innovative solutions implemented, and the remarkable outcomes achieved by integrating AR in underground utility detection.

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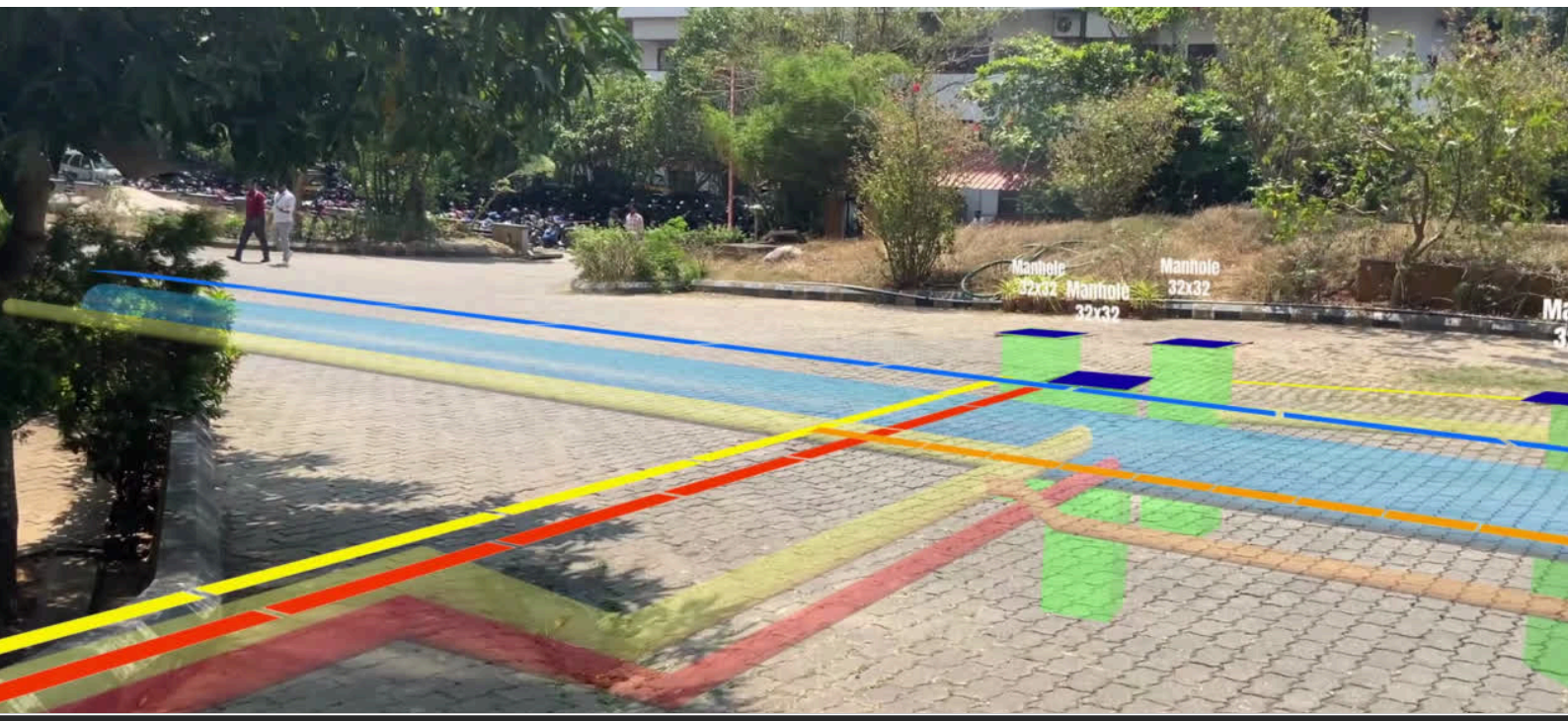


# PROJECT CHALLENGES

## Outdated Information

Limited access to current underground utility data, incomplete records, and lack of real-time updates on infrastructure changes.

## Real-Time Visualization Need

Difficulty in visualizing underground utilities during excavation, leading to increased risk of damages.

## Delays and Safety Risks

Potential project delays, budget overruns, safety hazards, and legal implications from utility strikes.

## Data Integration Challenges

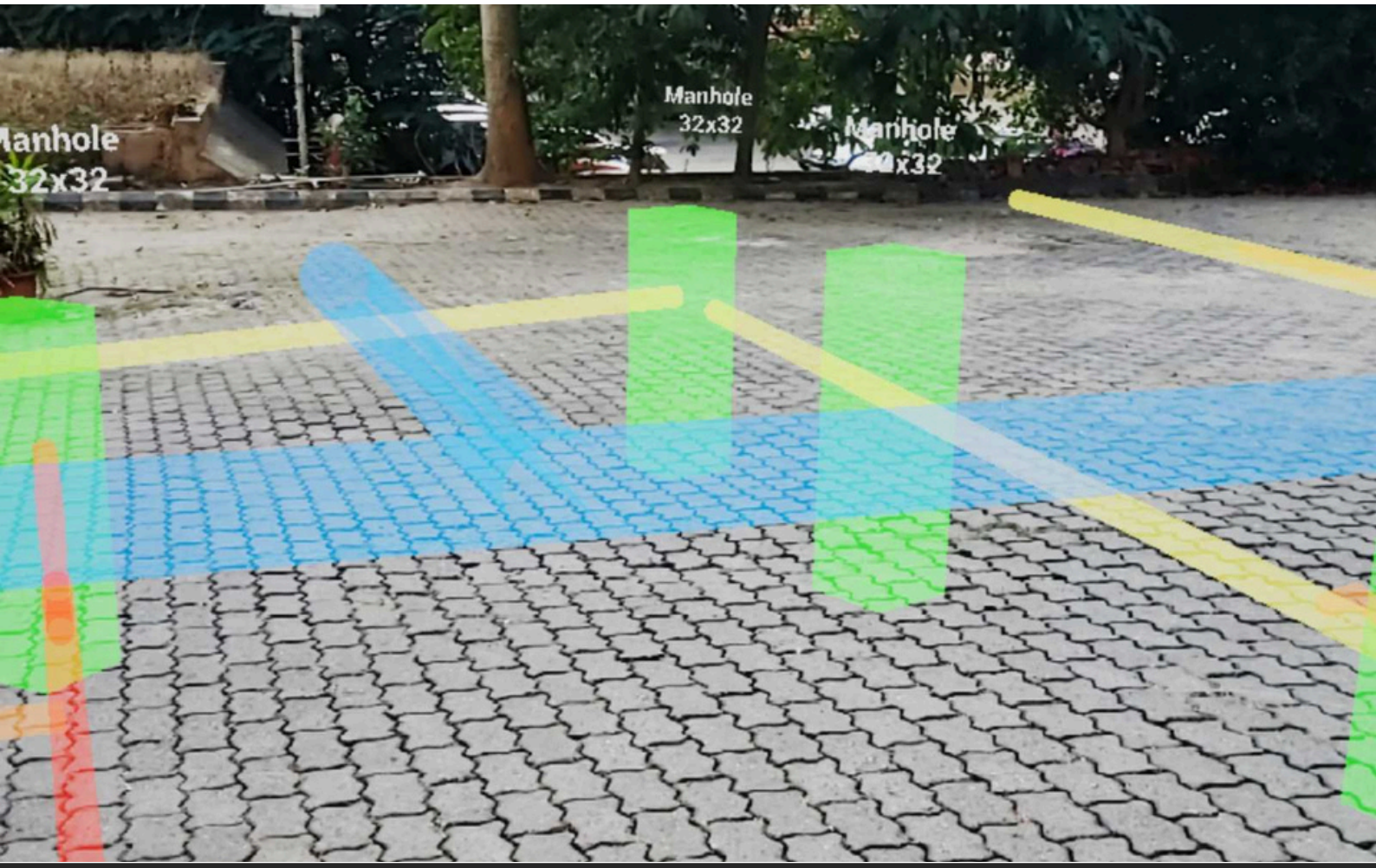
Difficulty in merging data from various sources into a comprehensive database.

## Construction Efficiency

Inefficient planning and decision-making due to manual data collection, limited conflict identification, and inadequate asset management tools.

# SOLUTION OVERVIEW

To address these challenges, our team proposed integrating AR technology into underground utility detection processes. Leveraging AR, users can visualize underground cables, pipes, and infrastructure in real-time through smartphones or tablets. By overlaying digital information in the real world, AR provides a comprehensive understanding of the underground utility network, allowing workers to identify potential obstacles before excavation begins.



# KEY FEATURES

## Real-time Visualization

AR technology lets users instantly visualize the location of utility lines, pipes, and cables on their device screens, eliminating the need for guesswork.

## Layered Information

Users can access detailed information about the depth, type, and condition of utility lines, enhancing decision-making and planning processes.

## Step-by-step Instructions

AR provides guided instructions for accurately locating and marking underground utilities, reducing the risk of errors, and ensuring compliance with safety regulations.

## Enhanced Efficiency

By saving time on manual mapping and marking processes, AR improves overall project efficiency and reduces costly mistakes, leading to significant time and cost savings.

## Improved Safety

AR technology enhances worker safety by clearly visualizing underground utilities, thereby reducing the risk of accidents and potential fatalities on construction sites.

# SOLUTIONS & METHODOLOGY

## Advanced Sensor Acquisition

Utilize LiDAR, GPR, and other sensors for accurate data collection on underground utilities. Ensure regular calibration and maintenance for optimal performance.

## Data Collection and Processing

Thoroughly scan the project area using selected sensors. Process collected data in real-time to generate accurate 3D models of underground utilities.

## Geospatial Data Modeling

Employ advanced software to model collected data in geospatially accurate 3D representations. Ensure models reflect accurate location, depth, and layout of underground utilities.

## Real-Time AR Environment

Develop an AR application for tablets, offering construction teams real-time visualization of underground hazards. Integrate 3D models for seamless navigation and interaction.

## User Training and Support

Provide comprehensive training on AR application usage and data interpretation. Offer ongoing technical support to address any issues during project execution.

## Environmental Adaptation

Consider environmental factors like weather and terrain during data collection. Implement measures to mitigate interference from surrounding structures.

## Data Security Measures

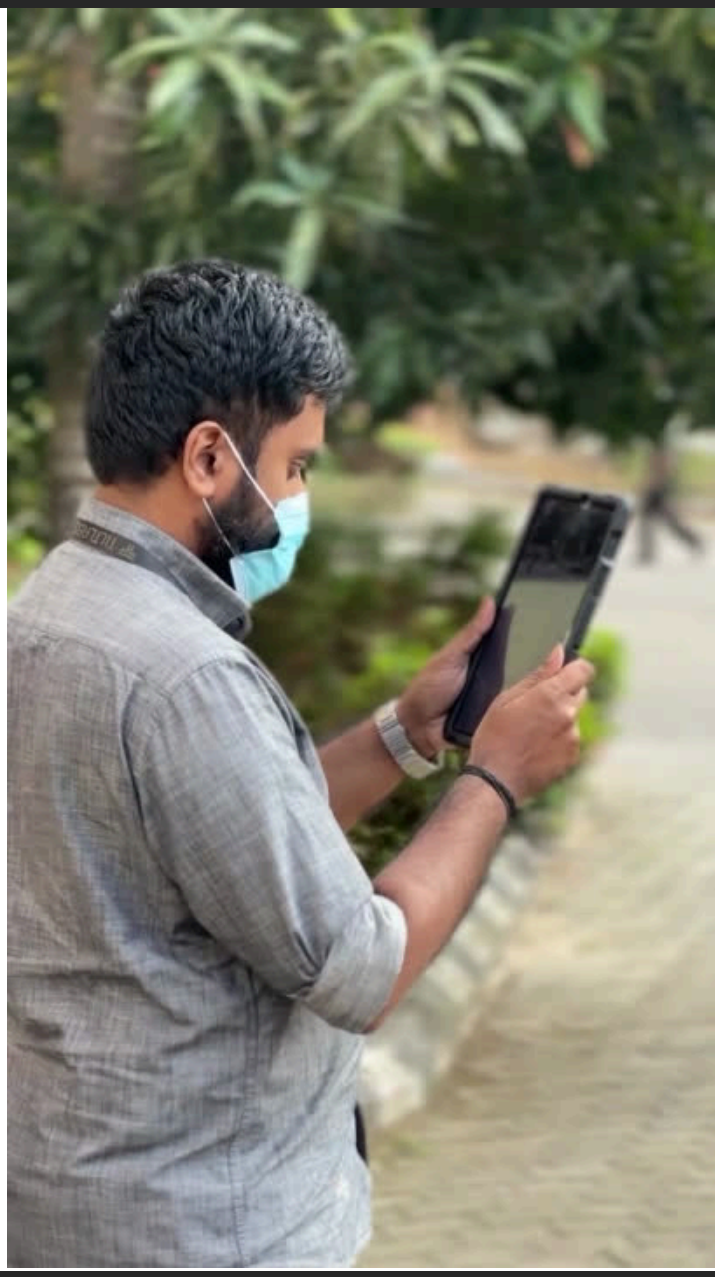
Implement robust data security protocols to protect sensitive information. Encrypt data transmission and storage to prevent unauthorized access.

## Quality Assurance and Testing

Conduct rigorous testing to ensure accuracy and reliability. Perform quality checks at various project stages to address discrepancies.

# CONCLUSION

Integrating Augmented Reality technology in underground utility detection represents a groundbreaking advancement in the construction and excavation industry. By providing real-time visualization of underground infrastructure, AR prevents costly damages and delays and enhances worker safety and project efficiency. As AR and VR technology continues to evolve, utility mapping will undoubtedly undergo further enhancements, ushering in a new era of innovation and efficiency in the construction sector.



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