
DIRTLENS
Real-Time Soil Color Analysis
A:10YR5/6
B:10YR4/4
UX Case Study

Problem: Field archaeologists often face challenges with subjective, inconsistent soil color identification in the field.

Solution: DirtLENS offers a portable, real-time soil color analysis device with integrated GPS and one-button operation.

Impact: Reduces soil classification time from minutes to seconds, improves accuracy, and streamlines field workflows.

Jesse

- **Age**: 34
- **Occupation**: Field Archaeologist
- **Personality:** Talkative, experienced, likes clarity and efficiency
- **Pain Points:**
  - Matching soil colors manually is slow and error-prone.
  - Needs a reliable way to document color in variable field conditions.
- **Goals:**
  - Speed up soil color matching.
  - Trust the tool's results in any light.
- **Quote:**
  "Matching soil colors used to be so tedious, especially in tricky light. Now with DirtLENS v2, I just press the button and it does it for me. It's quick and way more consistent."

Lincoln

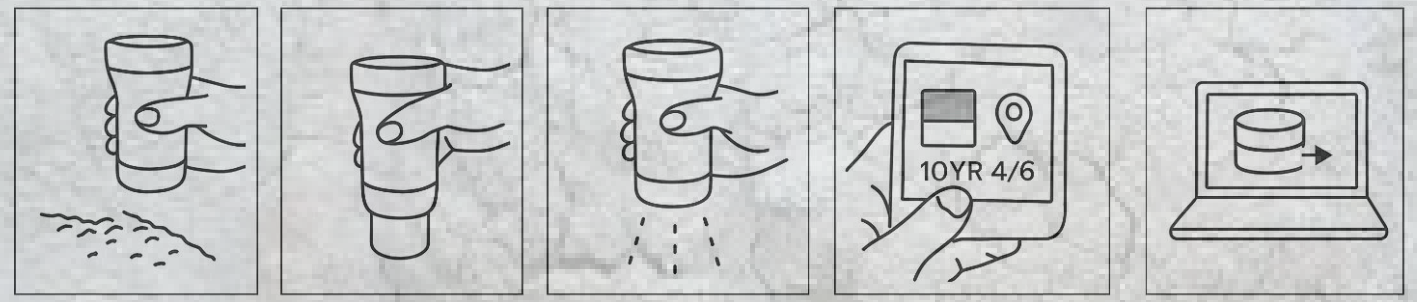
- **Age:** 29
- **Occupation:** Field Archaeologist
- **Personality:** Reserved, detail-focused, prefers clear feedback
- **Pain Points:**
  - Hard to trust visual color matching by eye.
  - Needs clear, immediate feedback to reduce errors.
- **Goals:**
  - Rely on the tool's results for accuracy.
  - Save time on color documentation.
- **Quote:**
  "I like how DirtLENS v2 shows me the color right away on the screen. It makes it easier to trust the results, especially compared to eyeballing it."

Motivation: Soil Scientists seek fast, accurate data capture to document soil layers and ensure consistency, while avoiding the high costs and limitations of traditional Munsell books.

Emotions: Frustration with manual methods, relief and confidence with automated DirtLENS process.

Task Flow

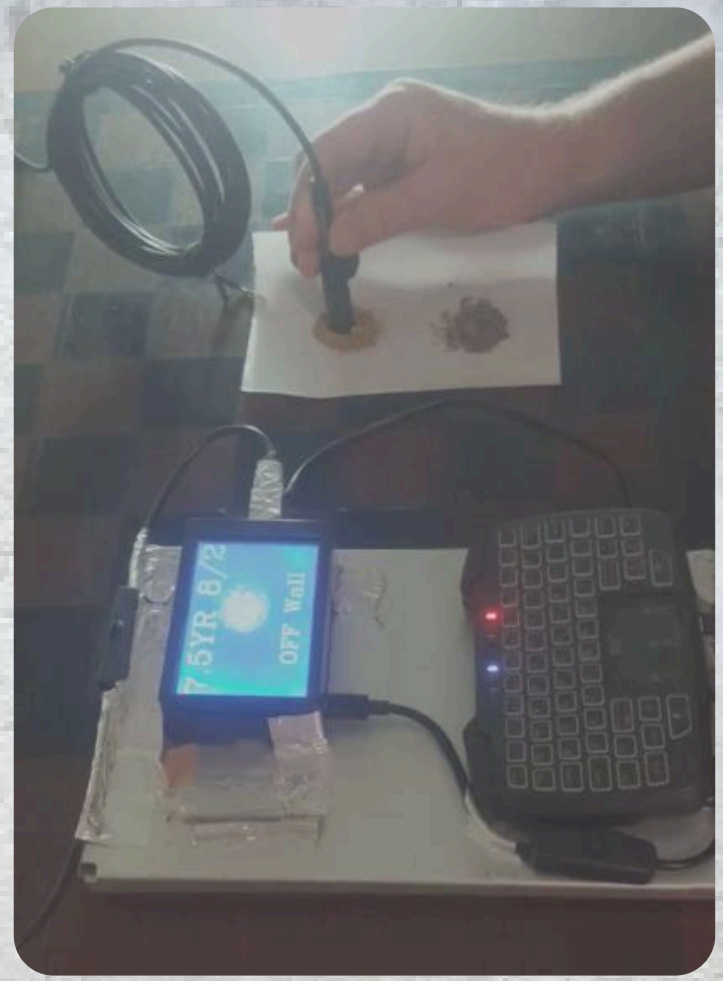
1. Position DirtLENS over soil.
2. Press button to scan.
3. LEDs activate and camera captures data.
4. Color code and GPS displayed.
5. Data optionally synced to database.



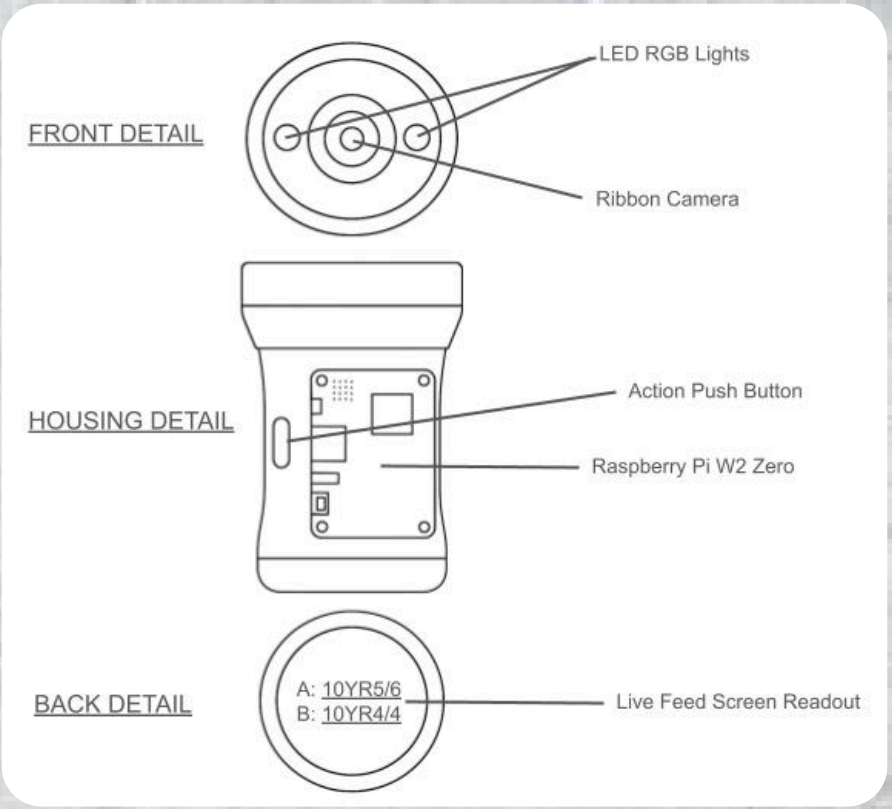
Position DirtLENS over soil | Press button to scan | LEDs activate and camera captures data | Color code and GPS displayed | Data optionally synced to database

Prototype v1: Proof of Concept

The first DirtLENS prototype used a borescope with built-in LED lighting to capture high-contrast images of soil samples. Two piles of differently colored soil were used to demonstrate its ability to detect color differences. Despite minimal structural housing and exposed wiring, it effectively captured color variations, proving the core concept of portable soil analysis.



Full Prototype Demonstration



DirtLENS v2 refines UX with a simple two-step Action Button.

This clear engagement sequence—press once to scan, again to readout—minimizes errors and streamlines user interaction. The Live Feed Screen Readout now provides immediate visual feedback, enhancing field confidence. The integration of individually addressable RGB LEDs simulating noontime sunlight ensures reliable, consistent illumination for more accurate color capture. Together, these changes improve clarity, control, and usability in field conditions.

Prototype Comparison Table

Feature	Prototype v1	Prototype v2
User Trigger	No clear engagement	Two-step Action Button
Lighting	Basic borescope LEDs	Individually addressable RGB
Feedback	Minimal	Live Feed Screen
Sample Capture	Single soil color	Dual sample capability
Data Sync	Manual	Future enhancement planned
User Testing Feedback	Limited clarity, wiring exposed	Clear interaction, improved usability

Key Takeaways from DirtLENS v2 Development

- Clearer User Interaction
  The two-step Action Button simplifies scanning and reduces errors.
- Improved Feedback
  Live feed screen provides immediate color and GPS data, increasing confidence.
- Enhanced Lighting
  Individually addressable RGB LEDs simulate noontime sunlight for consistency.
- User-Centered Design
  Feedback from Jesse and Lincoln informed intuitive and effective changes.
- Scalable Improvements
  Next steps include data syncing, ergonomic refinements, and durability upgrades.

Final Summary: DirtLENS v2

DirtLENS v2 redefines soil color analysis in the field with its simplified user interaction, real-time feedback, and consistent sample lighting. By incorporating user feedback from Jesse and Lincoln, we've enhanced the tool's accuracy, reliability, and ease of use. Moving forward, DirtLENS will continue to evolve with plans for data syncing, ergonomic improvements, and increased durability, empowering field archaeologists with confidence and efficiency.