

# UC San Diego

## Field Reports

### Title

Beijing, Shanghai, Xi'an July 8th - July 30th, 2026

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Field Report:

# Beijing, Shanghai, Xi'an

July 8th - July 30th, 2026



*Forbidden City July 28, 2026*

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Field Report prepared August 1st, 2026

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All Cultural Heritage Engineering Initiative (CHEI) projects are performed under the direction of Prof Falko Kuester & Dr. Dominique Rissolo, at the University of California San Diego

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## Expedition Overview:

A three-week expedition to China (Beijing, Shanghai, and Xi'an) to deliver a keynote presentation on OpenHeritage3D at the World Internet Conference (WIC) Digital Silk Road Development Forum, and to conduct a sculpture-scanning campaign in support of the **Emporium Road** project as a collaboration among European and Chinese academic partners. The trip was highly productive, yielding new institutional partnerships, friendships, and proposal opportunities, despite a suffocating summer heat and a number of logistical setbacks.

OpenHeritage3D had earlier been selected for a WIC award in the "case studies in cultural heritage" category, using examples centered on Florence, Italy; the pitch was subsequently expanded to include Chichén Itzá and the Temple of Bel. The main WIC event is typically held in Wuzhen in October; this campaign targeted the Xi'an sub-event, the **Digital Silk Road Development Forum**, which drew a substantial audience of government ministers and industry representatives focused on technical-infrastructure development under the Belt and Road framework. Notably, the Minister of Cyberspace Administration of China publicly stated that heritage data must be made open, a position that may not yet be widely shared on the cultural-institution side.

Scott's keynote focused on the spread of digital literacy through the visualization of science in heritage, framed as an international collaboration, and advanced the shared vision of a streaming digital-twin system spanning all UNESCO heritage sites, with China positioned as one of the leaders.

Museums throughout the trip were of exceptional quality, with sophisticated visualization systems (large LED walls and projectors), XR experiences, appearing even in comparatively modest university museums.

Our original 3D scanning plans, being dashed by permission complications, we ended up performing some high resolution scans of pots at the Lingtong Museum, used as guides for the terahertz robotic arm platform.

Please contact Scott McAvoy ([smcavoy@ucsd.edu](mailto:smcavoy@ucsd.edu)) with any questions regarding access to the data described in this report.

## Key Goals

- Meetings with Academic partners, towards building digital infrastructure within Chinese institutions.
- Meetings with Gov. / Media Representatives.
- Fundraising foundations, with UCSD affiliates in China.
- Keynote presentation: World Internet Conference (WIC) Digital Silk Road Development Forum, Familiarization with Chinese Digital Heritage Exhibits, specifically large scale visualization and VR systems on public display.
- Digitization of outdoor heritage spaces with low cost sensors, building out pipelines to decouple lidar data feeds from opaque processes to get the most out of them.

## Contacts:

Mi Yunjing- China Cultural Heritage News (reporter, handler for WIC heritage)

Professor Zhang Xia- Guangzhou Academy of Fine Arts (Head WIC heritage)

Carol Tohsaku - UCSD booster (fundraising)

Simone Pastor - Italian Government Sovraintendenza Rome (looking at joint proposals)

## Outcomes & Next Steps

- **WIC award received** for a cultural-heritage case study, presented at the Digital Silk Road Development Forum in Xi'an, with accompanying press interviews.
- **A joint tri-national digitization proposal is under discussion** — a concept for a two-year, ~€5M program to build distributed streaming and archival infrastructure for scientific data and digital twins, anchored by three digital hubs in **Mexico, Italy, and China**. The three case-study sites would center on Chichén Itzá, a major Italian monument (e.g., the Colosseum), and China.
- **Return trip planned for September 2026** to continue partnership development.
- **Terracotta-warrior scanning did not proceed** — permissions were withdrawn at the last minute (see Field Diary, July 23), but our substitute pieces represent key experimental components of novel research involving terahertz scanning tech, and will be key to future publications.
- **Mobile-metrology development ongoing** — continued work on a mobile system to extract reliable metric data directly from the iPhone LiDAR sensor.

## Data Acquisition:

Our imaging tools and methodologies are outlined below:

### Structured Light Scanning (SLS) - Artec Leo



This portable system projects patterns, whose deformation is read realtime and aligned with SLAM to create 3D scans.

Capable of capturing complex geometries at approximately 0.3mm resolution (under best conditions), reliably capturing at 0.6 - 0.7 mm resolution.

### iPhone 15/17 pro LiDAR Sensor Stack



The iPhone 15 and 17 Pro feature a front LiDAR camera with 18MP RGB sensor, constituting the “truedepth” system, and back time-of-flight sensor suitable for 0.5 - 5 meter range, with 3 different 48mp wide, ultrawide, and telephoto RGB sensors.

## Field Diary

### July 8 — Beijing: Arrival, National Art Museum

Scott and Aviral arrived in Beijing (Aviral in earlier). Carol had been in Beijing since July 6, meeting with an AI researcher and UC San Diego alumni/booster.

- Aviral visited the **National Art Museum of China** with Tim (UCSD student); the program was heavily Florence-themed facilitated by a collaboration with the Uffizi Museum. Displays included drawings of the *Battle of Anghiari*.
- Carol meeting with the UCSD Alumni Association.

### July 9 — Beijing: Numismatic Museum, Terracotta Collaboration

- Carol and Aviral at the **China Numismatic Museum**; planning session.
- Meeting with **Alexander Westra** (post-doc, Henan University) on the digital terracotta-warrior collaboration. Valuable insight into the motivations of Chinese archaeology scholars, including a new national emphasis on teaching over research.



## July 10 — Beijing: Temple of Heaven; iOS LiDAR App

- Visited the **Temple of Heaven Park** (the Great Wall tour was rained out).
- Scott and Aviral: planning for the iOS LiDAR app.



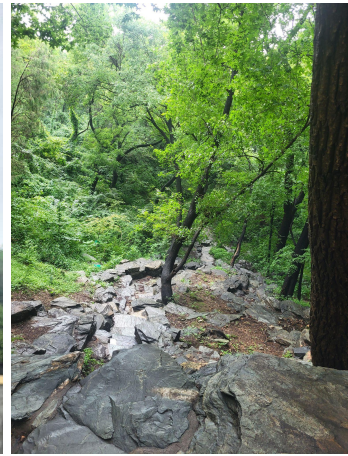
## July 11 — Beijing: National Museum; CHCD Paper

- Full day with **Mi Yunjing** (WIC) at the **National Museum of China**.
- Advanced the **CHDC** conference paper (with Jonny).



## July 12 — Beijing: Summer Palace

- Full day at the **Summer Palace**.
- UCSD Alumni Fundraising.



## July 13 — Beijing: Transitions

- Carol departed.
- Scott: remote interview.
- Aviral: Calligraphy District.

## July 14 — Beijing → Shanghai

- Train to **Shanghai**; WIC planning en route.
- Evening at **the Bund** — striking waterfront.



## July 15 — Shanghai: Fudan University

- Work day; planning for the Terracotta Warriors campaign.
- Visited **Fudan University** with Prof. Xia; Fudan featured excellent visualization systems.



## July 16 — Shanghai: Shanghai Museum; HKU

- Proposals in the morning.
- **Shanghai Museum** — Mesoamerican exhibition in collaboration with INAH.
- Meeting with **Prof. Peter Cobb** (HKU) in the evening. Discussed large-scale visualization systems for archaeology.



## July 17 — Shanghai: Proposals & Partner Meetings

- Aviral: LiDAR app development.
- Scott: proposals and papers.
- Afternoon meeting with **Prof. Maurizio Seracini**.

## July 18 — Shanghai: Rest / Rain Day

- Aviral: app development; planning around Potree-Next contribution.
- Scott: field reports and articles.

## July 19 — Shanghai: Shanghai Museum East

- **Shanghai Museum East** — Chinese collection, fantastic XR screens as part of the bronze casting exhibit.



## July 20 — Shanghai → Xi'an

- Long train to Xi'an.
- Scott met **Mi** and an intern at the **Big Wild Goose Pagoda**, a chocolate museum, and the **Great Tang Ever-Bright City**.
- Aviral spoke with **Markus Schütz** to plan an upcoming collaboration around Potree-Next at TU Wien.



## July 21 — Xi'an: WIC Registration

- WIC registration.
- Meeting with Mi, Simone Pastor, and Prof. Zhang.

## July 22 — Xi'an: Digital Silk Road Development Forum

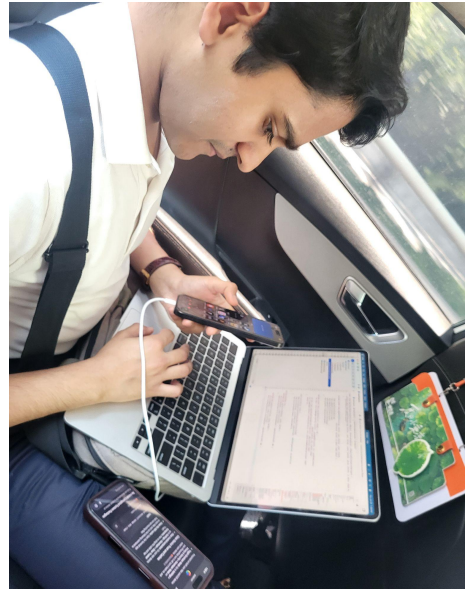
- **WIC Digital Silk Road Development Forum.**
- **Won an award** for a cultural-heritage case study; press interviews.
- Scott delivered the **keynote speech**. Strong turnout of government and industry representatives. Highlight speakers included Wang Xingxing (Founder and CEO of Unitree) and Wang Binying (Deputy Director General of WIPO).
- Participated in VR demos.



## July 23 — Xi'an: Lintong Museum Scanning Campaign

After settling on terms, the team met Peking University colleagues in the afternoon at the **Lintong Museum**. Due to unforeseen circumstances, permission to scan the four terracotta warriors and horse was withdrawn. In their place, the team was given access to **four pieces of painted pottery**. Coordinating through Dr. Han Sai, Beijing University of Petroleum.

- **Artec Leo** scans (S. McAvoy) provided the baseline maps for a **terahertz scanner** mounted on a robotic arm.
- Additional Artec Leo scans of a **winged tiger** and **two guardian statues** in the courtyard, a **bronze bell**, and the **underside of a pagoda**.
- Aviral captured sample data using his new depth-capture apps.



## July 24 — Xi'an: Terracotta Army & Mausoleum

- Aviral and Scott visited the **Terracotta Army and the Emperor Qinshihuang's Mausoleum Site Museum**.



- iPhone rear-LiDAR tests through glass display cases, with some true-view capture of warrior heads.



## July 25 — Xi'an → Beijing

- Train to Beijing.
- Evening Meetings with Simone Pastor and Mi.

## July 26 — Beijing: Project Planning

- Project discussions with Mi, Prof. Zhang, and Simone.

## July 27 — Beijing

- Simone departs.
- Afternoon project planning with Mi and Prof. Zhang.

## July 28 — Beijing: Forbidden City

- Tiananmen / Forbidden City at midday.



## July 29 — Beijing: Great Wall

- Great Wall, Mutianyu Section
- Evening with Mi.



## July 30 — Departure

- Flight home.

## Data Quality and Availability

The data provided by this project is not certified by a licensed surveyor. Measurements provided are subject to error. If an application requires a particularly high level of accuracy or precision (for example, a hydrological analysis) please contact the authors of this report.

Data captured at the Lingtong museum is owned by the institution. It is intended for research and educational use, the specific details of this data and its restrictions are available upon request.

## Appendix - Data Inventory

| Description                            | Source             | Internal Path                             | License                      |
|----------------------------------------|--------------------|-------------------------------------------|------------------------------|
| 00482 Lid and Bottom                   | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| 00116 Bowl                             | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| 00595 square vase with lid             | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| 00607 cylindrical granary              | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Bronze Bell                            | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Stone Qionqi - winged tiger            | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Stone Guardian 1                       | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Stone Guardian 2                       | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Gazebo interior                        | Artec Leo          | china/july_2026/lingtong                  | Restricted - Lingtong Museum |
| Terracotta Army - about 260 image sets | iPhone Depth Suite | china/july_2026/25_7_2026_terracotta_army | Open CC-BY                   |
| Forbidden City - 271 image sets        | iPhone Depth Suite | china/july_2026/28_7_2026_forbidden_city  | Open CC-BY                   |