

Request Information

Permalink

## Spatial Temporal Reasoning For Location-Specific Actions

Tech ID: 34174 / UC Case 2025-841-0

### BRIEF DESCRIPTION

A groundbreaking system that enables navigation in GPS-denied environments by using intelligent systems to mimic biological systems that recognize locations through visual cues and perform contextually appropriate actions.

### FULL DESCRIPTION

This technology introduces a novel approach to vision-based localization and navigation by leveraging biologically-inspired models to transform first-person perspective observations into precise geographical coordinates without relying on GPS or map databases. Utilizing sequential generative models, namely VAE-RNN and VAE-Transformer, this system achieves remarkable localization precision in diverse environments by directly mapping visual-temporal observations to spatial understandings, thereby enabling contextually appropriate responses to specific locations.

### SUGGESTED USES

- Enhanced autonomous driving systems with location-specific actions.
- Real-time navigation aids for robots in diverse environments.
- Efficient and precise location-based services without reliance on GPS.
- Improved spatial intelligence for AI systems in urban planning and mobility solutions
- Potential for specialized map service offerings utilizing STRMs.

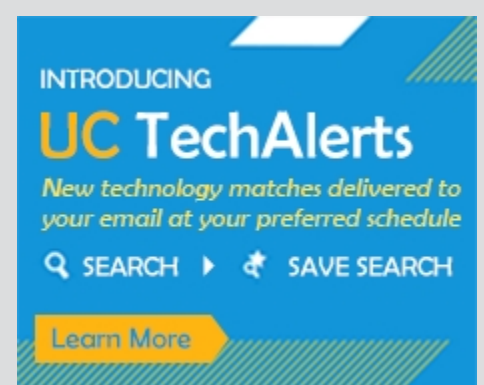
### ADVANTAGES

- Does not rely on dense satellite image databases or GPS coordinates.
- Outperforms existing cross-view geo-localization methods and, in some cases, matches commercial GPS accuracy.
- High precision localization with minimal deviation in challenging environments.
- Training can be done in an active environment because the system can reject transient objects.
- Superior computational efficiency enabling real-time operation on resource-constrained platforms.
- Direct transformation of visual cues into precise spatial understanding.

### PATENT STATUS

### CONTACT

Richard Y. Tun  
tunr@uci.edu  
tel: 949-824-3586.



### OTHER INFORMATION

### CATEGORIZED AS

#### » Sensors & Instrumentation

- » Analytical
- » Environmental Sensors
- » Other
- » Physical Measurement
- » Position sensors

#### » Transportation

- » Automotive

### RELATED CASES

2025-841-0

Patent Pending

## RELATED MATERIALS

» Lui, H. W., & Krichmar, J. L. (2025). STRMs: Spatial Temporal Reasoning Models for Vision-Based Localization Rivaling GPS Precision. arXiv preprint arXiv:2503.07939

**UCI** Beall  
Applied Innovation

5270 California Avenue / Irvine, CA  
92697-7700 / Tel: 949.824.2683



© 2025, The Regents of the University of  
California  
[Terms of use](#)  
[Privacy Notice](#)