



Vera: The OS for Commercial Spaces

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Resonai.com

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Introduction

We don't normally think of buildings as something we consciously interact with, much less as something that actively adapts to our needs from one moment to another.

At Resonai, we see new possibilities.

We believe that the entire physical structure in commercial buildings provides a canvas for the next digital revolution, changing what buildings can do for us and what we can do with them.

We've introduced a new kind of platform to do just that, and it's called Vera.

Vera: The OS for Commercial Spaces

Our expertise is in AI and computer vision – getting machines to understand what they see. With Vera, we built a platform that uses a complete and precise understanding of a building's 3D structure as the foundation for a new class of applications for the entire life cycle of a building.

Create apps for full-3D spaces

The kinds of applications you can create with Vera are unlike anything that's possible with other platforms today. Vera allows you to take full advantage of physical spaces in 3D, using their unique structure and geometry. Applications are more immersive, natural, and useful by an order of magnitude than the single-surface experiences possible with platforms like ARCore and ARKit. It's a development canvas that lends itself to an infinite amount of possibilities.

A full-stack OS

We designed Vera to be a true OS for commercial spaces – one that complements operations across the building lifecycle, and a platform designed from the ground up to support a thriving ecosystem of building owners, end-users, and developers.

| Developers | Building owners & managers |
|---|---|
| Platform and SDK Create next-gen AR experiences leveraging: <ul style="list-style-type: none">Advanced semantics: 3D object recognition and 3D scene reconstructionPrecise mesh understandingAccurate registration and tracking | Scanning services Professional teams to create full 3D scans of your space. Admin tools & analytics Central console to create, QA, preview, deploy, and manage Vera experiences across all your spaces. View analytics on how experiences are consumed. Security & permissions Manage viewing and editing rights for each experience. |
| Marketplace Distribute and monetize apps | App store Robust marketplace of apps tailored to the experiences for your business. Examples: <ul style="list-style-type: none">Indoor navigationIoT controlAR-powered tutorialsDigital conciergeContextual tickets for maintenance crew Cross-platform Deploy Vera experiences for any mobile device. |

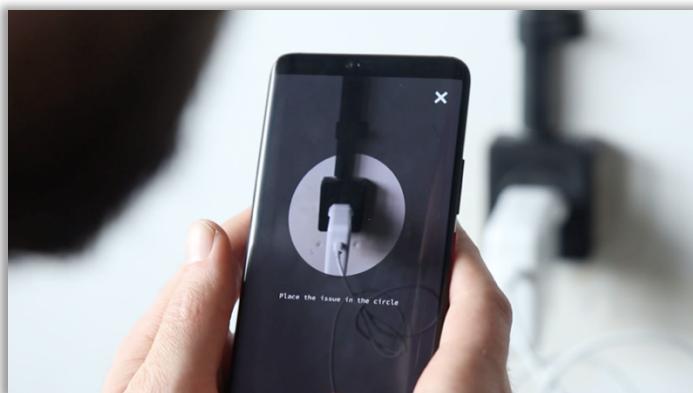
Use cases and real-life demos

We've built an SDK that harnesses our expertise in advanced semantics – powered by 3D object recognition, 3D scene reconstruction, and precise mesh understanding – and gave early access to developers to see what they could do. From information sharing to indoor navigation to controlling smart devices, these types of applications are just the beginning.

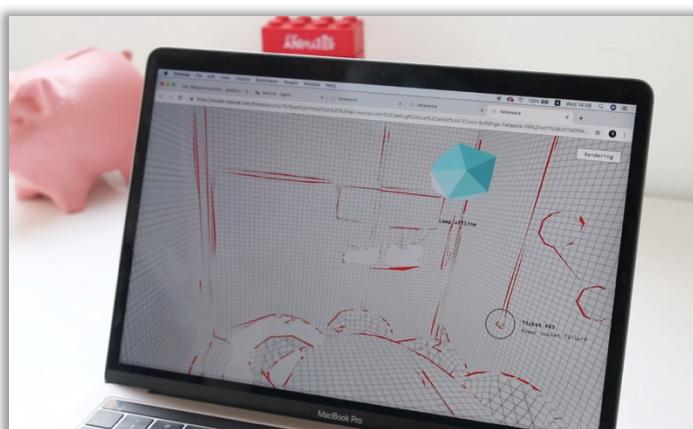
These are fully functional applications, ready to integrate into your commercial space:

Contextual tickets for design, construction, and maintenance

Sharing essential information and resolving issues about design discrepancies, inspections, and repairs with large, remote teams can be as simple as texting pictures to friends and family. Using the camera on their mobile device, property owners and others can take photos and write notes to report potential issues. Vera offers a comprehensive view of these issues and other relevant data in a centralized 3D model, so operators can exchange comments and track progress with contractors and crew members from anywhere. With indoor navigation, Vera can route engineers to the exact location for further inspection.

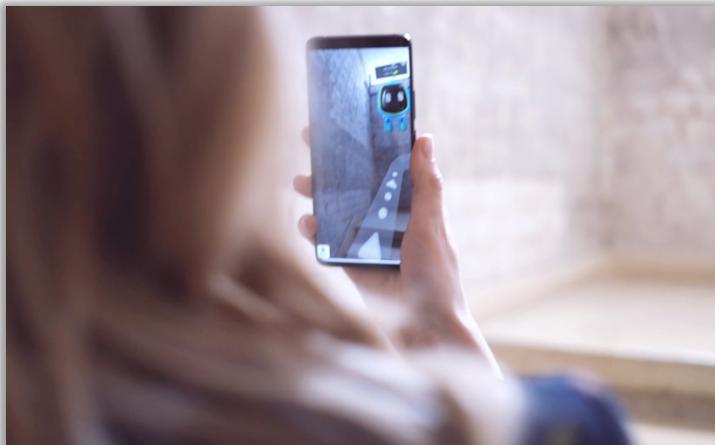


View and troubleshoot potential issues in context of a centralized 3D AR view of your entire building, accessible from anywhere. With indoor navigation, engineers get routed directly to the problem area.



Indoor navigation

Vera can power indoor navigation for commercial buildings, guiding people to where they want to go, while offering points of interest along the way such as restrooms, a place to grab a snack, or the way back to the parking garage.



Indoor navigation, powered by Vera's precise understanding of a building's 3D structure.

IoT control

With 3D object recognition, Vera lets you simply point your smartphone at connected devices to control them more naturally. You don't need to launch one app for lights and another for your thermostat. And with Vera, you don't have to constantly hold your phone up – once the object is recognized, Vera brings up the right interface automatically so you can interact with it more comfortably.

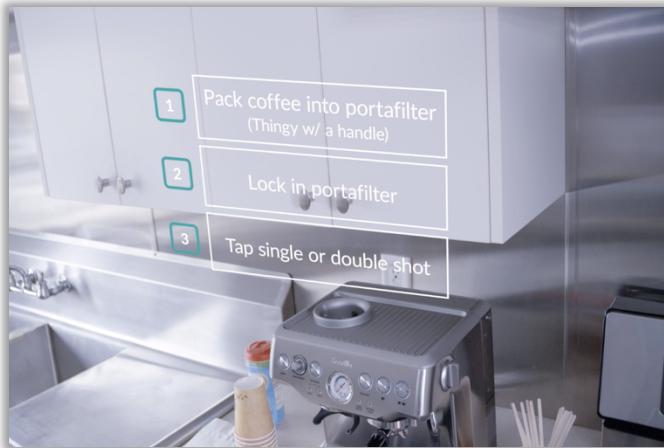


Control IoT devices with Vera, just by pointing your smartphone.

AR-powered tutorials

Whether it's a hotel or a co-working space, it's common to come across equipment or processes that aren't intuitive at the outset. Rather than distribute documentation that goes unread, is difficult to understand, or eventually goes outdated, building operators can offer AR-powered tutorials. These can display step-by-step instructions, real-world tips,

and other practical information for just about any kind of object, like common appliances or office equipment. Paired with Vera's navigation capabilities, you can even direct people to the right cabinet for the coffee mugs.



Present contextually-relevant information for complex devices and processes using AR-powered tutorials.

Digital concierge

To complement reception and concierge staff, Vera can extend your welcome and hospitality with an AR-powered digital concierge. With object recognition and navigation, Vera lets you overlay useful information about individual devices or locations, and contextually relevant tips about your facility's services based on where someone is, as well as special events or offers they can take advantage of during their stay.



Pair indoor navigation with a Vera-powered concierge to provide useful information and POIs, helping people make the most of your space.

Gamified experiences

As practical as Vera is for professional information sharing and tenant/client services, you can also create applications that are simply fun and improve the quality of life in your commercial space. Create gamified experiences that encourage people to take the stairs, digital graffiti walls for people to brainstorm and share ideas, or provide visual Easter eggs to entertain visitors and make them feel at home.



Enhance the tenant experience with gamified experiences, like encouraging people to take the stairs with a Donkey Kong-style, barrel-dodging challenge.

Vera and the entire building lifecycle

Vera-powered applications start with a detailed, high-quality 3D scan of your commercial space, whether it's a room, a floor, or a complete building. These types of scans are done with professional LIDAR scanners or 3D cameras.



View of a complete building scan in 3D, powered by Vera's admin console.

With a professional-grade 3D scan and the precise mesh understanding Vera provides, applications can take full advantage of the true structure and geometry of a space. Applications feel more immersive with realistic physics and occlusion between virtual and physical objects.

Vera processes and supports virtually any size 3D scan, so you can scale the design, management, and analysis of AR experiences in spaces both large and small. Once a master 3D scan is made, building owners and managers can easily update sections of the scan to support renovations and other changes to the space, ensuring an always-accurate 3D model. These incremental updates can be done with consumer-grade mobile phones that are equipped with depth cameras, as Vera can process video from RGBD input streams.

And to make any commercial space Vera-ready, Resonai offers scanning services through a trusted network of third-party professionals.

Admin tools

Building operators can easily manage Vera experiences from anywhere using a cloud-based admin console. You can preview and simulate exactly how an experience will work and behave within a 3D view of your space, without being on site. Of course, you can also preview multiple instances of Vera applications simultaneously throughout your building, giving you a complete view of how these experiences fit together – and how you can optimize Vera for your space over time.



Preview how applications will behave within a 3D view of your building. See how experiences fit in context with each other.

Security

Vera uses role-based access control (RBAC) for user authentication and authorization. Each user has a role in the system, and each role has different access permissions. This allows building administrators, for example, to ensure that a technician who works on the 5th floor only has access to data about the 5th floor – and similarly, property managers can access data for the entire building.

Access control is also defined at the location level (i.e. where users physically are within a space) and the application level (i.e. not every person in a given location needs to be exposed to the same content). Thus, visitors won't have access to content that's intended for maintenance staff.

Analytics

Vera offers useful analytics to building owners and app developers alike, all while respecting and maintaining user privacy. You can evaluate popular hotspots or under-utilized areas for Vera experiences in your space. As a developer, you can see what specific parts of your application should be optimized.

Hello (new) world

The Vera SDK: A development platform like no other

Working with large 3D meshes

Vera makes it easy to build, test, and deploy experiences using large, detailed, and complete 3D meshes of your building. They are processed, indexed, and stored on the cloud so you can work with detailed models from anywhere, and they are optimized so you can quickly navigate and inspect the properties of the full scan.

Vera has the added flexibility to let you plug and play various components to enhance your application, like statistics about a building, registration information, and semantic tagging. The data model makes it really easy to add properties and store more information and calculations for future use.

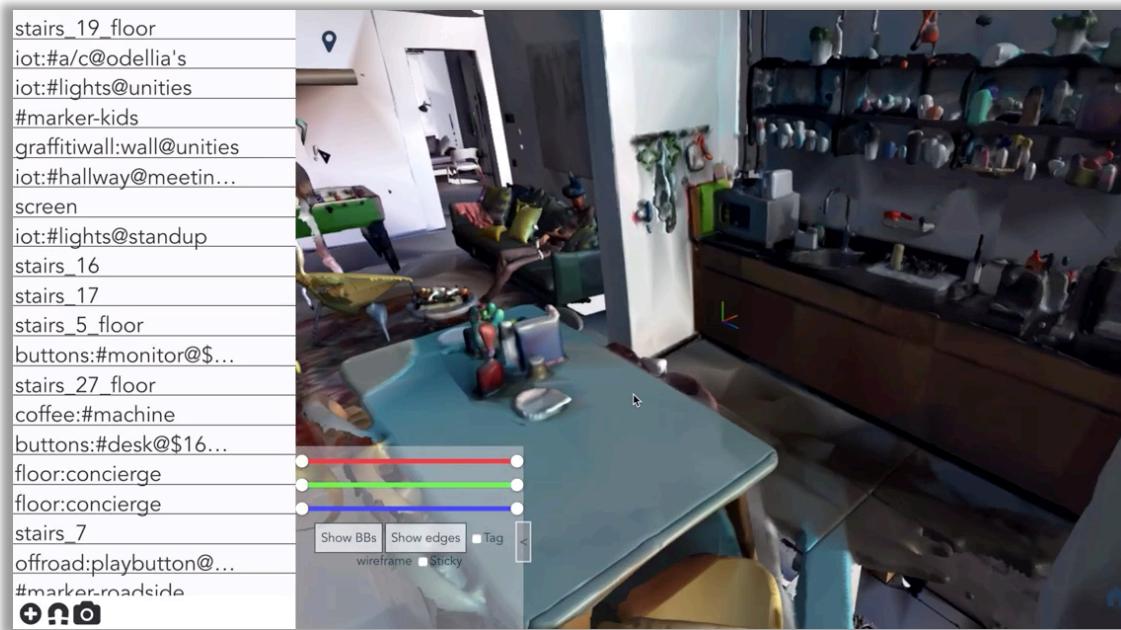
When you want to test your applications, you can simulate them in multiple spaces, and see exactly how they work in a 3D space. Because of our web-based console, you can do this from anywhere – whether it's a building that's just down the road, or halfway around the world.

Semantics: Adapting to spaces

Whatever kind of experience you create, Vera gives you the flexibility to develop applications that adapt to the commercial space they're in. On the development side, no specific coordinates need to be hard-coded into an application. Developers can query specific items and their locations, and this data is used in runtime to adapt the experience to any given building.

But at the core of Vera is its use of semantics – using the context of what is present within a space to tailor what your application can do. For instance, you might develop an application based on the presence of chairs, conference tables, stairwells, elevators, and connected devices like smart lights and thermostats. If your application is used in a property that doesn't have one of those objects, or if there's a notable change to one of those objects (e.g. an elevator that is temporarily out of order), the experience can adapt accordingly. In other words, you can develop a single application that provides tailored experiences based on what is present or not present in a given space.

Vera uses a hybrid approach to support semantically-aware experiences. While some objects are automatically detected when Vera processes the original 3D scan, Vera also allows building admins to review, verify, and manually tag where other semantically-significant objects are in their 3D scans so applications can take full advantage of your building's semantics.



Building admins can review, verify, and tag semantically-significant objects to ensure that applications adapt to the full semantics of a space.

A “SLAM” dunk for AR apps

Vera overcomes the traditional challenges commonly associated with registration and tracking. With high-quality 3D scans of commercial spaces, Vera can index and pre-calculate everything that's needed to solve the SLAM problem with high accuracy. In the near future, we are working on integrating a global coordinate system that allows developers to optimize applications around knowing where a user is within a building, as well as what direction they're facing.

Plugin for Unity

If you develop on Unity, we created a plugin to help you create Vera applications in an environment you already know.

Our Unity plugin helps with things like compiling, working with large 3D meshes efficiently, applying semantics, loading experiences, and hooks for when experiences start and end. This lets you focus on leveraging all the powerful capabilities in Vera, without having to learn a new platform completely from scratch.



A new frontier

Vera is truly a new kind of platform for developers – one that makes it possible to build a new generation of apps that can really change the world, with an opportunity to solve real problems in the spaces people use everyday.

Let's build something together

We are incredibly excited about what Vera can do, and we want to partner with innovative, forward-thinking commercial real estate companies, technology providers, and application developers around the world to realize Vera's full potential.

If you're interested in building proof-of-concepts or developing applications with Vera, send us a note at Vera@Resonai.com.

About Resonai

Founded in 2014, Resonai is backed by private investors and headquartered in Tel Aviv. Our U.S. office is in the heart of Silicon Valley in Palo Alto, California.