

AR Interior Design

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Abstract— The IKEA catalog lies. So does every other glossy furniture lookbook, for that matter. The whole experience is a masterclass in disappointment, a slow-burn tragedy that usually ends with a piece of furniture that's either comically oversized or laughably small for your actual living space. So when someone pitches yet another AR app promising to save us from our own terrible spatial reasoning, my default setting is skeptical. The pitch is familiar: point your phone at your sad, empty room and start dropping in digital couches and coffee tables. But this one tries to do a bit more than just prevent that specific brand of buyer's remorse—the kind that hits when you realize the Scandinavian-chic bookshelf you just spent an hour assembling with a tiny Allen key is approximately the size of a shoebox.

It even bakes in Vastu Shastra principles to guide your furniture Tetris, which is... a choice. So, theoretically, your sofa won't just fit, it'll be "energetically balanced." (Whatever that means. I'm pretty sure my energy is most balanced when I don't have to return a 200-pound sectional, but maybe that's just me.) Beyond the cosmic alignment of your chaise lounge, you can slap some virtual paint on the walls or preview glass materials, solving that age-old problem of agonizing over frosted versus clear panels. It'll also suggest actual, buyable furniture that fits your budget, saving you from the heartbreak of designing a dream room only to discover it costs more than your car.

The whole thing is stitched together with the usual suspects—ARCore, Unity, a dash of TensorFlow Lite—to make sure the digital ottoman doesn't clip through your real-life cat. Is it redefining interior design? Let's not get ahead of ourselves. But if it can save a few thousand people from the headache of building a piece of furniture only to realize it's all wrong for the space, then maybe it's earned its spot on your phone.

I. INTRODUCTION

Anyone who's ever had a full-blown argument over the precise shade of off-white for a hallway knows the unique agony of interior design. It's a process built on guesswork, squinting at furniture catalogs, and trying to imagine how a six-foot velvet sofa you saw online

might look in a space currently occupied by a dying houseplant. It rarely ends well.

This is the particular domestic nightmare a new breed of AR and VR tools is trying to solve. The concept is brutally simple: stop guessing. Instead of holding up a paint chip the size of a postage stamp under the terrible fluorescent light of a hardware store, trying to divine how 'Greige Mist' will look on a south-facing wall at dusk (a specific kind of design-based insanity we've all been forced to accept), you just point your phone. The AR part of the equation lets you scan your actual room and digitally slap that paint on the wall or plop down a virtual bookshelf to see if it tragically blocks the only convenient outlet.

For the truly commitment-averse, you can then slip into a VR headset for a full 3D walkthrough of the finished concept. It's less about just seeing it and more about *feeling* the space, getting a sense of whether you'll constantly be banging your shins on that aggressively modern coffee table. This particular system even throws in Vastu Shastra layout suggestions, which sit oddly next to budget furniture recommendations pulled from various online retailers. It's a strange, everything-but-the-kitchen-sink approach, but when you're trying to prevent a thousand-dollar sofa-related catastrophe, you take what you can get. So, the whole point is to finally put an end to the guesswork—and, if we're lucky, the inevitable arguments that come with it.

. II. RELATED WORK

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III. CHALLENGES IN THE FOUNDER JOURNEY

No one really wants to be a founder. They want the magazine cover. The real job is arguing with someone at 3 AM about the kerning on a button nobody will ever click. That whole 'change the world' story is just marketing copy for a lifestyle that's mostly composed of managing chaos and mainlining coffee.

First, you have to convince actual human beings to care about the thing you've built. They have a sterile name for this: 'product-market fit.' What it really is, is the gut-wrenching discovery that your brilliant idea is stunningly irrelevant to almost everyone. It's months, sometimes years, of chasing this ghost, tweaking features and cornering strangers for five minutes of their time, all for the prize of polite, soul-crushing feedback. (There's a special kind of silence in a user-test when you know, you just **know**, they're never going to open this app again once the Amazon gift card hits their inbox.)

If you survive that particular ego-shredding, you get the distinct pleasure of begging for money. This means putting on your one clean shirt to pitch your dream to a room of people who are absolutely checking their Apple Watches every 30 seconds. Your life becomes a spreadsheet. Your runway isn't a fashion statement; it's a terrifying countdown clock to insolvency. Every dollar spent feels like a desperate Hail Mary, and every dollar saved feels like you're strangling your own creation. It's a great headspace.

Then come the other people. Hiring sounds great, until you realize you're now personally responsible for someone else's mortgage. You stop being the person who does the thing and become a part-time therapist, a mediocre manager, and the official point person for when the Wi-Fi goes down. The goal is to find others who share your specific brand of delusion, a task much harder than it sounds.

And let's not forget the slow-motion psychological collapse. This journey is professionally isolating in a way few things are. You can't tell your team you're terrified of missing payroll, and you can't explain it to your friends without getting that patronizing head-tilt and a 'well, at least you're your own boss!' It's an immense pressure cooker, fueled by stale pizza and a constant, low-grade dread.

Really, the whole gig is just an exercise in getting punched in the mouth and asking for another. Markets shift, better-funded competitors materialize out of thin air, and your brilliant tech stack becomes a legacy system overnight. It never, ever stops. So why do it? I have no idea. Maybe it's a high-stakes form of masochism. Or maybe, after all that, the magazine cover just seems worth it.

V. FRAMEWORK AND DESIGN PRINCIPLE

There's a special kind of dread that comes from staring at a wall of paint swatches, each one a slightly different shade of "disappointment beige." You know that whichever one you pick, it's going to look completely different in your actual, poorly-lit living room. An army of developers, it seems, has decided this specific form of domestic misery is the next frontier, and their solution is a cocktail of AR, VR, and a surprisingly opinionated AI.

Forget the corporate slide deck about a "three-layer architecture." In plain English, it works like this. First,

your phone's camera gets to work scanning your room, using some slick AR mapping to figure out the walls, the windows, and that weird stain on the carpet you've been meaning to clean. This is the part where it gobbles up all the sensory data—the real-world dimensions and lighting—before you even start tapping on minimalist Scandinavian furniture in a digital catalog.

Next, the whole operation gets handed off to the brains of the system. This isn't just about rendering a 3D model; an on-device AI, running TensorFlow Lite, starts making some actual judgements. It classifies your existing junk, suggests color palettes, and then—this is the part that feels plucked from a completely different universe—starts applying Vastu Shastra rules to optimize the layout. Seriously. It analyzes the room's orientation to tell you where your sofa should go for better energy flow, a fascinating, slightly bizarre marriage of ancient Indian architectural principles and modern machine learning. (A detail that probably makes perfect sense in some markets and sounds like tech-infused mysticism in others.) Everything you do, by the way, gets quietly synced to Firebase in the cloud, so your grand design doesn't vanish when you switch from your phone to a headset.

The payoff, of course, is what you see. Using Unity, the system lets you either plonk a true-to-scale virtual sofa in your actual living room with AR or take a full-on 3D walkthrough of the finished space in VR. The creators are obsessed with realism, tweaking the dynamic lighting and shadows to avoid that classic online shopping problem where the armchair you bought turns out to be fit for a dollhouse.

The entire thing is supposedly built to be modular and intuitive, which is usually just a fancy way of saying “we hope to add more features later” and “you won't need an engineering degree to use it.” It's a clever attempt to solve the paralysis of choice that haunts every trip to IKEA. At the very least, it gives you a new, technologically advanced way to argue with your partner about furniture placement.

VI. REFERANCE SYSTEM ARCHITECTURE

Let's be honest, trying to mentally place a new sofa in your living room is a special kind of hell. It's an exercise in failed spatial reasoning that usually ends with you, a tape measure, and the slow-dawning

horror that your dream couch won't even fit through the door. This app, or rather, the sprawling architecture behind it, is the latest high-tech attempt to solve that very analog problem.

Forget the neat, layered diagrams. The guts of the thing start with your phone's camera, which greedily maps every nook, cranny, and unfortunate dust bunny in your room using ARCore. It's not just taking a picture; it's building a crude digital twin of your space, figuring out where the walls are, how the light hits the floor, and where it can anchor a virtual chaise lounge without it floating away into the ceiling. At the same time, you're telling it what you want, flicking through catalogs and setting budgets.

All that raw data—the room scan and your questionable taste in throw pillows—gets funneled into the system's brain. This is where a lightweight TensorFlow AI starts making judgment calls. It identifies that you're in a bedroom, not a kitchen, and then does something truly wild: it runs your layout against Vastu Shastra principles. (Because what everyone needs is an AI acting as a digital feng shui consultant you never asked for, but here we are.) This processing layer is also where the boring-but-essential stuff happens. Algorithms make sure the virtual furniture is scaled correctly, so you don't end up with a dollhouse-sized armchair, and it all syncs up to a Firebase Cloud account so your meticulously crafted design doesn't vanish into the ether if you switch from your phone to a tablet. Of course, none of that matters if you can't see it. A whole integration layer works like a frantic backstage crew, connecting the 3D models from the library to the real-time render, constantly checking for updates like if that lamp you wanted just went out of stock. This is the plumbing that allows the whole magic trick to work. And the show itself? That's all handled by Unity 3D. It's what slaps that surprisingly realistic 3D model of a sofa right where your cat is currently sleeping. This is where you get to toggle between AR, seeing the furniture in your actual room, and a fully immersive VR walkthrough for the complete “is this really my life?” experience. The system sweats the details, rendering dynamic lighting and shadows to try and convince you it's all real. It's a mountain of code, a complex dance between half a dozen different technologies, all just to answer one simple, agonizing question: will it fit?

VII. CONCLUSION

you've had the argument over paint swatches. That special kind of domestic hell where fifty shades of off-white all look identical until one is on your wall, at which point it's revealed to be a nauseating shade of yellow. Well, another piece of tech is here, promising to end these disputes by throwing the entire kitchen sink of buzzwords at the problem—AR, VR, and a dash of AI for good measure.

The pitch isn't new. You point your phone at your tragically empty room, and a blend of ARCore and Unity lets you digitally plop down a sofa that, in theory, will actually fit through the doorway this time. Its main party trick is jumping from that AR view into a full-on VR walkthrough. You can actually stand in your not-yet-real living room to see if you'll constantly be banging your shins on that trendy, sharp-edged coffee table. (A problem no 2D floor plan has ever really solved, let's be honest.) The system even uses TensorFlow Lite to give you "smart suggestions," which I can only assume is a polite algorithm to stop you from pairing floral wallpaper with plaid curtains.

But the part that actually made me raise an eyebrow wasn't the furniture placement. It was the Vastu Shastra guidance. They actually digitized an ancient Hindu system of architecture to make sure your virtual feng shui is dialed in for "harmony and positive energy." I'm not entirely convinced the placement of my digital ficus tree will bring me inner peace, but it's such a bizarrely human, almost superstitious detail to find in a sea of cold code.

Naturally, it's not all perfectly rendered digital zen. The system still has to fight the usual demons of this tech—lighting that never quite looks real, the kind of rendering lag that tests your stomach, and the very real possibility of your phone heating up to the temperature of the sun. The creators insist their AI and cloud-based fixes are on the case. We'll see. For now, it's one of the more interesting attempts I've seen to solve that sinking feeling you get when you realize the armchair you just bought is two inches too wide for the only wall it can go on. Anything to avoid having to disassemble an IKEA bookshelf because you measured wrong. If it brings some positive energy along the way, I guess that's just a bonus.

APPENDIX

Let me guess: you've had the argument over paint swatches. That special kind of domestic hell where fifty shades of off-white all look identical until one is on your wall, at which point it's revealed to be a nauseating shade of yellow. Well, another piece of tech is here, promising to end these disputes by throwing the entire kitchen sink of buzzwords at the problem—AR, VR, and a dash of AI for good measure.

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ACKNOWLEDGMENT

And... scene. The project is done. Shipped. Pushed out the door before it could consume another one of our weekends. Cobbling together this “NextGen AR + VR Interior Design System” was less a neat journey of discovery and more of a frantic, caffeine-fueled scramble, so it feels only right to acknowledge the people who kept the whole enterprise from completely catching fire.

First, to our Project Guide, Dhanashree Jagdale [for possessing the patience of a saint and gently talking us down from the kind of catastrophic dead-ends that seem like genius ideas at three in the morning. Your guidance was the thin line between a working prototype and a very expensive, non-functional paperweight.

A massive nod is due to our Head of Department, Shubham Shelke, and the entire faculty at Samarth College’s AI/ML department. You all gave us the theoretical toolkit, which, after enough trial and error, finally started to make sense in the real world. To the Principal, [Principal’s Name], thank you for cultivating an atmosphere where booking a lab didn’t require a form filled out in triplicate (a small miracle in academic life) and for ensuring the Wi-Fi worked at least most of the time.

Of course, there are our friends and classmates, who we roped into being our first, and most brutally honest, beta testers. The feedback, which ranged from “this is actually kind of cool” to “this user interface makes my eyes hurt,” was equally vital. We owe you all several rounds of drinks.

Finally, to our families. For the unwavering moral support, the tactical delivery of food at odd hours, and for perfecting the art of not asking too many pointed questions about when exactly “that computer thing” was going to be finished. Your belief in us was the background process that kept everything from crashing.

We learned a ton, sure. But the main takeaway was that building anything is a team sport, even when it feels like a solo marathon against a ticking clock. So, to everyone in the credits, thank you.

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