Project: VoiceCAD-AI
Opportunity Report

USC Viterbi School of Engineering

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Abstract

VoiceCAD-AI is redefining the CAD landscape by introducing voice and gesture controls that make professional-grade design tools accessible, intuitive, and efficient. By addressing critical barriers such as steep learning curves, counterintuitive interfaces, and limited accessibility for users with diverse technical proficiencies, VoiceCAD-AI empowers professionals and students to design seamlessly and innovate faster.

Built on advanced AI technologies like Natural Language Processing (NLP) and gesture recognition, VoiceCAD-AI integrates directly with AutoCAD to enable precise modeling, automated workflows, and real-time collaboration. Targeting a growing CAD and PLM market valued at $26.37 billion by 2030, this transformative platform is poised to capture significant market share with scalable solutions tailored for industries like engineering, architecture, and manufacturing.

With a clear growth trajectory, a validated prototype, and a strong team, VoiceCAD-AI seeks $3 million in funding to expand operations and capitalize on this unprecedented opportunity to revolutionize design workflows globally.

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Vision and Value Proposition

Slogan: The Alexa of CAD: Transforming design with AI
VoiceCAD AI revolutionizes CAD with voice and gesture controls, enabling faster, intuitive workflows and accessible professional-grade design for all.

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Problem

Traditional CAD design faces critical challenges to accessibility and effectiveness. Steep learning curves and complicated interfaces frustrate users, stifle creativity, and extend design workflows. Designers often cannot express their ideas in a digital model due to counterintuitive inputs, extending project timelines, and increasing costs. For students, this creates a barrier to learning and innovation, preventing them from exploring their creative potential and preparing for industry demands. Furthermore, these tools are largely inaccessible to those who have limited technical proficiency or physical impairments, further constraining their utility.

With the increasing adoption of 3D printing in industries, a big challenge arises - dependence on CAD files for input. This is a limitation for consumers who have no experience in CAD and thus cannot fully exploit 3D printing for their customization needs. If we fail to address these challenges, we risk slowing innovation and alienating a growing segment of users who demand more intuitive and inclusive design tools.

The consequences of this problem are far-reaching, from productivity and creativity to market growth. For investors, this represents an untapped opportunity to address a pressing need in a rapidly evolving technological landscape.

Solution

VoiceCAD-AI transforms voice commands into precise CAD models using advanced Artificial Intelligence. With gesture-based inputs, it simplifies design modifications, offering an intuitive, efficient, and accessible experience for professionals across industries.

Product Features and Functions

The AI-assisted CAD system transforms design workflows by integrating Artificial Intelligence, Natural Language Processing (NLP), and gesture recognition directly with AutoCAD.

System Overview

The system architecture seamlessly blends:

- **NLP Processing:** Enables voice-activated commands for creating, editing, and annotating CAD models using cloud-based NLP services for scalability and adaptability.
- **Gesture Recognition:** Software-based gesture tracking allows users to interact with 3D models intuitively, eliminating the need for specialized hardware.
- **AutoCAD.NET API:** Ensures precise, customizable CAD functionalities, empowering users to meet industry-specific needs.

Key Features and Functions

1. **Voice Commands:**
    - Draw, modify, and annotate objects using spoken commands.

    - Automates complex design tasks by understanding user intent through natural language.
2. **Gesture Interaction:**
    - Navigate and manipulate 3D models with hand gestures for zooming, rotating, and selecting objects.
    - Enables real-time responsiveness for smooth and natural interaction.
3. **AI-Driven Automation:**
    - Automatically performs repetitive design tasks, such as dimensioning, resizing, and error checks.
    - Enhances efficiency by reducing manual effort and ensuring consistent quality.
4. **Real-Time Collaboration:**
    - Integrates with cloud storage for saving, accessing, and sharing designs.
    - Supports multi-user interaction in collaborative design environments.
5. **Customizability:**
    - Utilizes the AutoCAD.NET API to build custom workflows, tools, and templates tailored to user-specific requirements.

Customizable Solutions for Diverse Needs

VoiceCAD-AI offers tiered solutions to meet various requirements:

- **VoiceCAD Basic:** Affordable, essential tools for SMEs and independent professionals.
- **VoiceCAD Pro:** Premium features like AR/VR integration and real-time collaboration tailored for enterprise clients in industries such as automotive, aerospace, and architecture.

Market

VoiceCAD-AI is versatile, supporting applications in engineering, manufacturing, architecture, and education. Whether it's iterative design processes, immersive presentations, or student training, the platform adapts to the unique needs of its users.

The TAM (Total Addressable Market) represents the global CAD and PLM software market. According to Fortune Business Insights, the TAM for CAD and PLM software is $19.04 billion in 2024, with a CAGR of 6.2%. VoiceCAD AI, as a CAD tool with advanced AI integration, has the potential to serve all industries using CAD software, including architecture, automotive, aerospace, and manufacturing [7].

The SAM (Serviceable Addressable Market) narrows down to the AI-enhanced CAD market and industries with workflows that can benefit directly from natural language and gesture controls. Focusing on 3D CAD software, which is valued at $10.93 billion in 2024, the SAM for AI-integrated CAD solutions like VoiceCAD AI could be conservatively estimated at 25%-30% of the TAM, or approximately $6.59 billion in 2024, assuming AI is a growing yet emerging feature in the CAD space [8]

The SOM (Serviceable Obtainable Market) represents the market VoiceCAD AI could realistically capture in the short term (e.g., 3-5 years), focusing on early adopters and industries with immediate needs for accessible, AI-driven CAD solutions. With AutoCAD's market share at 23.8%, VoiceCAD AI's SOM could aim for 5-10% of this, assuming strong differentiation and effective market entry strategies. This results in a SOM of $330–660 million, based on a $6.59 billion SAM [2].

Competition

Features	VoiceCAD-AI	Voice Commands for AutoCAD®	Voice2CAD®
Voice to sketch	Prompts are converted into detailed sketches with multiple layers automatically	Prompts select AutoCAD mode from the menu (LINE, CIRCLE, etc.). Further action must be taken by the user using a mouse and keyboard.	Prompts select AutoCAD mode from the menu (LINE, CIRCLE, etc.). Further action must be taken by the user using a mouse and keyboard.
Ease of Use (Learning Curve)	Minimal knowledge of CAD tool required	All knowledge of CAD tool required	All knowledge of CAD tool required
Cloud Processing	Yes	No	No
Natural Language Processing (NLP) Capabilities	Advanced NLP enables understanding of complex, conversational commands.	Limited to specific, predefined commands.	Limited to specific, predefined commands.
Cross-Platform Compatibility	Compatible with multiple CAD platforms and operating systems.	Primarily designed for AutoCAD on Windows.	Primarily designed for AutoCAD on Windows.
Customization and Extensibility	Offers extensive customization options and supports third-party plugin integration.	Limited customization; minimal support for third-party plugins.	Limited customization; minimal support for third-party plugins.

Fusion 360's potential launch of voice and AI features poses competitive risks, including overshadowing VoiceCAD AI with its established brand and resources. Our tool is also cross-functional and will work on all platforms unlike Fusion 360. To mitigate this, we will differentiate through specialized features, target niche markets, and prioritize innovation, user-centric design, and seamless integration. Building customer loyalty, engaging communities, and securing intellectual property will ensure VoiceCAD AI remains a compelling alternative.

Revenue and Operating Cost

Revenue Growth

- 2025: Pre-revenue stage focused on development.
- 2026: Gross revenue of **$795,240** driven by VoiceCAD Basic and Pro subscriptions.
- 2028: Projected annual revenue of **$1.2 million**, supported by sustained growth and geographic expansion.

Operating Costs

- 2025: Going live in 2026 requires Development, Facilities/Infrastructure, and Human Resources in place with a future vision, which results in a total of somewhere closer to **$3 Million**
- 2026: The operating cost for the first year when the product goes live is somewhere closer to **711K**
- 2028: Operating cost is closer to **72%** of the Revenue, which shows revenue is increasing linearly

Net Revenue (2026)

- Adjustments for discounts and churn yield a net revenue of $84,220, ensuring sustainable retention.

Traction

Market survey

1. William Rollins (Lab Manager, Baum Family Maker Space, USC Park Campus)
   "The proposed ability to generate a floorplan interactively through voice commands is intriguing…"
2. Vinaykumar Achwal (Chairman and Director, Crest Test Systems)
   "I would be "Highly interested" [in buying VoiceCAD-AI's subscription]😀"
3. Sherman Yan (Student Worker, Baum Family Maker Space, USC)
   "…will enable students to visualize their concepts quickly without the need for manual CAD work"

Proof of Concept

We have successfully developed a text-to-sketch POC that integrates GPT's natural language processing with AutoCAD's command-line scripting. This solution has enabled users to describe design requirements in plain text, and the system has generated precise scripts to execute these designs in AutoCAD. By automating repetitive tasks, we have streamlined workflows and minimized manual input errors. This POC has demonstrated its potential to enhance efficiency and accuracy in rapid prototyping for engineering and design.

Projections

1. Gross Margin (Y1): 11%
2. Compound Annual Growth Rate (CAGR): 15% (2026–2030)
3. Payback Period: 5 years
4. Break-Even Revenue (2024): $2 Million
5. Customer Acquisition Cost (CAC): $56
6. Customer Lifetime Value (LTV): $800
7. LTV-to-CAC Ratio: 14.28X

The Team

CEO (Chief Executive Officer): Anish - He brings expertise in parametric CAD modeling and systems thinking, driven by a mission to make CAD tools accessible to all. As a current MS student in Product Development Engineering and former Head of New Product Development, he combines strategic vision with hands-on innovation, uniquely positioning him to deliver transformative AI-powered CAD solutions.
CFO (Chief Financial Officer): Atharva - He brings financial expertise from roles at NatWest Group, specializing in planning and analysis, and Welltower, managing large-scale budgets. With a track record of driving profitability, he is dedicated to ensuring VoiceCAD-AI's financial success and investor returns.
CTO (Chief Technology Officer): Aashay - As CTO, he brings expertise in AI-driven CAD technologies, advanced NLP systems, and AR/VR integrations. With a track record of spearheading innovative tech projects, he is equipped to lead transformative solutions that redefine CAD design.
CPO (Chief Product Officer): Mehrad - With a degree in industrial engineering, he has expertise in CAD design, customer relations, PM, and engineering, enabling him to bridge the gap between development teams and customers. As a product development engineering MS student, he is further refining his skills.
CMO (Chief Marketing Officer): Diya - She excels in customer relations and market execution. With experience as a venture scout at Pegasus Angel Accelerator and strategy refinement at Larta Institute, combined with a MEM education and cost-saving expertise at Flipkart, she will drive marketing success.

The VoiceCAD AI team excels with a unique blend of expertise and complementary skills, positioning it to redefine the CAD industry. Anish's innovation in parametric CAD, Atharva's financial expertise driving profitability, Aashay's leadership in AI-driven CAD and AR/VR, Mehrad's ability to connect customer needs with engineering solutions, and Diya's marketing acumen form a powerhouse team. Together, they deliver cutting-edge solutions to industry challenges, backed by strong financial planning and impactful marketing strategies, ensuring VoiceCAD AI's competitive edge in the market.

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The Ask

VoiceCAD-AI is seeking a $3 million investment to fund growth and operations over the next 24 months.

Category	Amount	% of Total
Technology & Infrastructure	$1,200,000	40%
Marketing & Sales	$900,000	30%
Talent Acquisition & Ops	$600,000	20%
Contingency & Working Capital	$300,000	10%
Total	$3,000,000	100%

What Investors Get in Return

1. **Equity Offered:**
   - 23% equity, based on a $10 million pre-money valuation and a $13 million post-money valuation.
2. **Investor Benefits:**
   - Ownership in a SaaS company with a 15% CAGR.
   - Subscription-based revenue ensures predictable and scalable cash flow.

Comprehensive Financial Metrics Summary

Metric	Value
Gross Margin (GM) 2026	11%
CAGR	15% (2024–2027)
Payback Period	5 years
Break-Even Revenue	$2 million
CAC	$56
LTV	$800
LTV-to-CAC Ratio	14.28X
Valuation	$13 million (2026)

Citations

1. AutoCAD (2001). Wikimedia Foundation, Inc. Available at: https://en.wikipedia.org/wiki/AutoCAD (Accessed: 27 November 2024).
2. Autodesk AutoCAD commands 23.83% market share in Computer-aided Design & Engineering (no date). Available at: https://enlyft.com/tech/products/autodesk-autocad (Accessed: 27 November 2024).
3. (Autodesk AutoCAD commands 23.83% market share in Computer-aided Design & Engineering, no date)
4. (Growing Market Share and Improving Product Profitability with Design Automation, n.d.)
5. Voice Assistant for CAD software (no date). Available at: Voice Assistant for CAD software | AutoCAD | Autodesk App Store (Accessed: 27 November 2024).
6. Welcome to Voice2CAD! (2019) Voice Activated Software | Voice2CAD. Hamill Innovations LLC. Available at: https://voice2cad.com/ (Accessed: 27 November 2024).
7. 3D CAD Software Market Size, Share, Growth | Forecast [2030]
8. 3D CAD Software Market Size to Hit USD 19.82 Billion by 2032, Due to Increased Adoption of Cloud-Based Solutions and AI Integration | Research by SNS Insider

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