GOLDEN UNIVERSITY

Student International Business Council

Spring 2025

STEM

Deloitte

Introduction

Overview of Augmented Reality (AR)

Proposal

- Education
- Navigation
- Student Life

Financial Analysis

Risk & Mitigations

Implementation Timeline

Project Leader Introduction

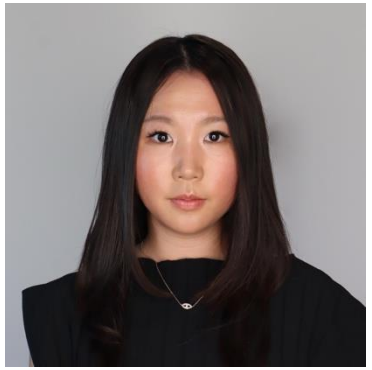
Matthew Lee
Sophomore
Computer Science
Valencia, California
O'Neill Family Hall

Chloe Wang
Sophomore
ACMS
Taipei, Taiwan
Pasquerilla East Hall

Team Introduction

Holden Pecoraro
Sophomore
ACMS & Economics
Sloatsburg, NY
O'Neill Family Hall

Zachary Gurland
Freshman
Mechanical Engineering
Hinsdale, IL
Graham Family Hall



Olivia Lee
Freshman
Computer Engineering
Bellevue, WA
Farley Hall

Kristijonas Bernatonis
Freshman
Mathematics & Physics
Vilnius, Lithuania
Keough Hall

Bobby Devitt
Freshman
Electrical Engineering
Yonkers, NY
Graham Family Hall

Virgil Ruddy
Freshman
Business Analytics, ACMS
Somerville, MA
Baumer Hall

Peter Bae
Freshman
Computer Science
Ambler, PA
Duncan Hall

Annika Svensson
Sophomore
Computer Science
Basking Ridge, NJ
Cavanaugh Hall

Executive Overview

Golden University aims to enhance student engagement, navigation, and campus life through a 3-part Augmented Reality (AR) integration plan focused on education, guidance, and community connection.

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Golden University

27,000
Student Population

1 On-prem Datacenter
1 Private Cloud

1 Main Campus
3 Satellite Campuses

University Majors

46% Engineering & Tech

24% Natural Sciences

18% Business

Objective

Develop & Integrate an **Augmented Reality** (AR) Tool to Enhance the **Student Experience** at Golden University

3-Part Proposal

1 **Education**
Deliver **interactive** and **immersive** learning experiences

2 **Navigation**
Provide **real-time guidance** and contextual information

3 **Student Life**
Connect students to **events**, **resources**, and **communities**

Projected Outcomes

- Increased student engagement with **interactive academic content**
- **More efficient and accurate** campus navigation
- **Higher participation and awareness** in student life and events
- **Increased satisfaction** with student support services
- **Enhanced university reputation** for innovation and technology

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AR Overview

Augmented Reality offers users an immersive and interactive experience by seamlessly blending digital elements with the real world, and its widespread adoption across various industries drives rapid growth in the market.

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Synopsis of AR Functionality & Applications

Augmented Reality (AR) is an interaction version of a real-world environment achieved through digital visual elements and other **sensory stimuli** via **holographic technology**.

5 significant components of AR
1. Artificial Intelligence 2. AR Software 3.Processing 4. Lenses 5. Sensors

Types of AR Applications
Marker-based, Markerless, Location-based, Projection, Superimposition

Implementation Benefits

Enhanced Learning
14% higher success rate using AR as education tools

Enhanced Collaboration
Remote collaboration and interaction with virtual objects and simulations

Increased Efficiency & Productivity
Streamlined product development lifecycles in manufacturing industries

Common Applications

MergeEDU
- Uses Merge Cube and AR
- Explore STEM with interactive 3D models

Google Expeditions
- Allows students to go on virtual field trips
- Enables interaction with 3D models and artifacts

zSpace
- AR hardware and extensive AR software/apps
- Focus on STEM and medical education

Typical Costs

$ **Tier 1**
- Educational apps
- Simple Games

$$ **Tier 2**
- Training Simulations
- Retail Experiences

$$$ **Tier 3**
- AR Social Games
- Medical Applications

Sources: Statista | CGS | HBR | EBSCO | Fortune | Microsoft | IOPScience |

Technical Augmented Reality

The goal is to seamlessly integrate digital content with the real world by leveraging innovative hardware, software, and cloud-based solutions, enabling immersive, efficient, and scalable AR experiences.

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Hardware

Enables the interaction between the **real world** and **digital content**

- **AR Glasses** | Microsoft HoloLens, Magic Leap
- **Smartphones** and **Tablets** | TrueDepth, RGB
- **Mounted Displays** | Oculus Quest, Mojo Vision

Software

AR Development

- Frameworks
- SDKs

3D Rendering

- User Interface
- Data Processing

Cloud Integration

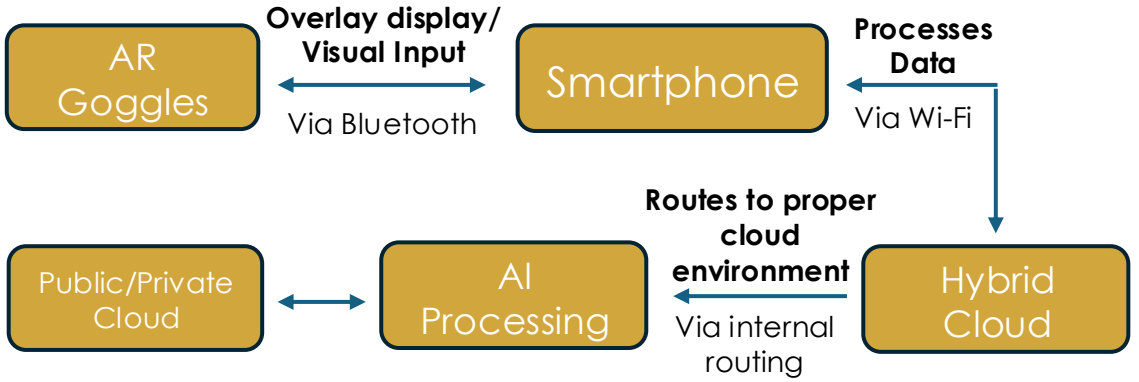
Cloud-hosted AR experiences can synchronize personal data in **30 to 90 Hz**

With access to a **cloud** environment, AI models can process imaging data quickly and efficiently

AR applications need to have **low latency connections of 10-50 ms** for real time rendering

AR integration into a cloud would allow for **dynamic scaling** of 3D assets and models

System Framework



Sources: Statistia, AWS

Educational AR Overview

Key players in the augmented reality in education market like those below are focusing on collaborations, acquisitions, technological innovations, and new product developments to gain market share. The market has a projected growth of 14.94 billion in 2030.

Why AR in Education?

The **COVID-19 pandemic** accelerated technology adoption in education. Augmented reality is enhancing **remote learning**, with the online learning industry growing by **9.1%** annually.

Virtual simulations and experiments can be used to replace expensive physical equipment while providing a **safe and scalable** learning environment.

Universities Currently Using AR

MIT, USC, NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE, Stanford

Integration of Educational AR Tools

Industry	Children Educational Toys	Spatial AI	Virtual Tours	Pilot Training
Examples	Dinosaur 4D+: Augmented reality dinosaur app	Eon Reality: AI-driven XR platform for education & industry	Google Expeditions: interactive AR educational tours	Varjo Aero: High-end VR headset with eye-tracking
Industry Growth & Tailwinds	• More parents are **shifting** to educational toys in the US • **90%** of young children use educational toys	• Continued **demand** for immersive experiences in the US • **IoT** leads to **seamless interaction** between devices	• Virtual tour market is expected to grow at a **CAGR of 29%** and projected to reach **$12.3bn** by 2033	• **Emergence of new airlines** and demand for pilots will increase the market value, projecting **$20bn** in 2030 (**CAGR 13.8%**)

Sources: Statistica, GrandViewResearch.com, IBIS World

Key Players in the AR Market

Backed by top electronics and telecom firms, major players like Apple, Meta, and Google are investing in AR—fueling the rise of AI-powered platforms like MagicSchool, Mindgrasp, and Kami to transform how universities teach, navigate, and support student life.

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Educational AI Softwares

Magic School AI - AI-powered tools that streamline **educator** workflows by automating tasks like **lesson planning, rubric creation**, and **communication**.

Mindgrasp - AI tools to rapidly process diverse information sources, **generate summaries and extract key concepts** for **efficient learning** and research.

Kami - Transforms static documents into interactive learning spaces with **annotation**, **collaboration**, and **accessibility tools**.

Our AR Package

Educator Tools	High-tech Study Tools	Policy Compliance
Optimize **lesson planning** and assists with creating class material.	Students enjoy AR powered **research** and **study tools**, as well as AI assistant.	Custom AI is tailored to suit the university's fair use **policy**.

Notable AR Products

Cutting-edge technology is driving new **AR/VR** markets, blending **digital** and **physical** realities

- **Vision Pro** — A high-tech headset with eye tracking and gesture controls for immersive experiences
- **Meta** — A versatile VR and AR headset with hand tracking and spatial computing for gaming and productivity
- **Google Lens** — Identifies objects, translates text, and provides information using AR
- **NVIDIA** — Uses neural radiance fields (NeRF) to generate 3D scenes from a few 2D images

AR Investment Landscape

Top **electronics** and **telecom** firms are fueling major **AR startup deals**.

- **Apple** acquired AR headset startup **Mira** in 2023 to boost its **Vision Pro ecosystem**.
- **Qualcomm** partnered with **RayNeo** in 2024 to develop next-gen **AR glasses**.
- The **AR Alliance** unites major tech firms to drive AR innovation and standards.

Sources: Apple | Meta | Google | NVIDIA | MagicSchool | mindgrasp | kami

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Education: Laboratory Aid Tool

The laboratory aid tool & accompanying AR goggles would enhance laboratory experiences with advanced measurement & data collection technology.

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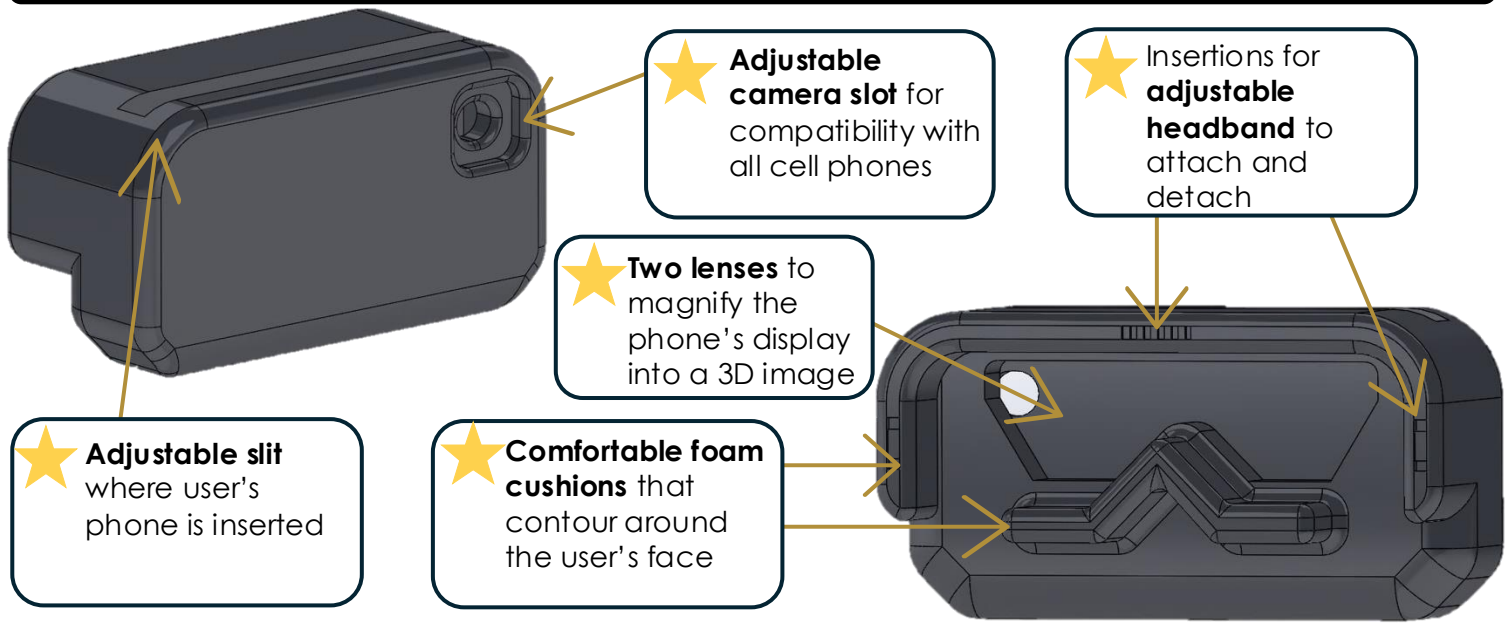
Overview & Goals

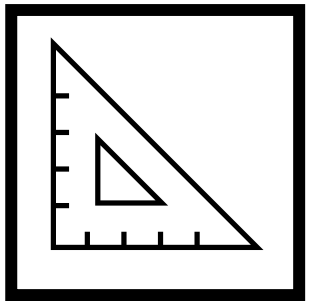
3D laboratory-aid tools to assist experimental research

- **Enhanced laboratory experience** for STEM-based majors
- **Virtual laboratory collaboration** between four campuses
- Accessibility of laboratory tools at an **affordable cost**

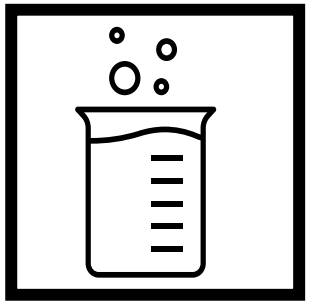
Goggles Design Proposal



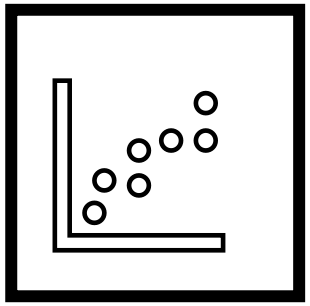
Key Features



3D measurement tools to ease the collection and precision of empirical data



Access to **information** on relevant **chemical compounds** and **scientific phenomena**



User-generated **3D models and graphical analysis tools** to compile and communicate data

Sources: IBM | Medium | SolidWorks

Education: Study Tools and Visualization

AR-based learning tools can transform textbooks and studying by incorporating interactive 3D models, gamified challenges, customizable experiences, and real-time collaboration, all while enhancing engagement, understanding, and accessibility for diverse students.

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Interactive Textbooks

AR-Enhanced Pages

- 3D Models
- Animations
- Scanning

Live Annotations

- Highlight text
- View professor annotations
- Receive instant explanations

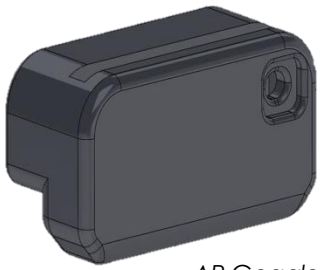
Multimedia Integration

- Embedded Video Tutorials
- Interactive Simulations
- Audio Narrations

Data Analysis

3D Graphs & Models

Abstract data can be transformed into **immersive 3D visualizations**, making **trends** and **patterns** clearer.



AR Goggles model

Real-Time Interactions

- Users manipulate datasets, filter data, and explore models in **different dimensions**

Simulated Experiments

- AR can visualize physics, chemistry, and biology experiments **without needing a lab setup.**

Step-by-Step Integration

Set up AR Platform → **Create Gamified Content** → **Add Points/Reward System**

Provide feedback and track progress → **Collaboration and Customization**

- Leadership boards
- Shared spaces
- Text to speech
- Sign language

1. Ensure the platform supports interactive elements such as **quizzes**, **challenges**, and **gamified tasks**.
2. Turn these quizzes into **interactive experiences**, where students can **scan objects** or locations to unlock questions or mini-games.
3. Virtual rewards like **badges**, **stars**, or **levels** to motivate students to complete tasks efficiently and correctly.
4. Display a **congratulatory message** or offer **explanations** for incorrect answers, and **adjust difficulty** based on performance.

Sources: eLearning Industry | Immersive Learning News

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Navigation: Interactive Map

An interactive navigation map should prioritize accuracy and real-time updates, while also considering the added complexity and cost of indoor mapping, especially if implementing solutions like Bluetooth beacons within buildings.

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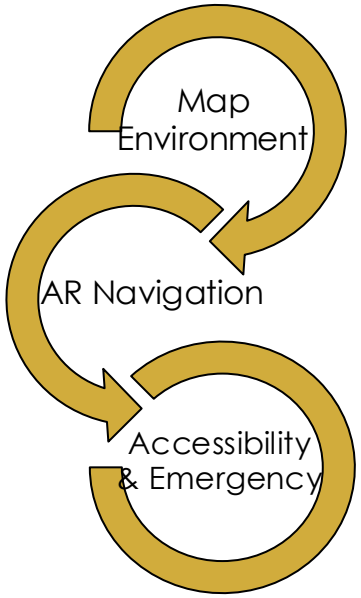
Overview

The AR-enhanced navigation system improves **campus wayfinding** by overlaying **real-time directional cues** on a user's device.

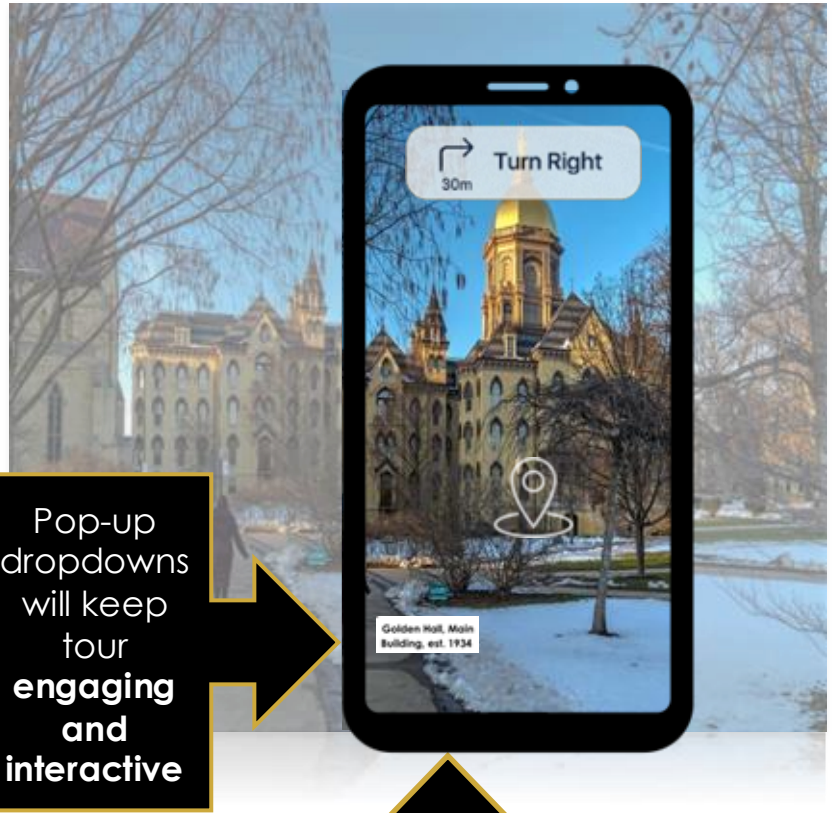
Implementation Plan



Scan key locations using 3D images & enable **VPS-based object recognition**

Use AR Programs to overlay **real time navigation cues**

Wheelchair-friendly routes, elevators, and **accessible entrances** in AR & **One Tap SOS**



Pop-up dropdowns will keep tour **engaging and interactive**

Traditional: 30m turn right
AR: Turn right at basilica

Expected Outcomes

- **Interactive** campus stories
- **Fun facts** for campus areas
- **Real time video & audio** cues
- Campus **landmark identification**

Key Technologies

AR Based Positioning & AR Overlays

Visual Positioning System (VPS)	**Simultaneous Localization and Mapping (SLAM)**	**AI Object Recognition**	**Dynamic POI Labels**

Enhancing Accuracy

GPS (Outdoors)	**Bluetooth Beacons (Indoors)**	**Wi-Fi Positioning**	**IMU Sensor Fusion**

Sources: Mobidev

Navigation: Live Information

An AR-powered campus navigation tool that enhances student experience by providing real-time noise, foot traffic, and event updates for smarter, more efficient movement.

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Overview

The AR navigation system enables users to **scan campus locations with their smartphones**, displaying real-time noise levels, foot traffic density, and live event updates as **interactive overlays**. It integrates IoT sensors, crowdsourced reports, and university event data to provide accurate, up-to-date insights for **seamless campus navigation**.

Plan Implementation

Set up sensor cameras to track noise and foot traffic

Have all event bookings in University buildings logged on the app

Leverage WiFi access points (APs) to detect number of device connections

Key Features

- Noise level insights
- Pedestrian Traffic Data
- Live Event Update

Outcomes

- Optimized **Event Attendance**
- Greater Student **Engagement** & **Satisfaction**
- Improved Study & Work **Environments**

Sources: National Transportation Noise

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Student Life: Career Exploration

AR goggles allow students at Golden University to explore various career paths, while preparing for interview through an interactive experience.

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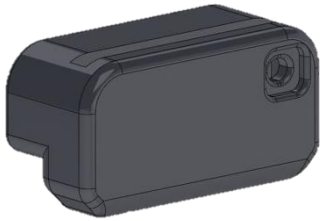
Overview

AR goggles help simulate interactive professional development experiences to explore a variety of careers



- AR Technology
- Voice Recognition
- Facial Recognition

Interview Preparation

AR Interview Simulations

- Mock interview questions to practice soft skills
- Customizable interviewers tailored to different industries

AI Feedback

- Facial and Speech Recognition provide performance feedback based on algorithms
- Progress and feedback are stored on the platform

Other Key Features

Job Shadowing Simulations:
Virtual shadowing of professionals give **new perspectives** on various **job environments and workdays**

AR-powered Skill Development:
Students are taken through a variety of **interactive activities** that their **future careers may require**

Career Insight:
Through the virtual exploration of industries, students gain **new insights into numerous career paths**

Accessibility:
Flexibility in learning as this technology can be used at times aligned with **students' individual schedules**

Sources: The Franklin Institute | Maryville University | KnoxLabs

Student Life: Enhancing Activities with AR

AR to support daily student life via gamification of fitness, learning, etc. Furthermore, the campus community will support the AR system.

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Gamification Using AR

Gamifying Diverse Activities

Learning

- Engaging learning tools: Gamification boosts **student participation**
- **Accessibility features**: AR supports neurodiversity

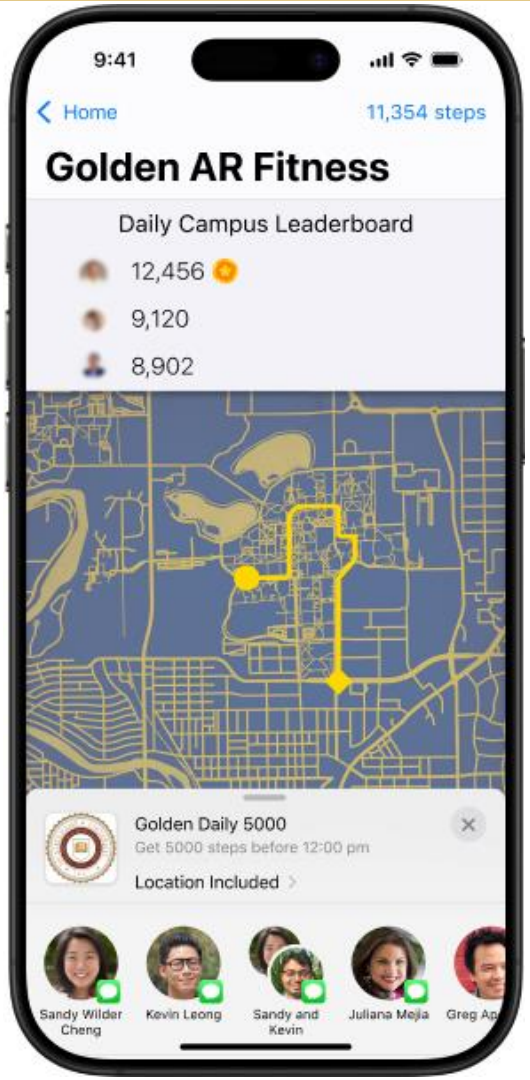
Special Events

- Easy **event hosting**: AR simplifies e.g., scavenger hunt setup
- Digital world overlay: AR adds data to real spaces
- **Lower** activity **costs**: AR reduces student event expenses

Fitness

- Fitness challenges: AR creates interactive **campus-wide fitness events**
- Goal tracking: AR helps students monitor fitness progress

Inclusive Features | Multilingual Support | Device Compatibility



Self-Supporting Ecosystem

AR captivates students, inspiring them to create innovative campus products.

AR Programming Clubs

Motivated student organizations **develop AR applications**.

Student organizations **implement AR** technology on campus.

Golden Scholar AR

- Boost campus **community engagement**.
- Boost **learning** and **fitness**.
- Provide tools for **academic and career** success

Sources: Upadhyay et al. | Shahzad et al.

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Implementing AR at Golden University can cost around 2.5 million for a full solution, but GU can reduce costs by focusing on one area, like education, navigation, or student life, based on their needs.

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Solution Breakdown

Education

Development	$100 - 250,000
Operations	$30 - 50,000
Testing	$5 - 15,000
Implementation	$20 - 40
Total cost	$135,020 - 315,040

1+ Year(s) – Short Term Investment

Education	$135,020 - 315,040
Server Infrastructure	$100 - 150,000
IT Support	$30 - 50,000
Data Management	$20 - 40,000
Total cost	$285,020 - 555,000

5-10+ Years – Long Term Investment

Short Term Investment	$285,020 - 555,000
New Features	$20 - 50,000
Data Management (yr.)	$20 - 40,000
IT Support	$30 - 50,000
Total cost	$355,020 - 695,000

Student Life

Development	$100 - 250,000
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Navigation

Development	$975,000 - 1,125,000
Operations	$30 - 50,000
Testing	$5 - 15,000
Implementation.	$20 - 40
Total cost	$1,010,002 - 1,190,040

1+ Year(s) – Short Term Investment

Navigation	$1,010,002 - 1,190,040
Server Infrastructure	$100 - 150,000
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Data Management	$20 - 40,000
Total cost	$1,160,002 - 1,430,040

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Sources: govtech | VictoryXR | intelivita | appinventiv | Business Plans | Appsiera |

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Risk and Mitigation

By proactively addressing security, user-experience, and operational risks through strategic planning and technology solutions, the project ensures a more sustainable and effective AR learning environment. Addressing these issues will ensure a smooth transition during the implementation of our solution.

Risks

Security Risks:
- Unauthorized access or misuse of user data
- Non-compliance with privacy laws

Operational Risks:
- Inconsistent content updates
- Breakdown in coordination

User Experience Risks:
- Confusing app interface
- Input delay or lag/glitches
- Difficulty understanding AR controls and interactions

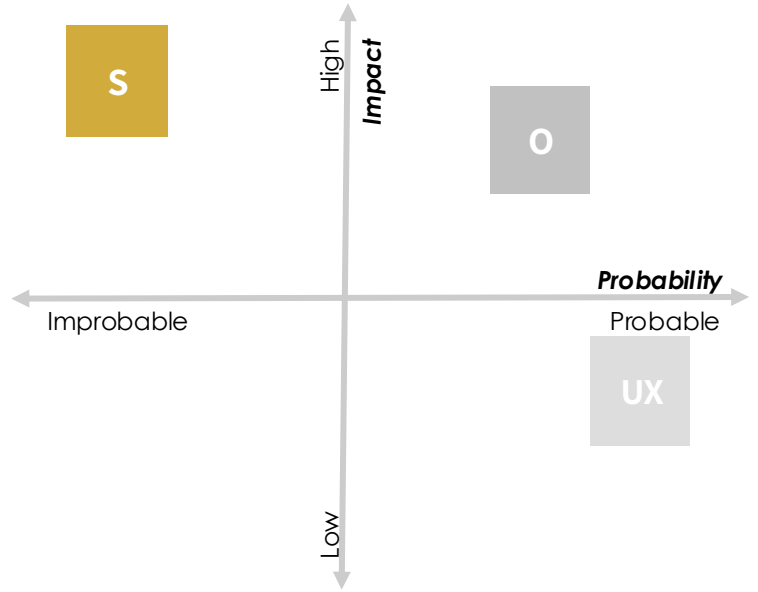
Mitigations

- Conduct a **third-party security audit** and implement data encryption
- **Include opt-in privacy controls** for data sharing
- Establish reviews to make sure we **are compliant with data protection regulations**

- **Assign dedicated admin roles** at each campus site to manage location-specific content accuracy
- Create a **maintenance schedule** and escalation process for AR assets and backend infrastructure

- Implement **AR training** with interactive demos and tooltips
- Provide **accessible alternatives** (e.g., map-based navigation) for users unfamiliar with AR

Risk Matrix



We enhance engagement by offering interactive AR tutorials, simplified user interfaces, and faculty-led onboarding sessions to support user adaptation and confidence.

Sources: NSFLOW | TripWire

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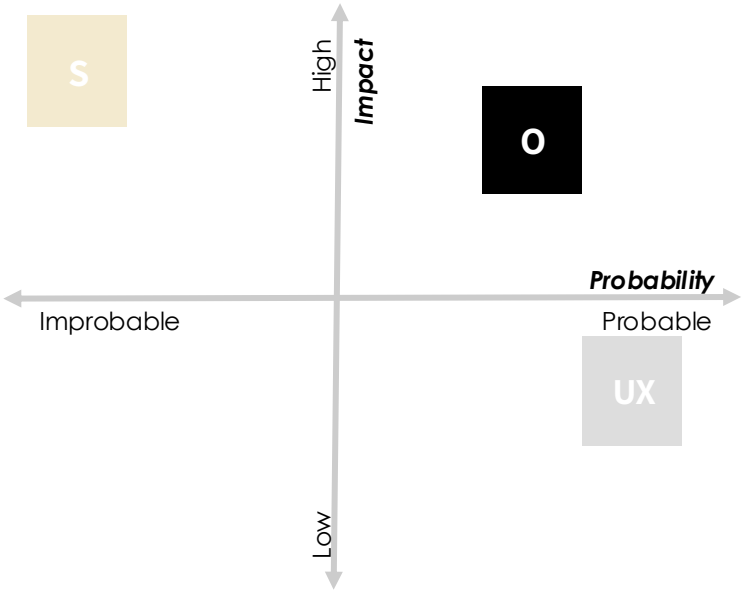

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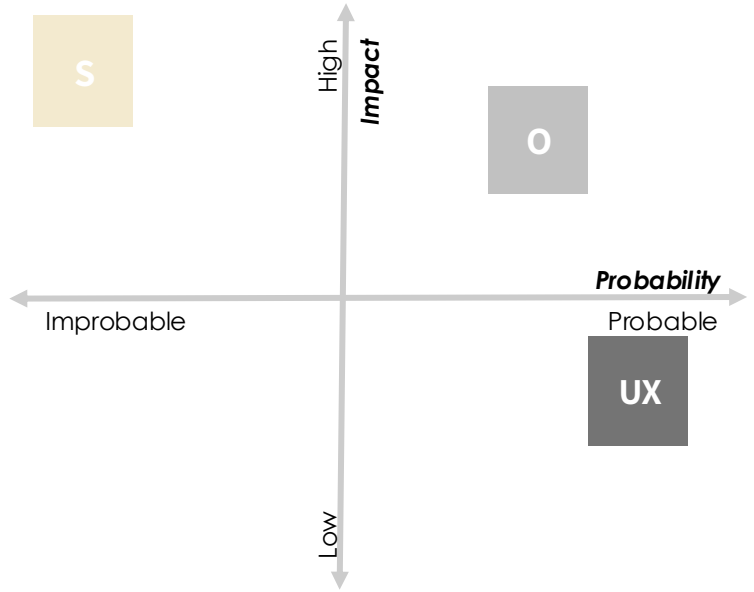

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Vertical Risk and Mitigation

Through targeted planning and innovative technology solutions, this project directly tackles key challenges in navigation, education, and student life. By addressing security, user-experience, and operational risks in each vertical we establish more sustainable and effective AR learning environment.

Risks

Navigation Risks:
- Inaccurate mapping
- User distraction and safety concerns

Accessibility and Equity Risks:
- Accessibility and equity issues
- Distracting the learning environment

Student Life Risks:
- Overwhelming information or content overload
- Reduced in-person interactions

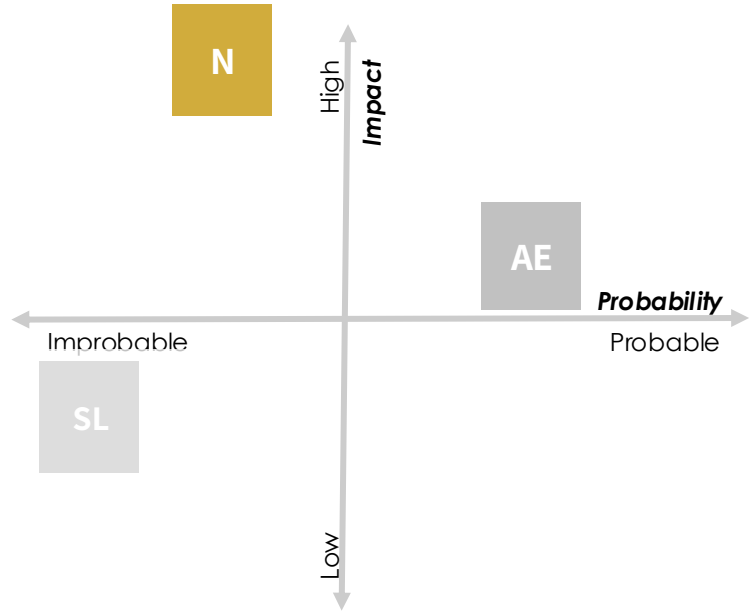
Mitigations

- Integrate **GPS** for broader areas and **multiple Wi-Fi sources** and **Cell towers** for dense areas to increase accuracy
- Use **haptic feedback** and **screen safety reminders** to make sure users are attentive and safe

- Make sure the app is compliant with accessibility standards such as ADA and FERPA and **available on range of devices**
- Create campus **quiet zones** or a **silent mode** to allow for minimal use in sensitive areas

- Add **smart filters** to allow the student to choose what they are exposed to
- Provide **gamified resources** to encourage in person meetings and group collaboration

Risk Matrix



The risk matrix guides **proactive mitigation strategies** per vertical to ensure a smooth and secure implementation of the AR solution.

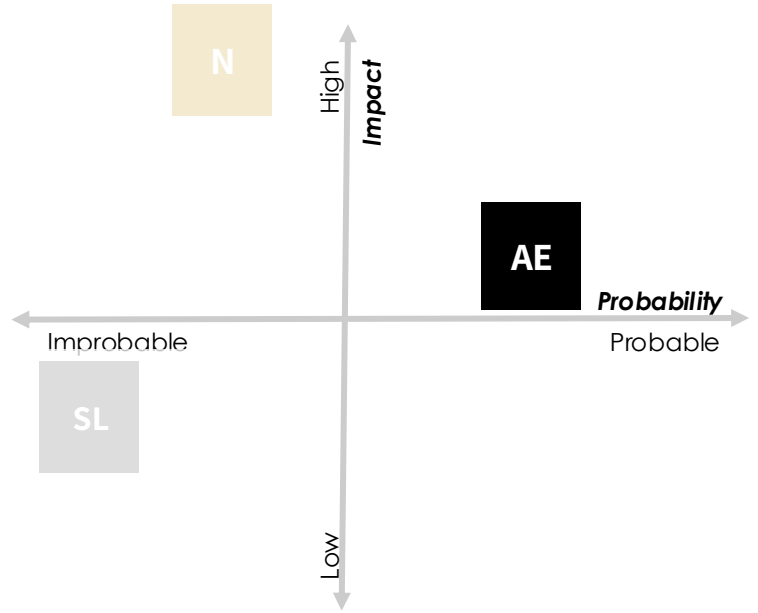
Sources: Groundtruth

Vertical Risk and Mitigation

Through targeted planning and innovative technology solutions, this project directly tackles key challenges in navigation, education, and student life. By addressing security, user-experience, and operational risks in each vertical we establish more sustainable and effective AR learning environment.

Risks	Mitigations
Navigation Risks: ❖ Inaccurate mapping ❖ User distraction and safety concerns	• Integrate **multiple Wi-Fi sources** and **Bluetooth beacons** to help with map accuracy • Use **haptic feedback** and **screen safety reminders** to make sure users are attentive and safe
Accessibility and Equity Risks: ❖ Accessibility and equity issues ❖ Distracting the learning environment	• Make sure the app is compliant with accessibility standards such as ADA and FERPA and **available on range of devices** • Create campus **quiet zones** or a **silent mode** to allow for minimal use in sensitive areas
Student Life Risks: ❖ Overwhelming information or content overload ❖ Reduced in-person interactions	• Add **smart filters** to allow the student to choose what they are exposed to • Provide **gamified resources** to encourage in person meetings and group collaboration

Risk Matrix



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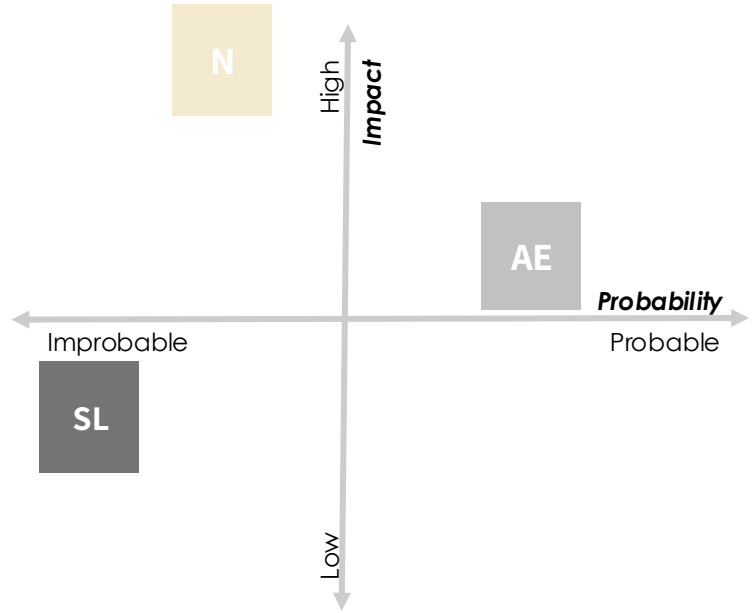

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Introduction

Overview of Augmented Reality (AR)

Proposal

- *Education*
- *Navigation*
- *Student Life*

Financial Analysis

Risk & Mitigations

Implementation Timeline

Implementation

Seamless implementation with GU's hybrid cloud requires careful planning across cloud infrastructure, hardware, scalability, security, and cross-platform distribution.

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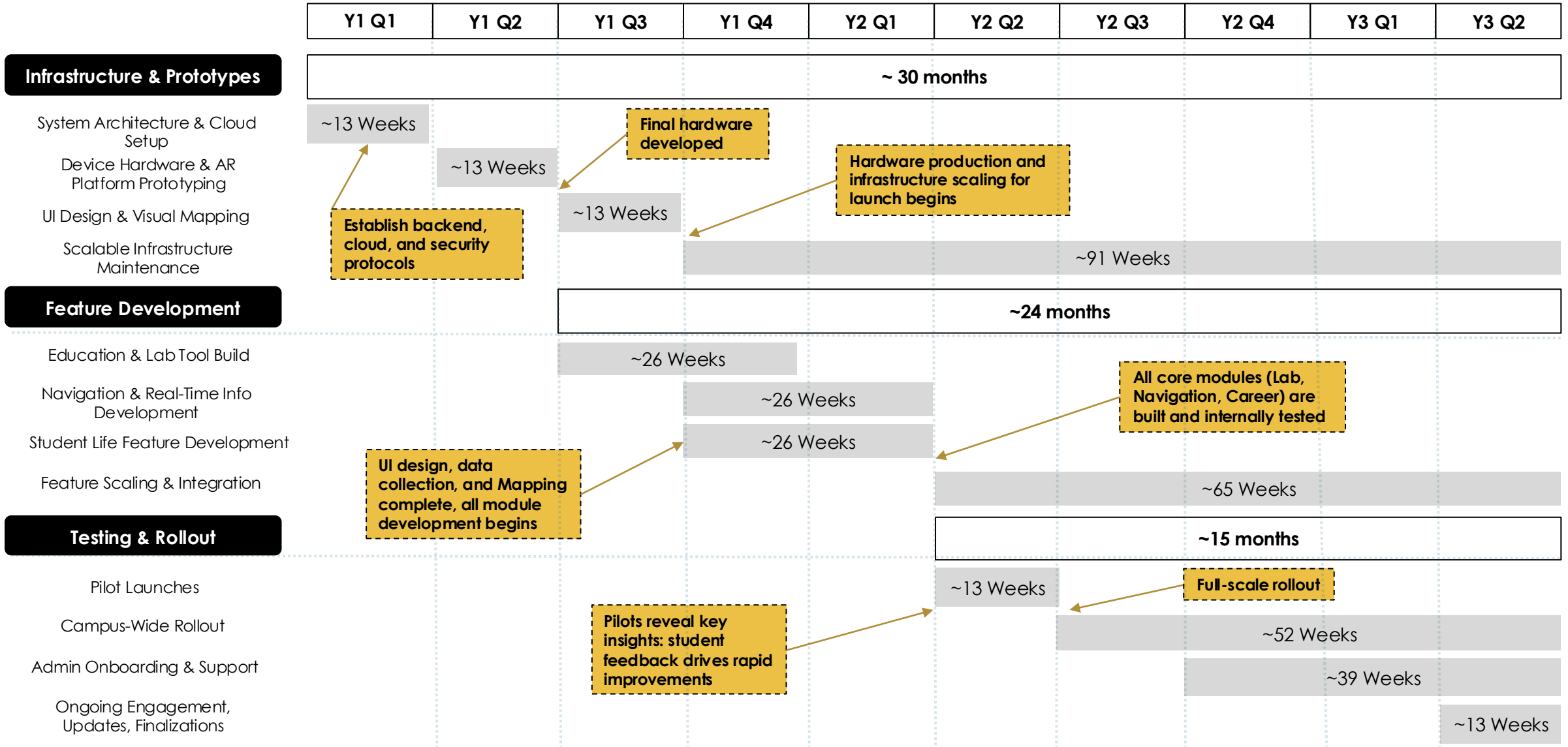
Technical & Operational Considerations

	Areas for Consideration	Consideration #1	Consideration #2	Consideration #3
	**Cloud Integration & Data Management**	**Data Synchronization** between the user's device and GU's private cloud environments	**Object storage** for asset delivery, **block storage** for data, and **file storage** for shared internal data	**Internal API gateways** to be used inside GU's private network
	**Hardware & Functionality**	**Edge computing devices** (NVIDIA Jetson, Raspberry Pi, etc.) for on-site data processing before syncing with the hybrid cloud	**Cameras, gyroscopes, and accelerometers** embedded in users' phones to create an immersive experience	**High-resolution display** (at least 30 fps) to render clear AR visuals
	**Scalability & Maintenance**	**Auto-scaling** (automatically adjusts the number of compute instances based on the current demand)	**Load Balancing** (distributes traffic across multiple servers to accommodate spikes in traffic)	**Version Control** (content updates and bug fixes)
	**Security & Privacy**	**Data encryption at rest** (for stored data, e.g. AWS KMS) **and in transit** (for data moving across networks, e.g. TLS/SSL)	**Virtual Private Network (VPN)** to create a secure encrypted data flow between the clouds	**Single Sign-On (SSO)** (i.e. Okta) to manage user authentication
	**Distribution Channels**	**Cross-platform frameworks** (Flutter, Ionic, React Native)	**Single codebase** that works on a **variety of devices and OS**	**Free** to download app available on **all operating systems**

Sources: IBM | GeeksForGeeks | TechTarget | GeeksForGeeks | git | HowToGeek | DigitalGuardian | Cloudflare | JetBrains

Project Timeline



Thank You!

Questions?

Student Life: Student Healthcare with AR

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AR is revolutionizing student healthcare with remote checkups, non-invasive screenings, emergency training, and personalized treatment, making care more accessible and efficient.

AR in Student Healthcare

- AR for Health Education
- AR-Assisted Medical Testing
- AR in Emergency Training
- AR for Personalized Treatment Plans

Benefits

More Accessible & Convenient

Enhanced Accuracy & Early Detection

Interactive & Engaging Health Education

How a Consultation would Work

Appointment Scheduling
Students book appointments through an **AR interface** that **suggests providers** based on symptoms.

↓

Virtual Consultation
Students meet a **doctor remotely** as AR assists with **self-exams** and **vitals**

↓

Diagnosis & Personalized Care Plan
Students receive an **AR-assisted diagnosis** with **visual treatment** instructions or referrals

AR Applications in Student Health

Interactive tools help students learn about their health history, treatment compliance, and self-care.

AR enables **quick**, **non-invasive** monitoring of vitals, vision, and hearing without traditional medical equipment

Simulated CPR and first-aid scenarios **improve response time** and **life-saving skills**

Step-by-step **AR guidance** helps with medication, therapy, and recovery

Sources: HealthTech | TheMedicalFuturist

Temporary space for moved content from previous slides

Case Study – VictoryXR's Metaversity"

Implementation

Adopted by 16 U.S. universities to explore digital twin or lab-based solutions

Financials

Full Digital Twin Campus:	$50,000
Single Building Model:	$25,000
VictoryXR License:	$92/student per sem.
VXRLabs Subscription:	$12–13/month per user

Benefits & Stats

Final Grades:
Traditional: 78%
Online: 81%
Metaversity: 95%

Attendance:
Traditional: 80%
Online: 88%
Metaversity: 90%

Satisfaction
- Traditional: 80%
- Online: 90%
- **Metaversity: 100%**

Engagement:
- 100% of students reported higher engagement

Other Components
Processors $30-150
Battery $10-40
Camera $20-100
Sound $10-50
Structural Components $80-100
Manufacturing Costs $50-200

Total Cost Estimate: $500- $2,215 per unit

Challenges and Limitations

Hardware Constraints – AR devices struggle with size, weight, battery life, and heat management, limiting portability and usability.

High Costs – Advanced AR technology, like high-resolution displays and spatial computing, remains expensive, slowing mass adoption.

Technical Barriers – Challenges like real-time processing, 5G/cloud dependency, and environmental mapping accuracy affect performance.

Privacy & Data Concerns – AR relies on cameras and sensors to map environments, raising concerns about surveillance and data security.