YUE FAN
DESIGNER

yue fan. is a designer of user experience, digital product,
and emerging technology.

2023

Content

IF EARTH COULD TALK

By Yue Fan with her lovely TDF Team

As we both represent the triality of past, present and future, I can only hope, that with time, human error transforms for the greater good of all life who call me home.

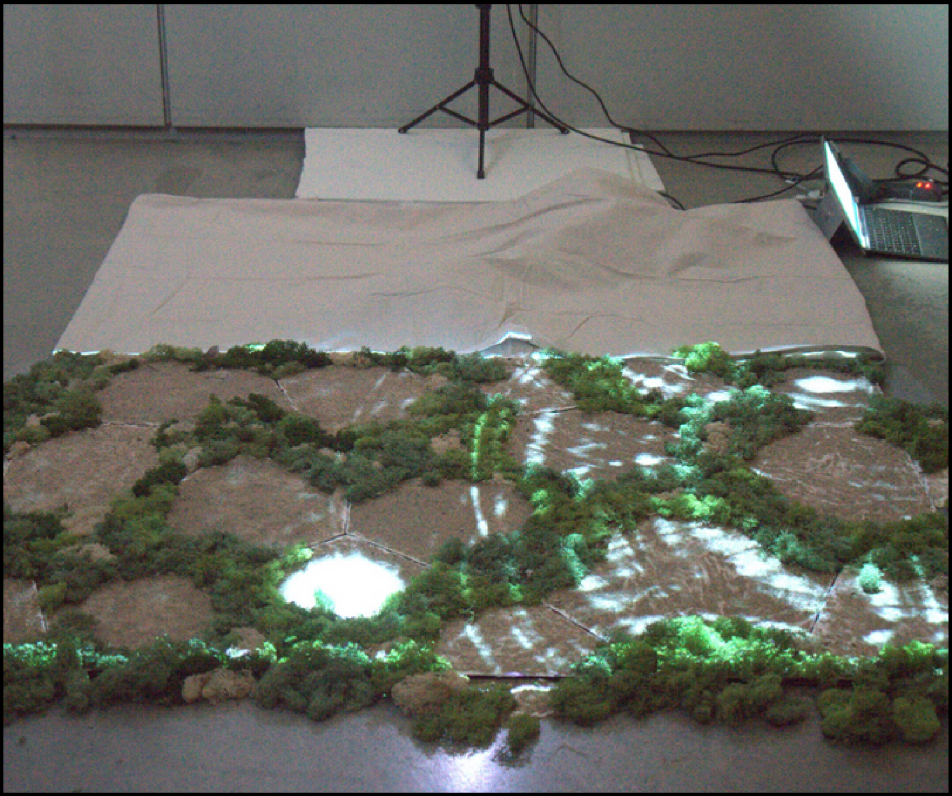
WHO: Inhabitants of earth

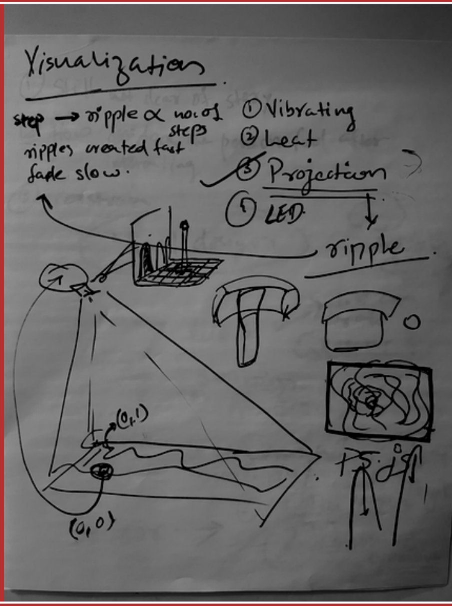
WHAT/HOW: a sensory enabled platform that responds to feet contact by emitting ripples when the user comes into direct contact with the surface.

WHERE: Earth's consciousness

WHEN: Alternate reality where earth's consciousness has morphed into visceral responses due to human's disconnection with nature.

WHY: In representing the triality of both past, present and future where human action has, had and have an everlasting impact on our surroundings —sight seen and unseen. Where textural components represent nature's tried and tested resilience in the face of human impact and ecological casualties.

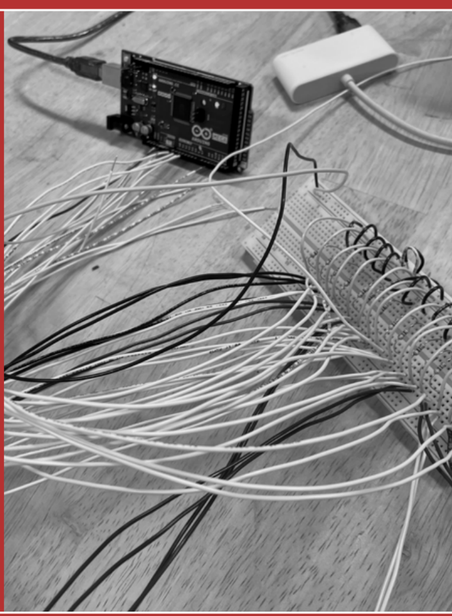




A glimpse into the many rounds of sketching and reworking timelines

Brainstorming Ideas

Purin testing our first round of our final prototype

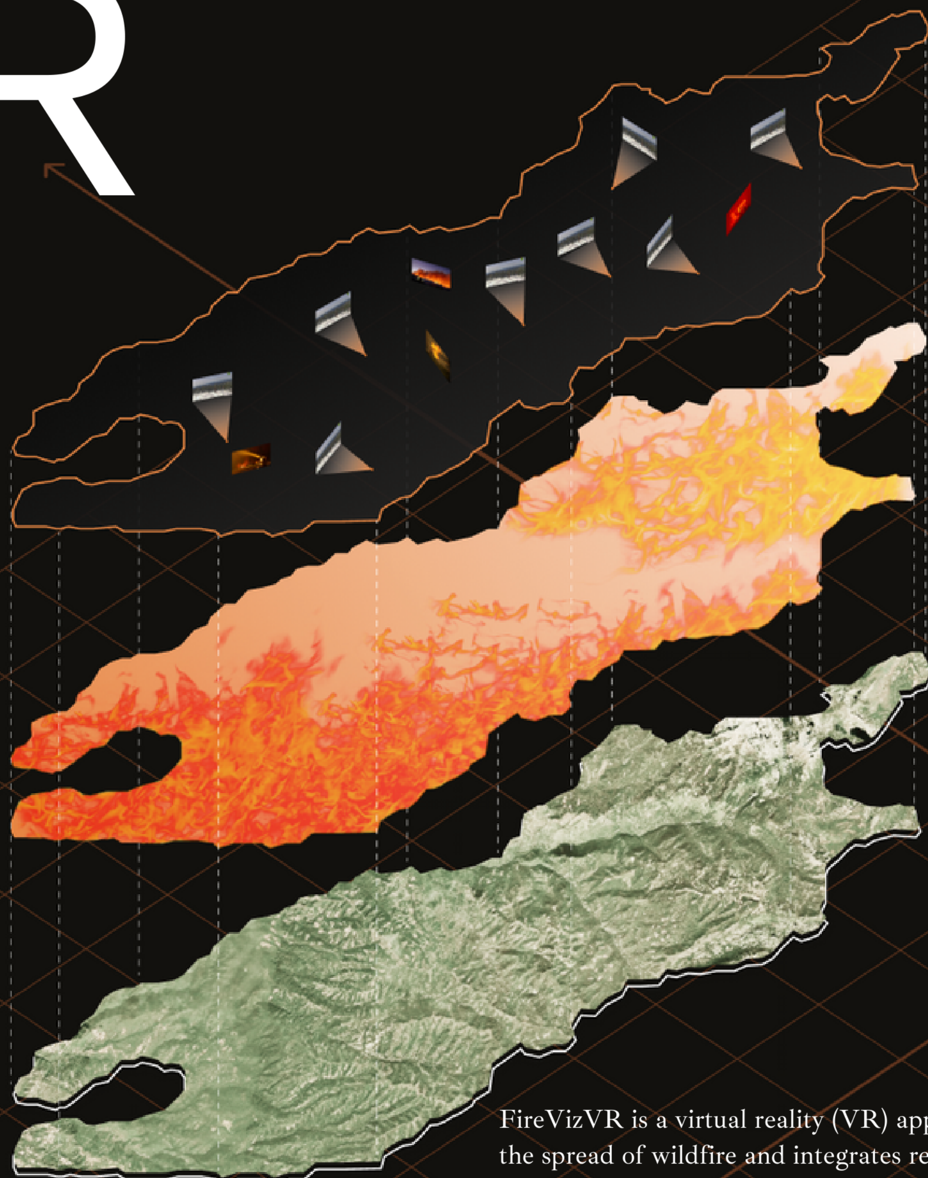


Making sure our sensors work and testing them

Assembling all of our laser cut polygons and sensors

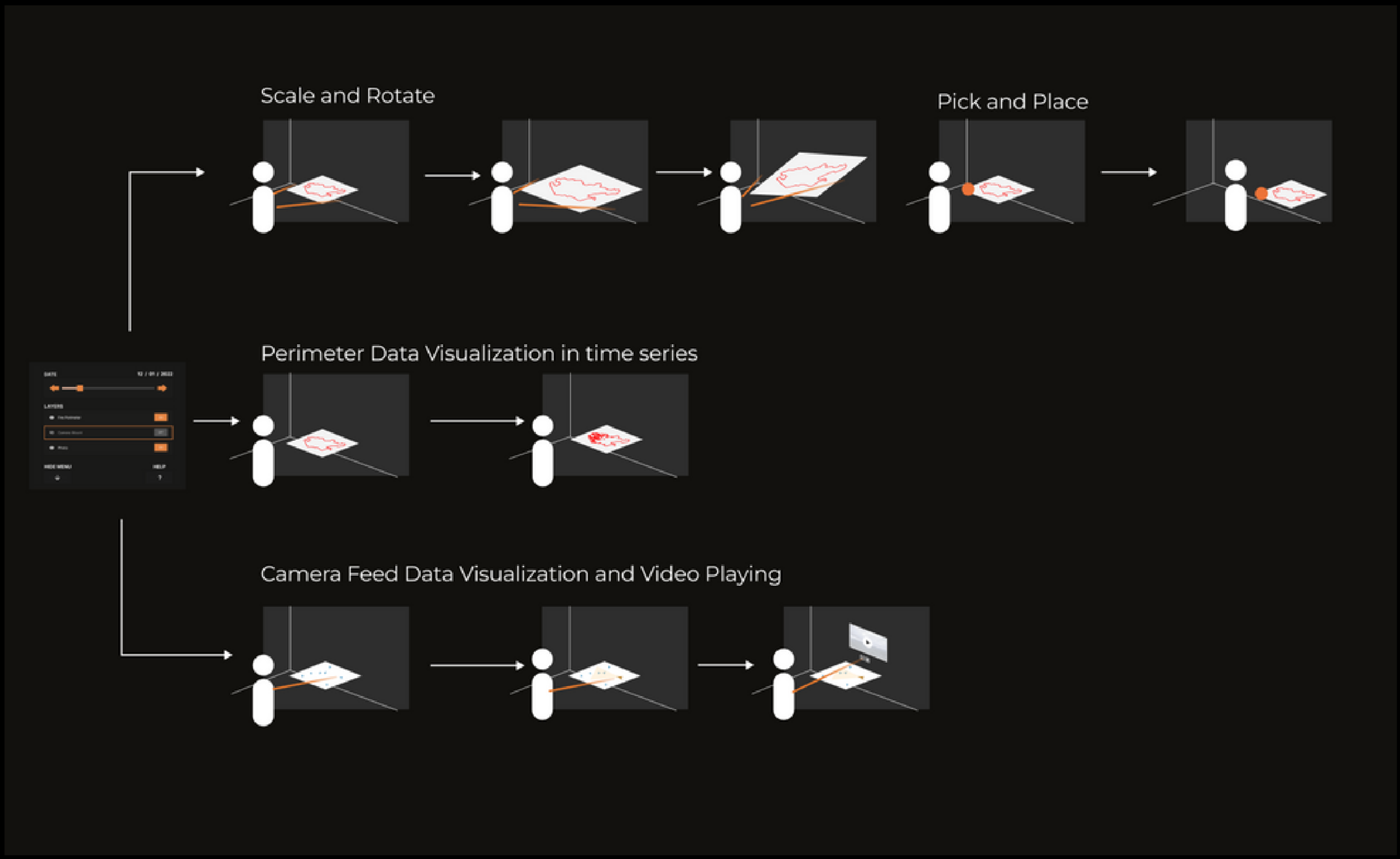
Testing the projector

FIREVIZ VR



FireVizVR is a virtual reality (VR) application that visualizes the spread of wildfire and integrates relevant data into one tool. The aim of this project is to address the problem of reconstructing historical fire from publicly available data by visualizing its spread over time in the immersive medium of virtual reality. Our application combines multiple sources of publicly available fire data in a single VR experience for an immersive and interactive wildfire visualization. For the proof of concept, we focus on the Caldor Fire, which occurred in August 2021 in El Dorado county, California. The Caldor Fire was one of the largest fires recorded in California wildfire history. Hence, there was a large amount of data related to this fire. In the future, our application can extend to other wildfires given the requisite data.

CHARLES SUN / IRINA HALLINAN / YUE FAN
ADVISED BY PROFESSOR HARTMANN

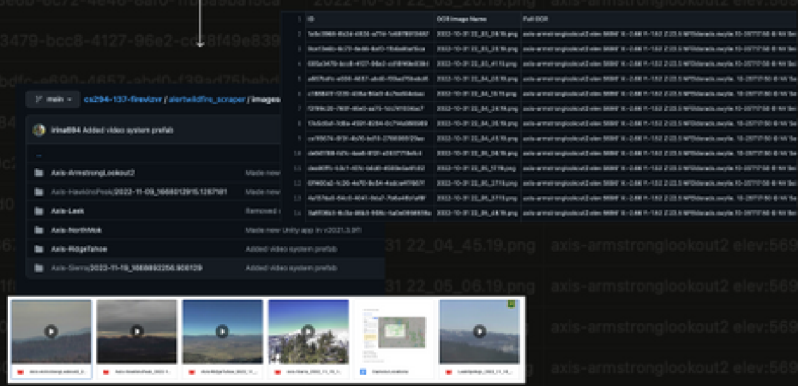


INTERACTION DESIGN

The user can walk through and around the hologram by moving their body in the real world to examine different parts of the terrain. The user can also look around the terrain by moving the hologram with VR controllers while remaining stationary. The terrain can be rotated and scaled to either focus on the entire fire or specific sections of it. The fire perimeter of a specific day is shown as a decal on the map that darkens the burnt area. The currently burning areas are shown with fire particles and smoke. The user can move the controller joystick to scroll through the days on which the wildfire burned, and see the fire's spread over the duration it burned. The video data is integrated into the interface as stationary interactable camera objects. The user sees the interactable components and can select them with VR controllers. Selecting one of the camera objects brings a screen in front of the user that plays the recorded video of the fire from the geographical location on the map. We hope the application provides an intuitive user experience that integrates multiple data sources to improve data comprehension related to the spread of a particular wildfire.

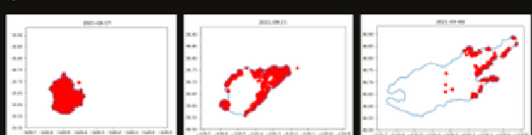
Video and Photo Data

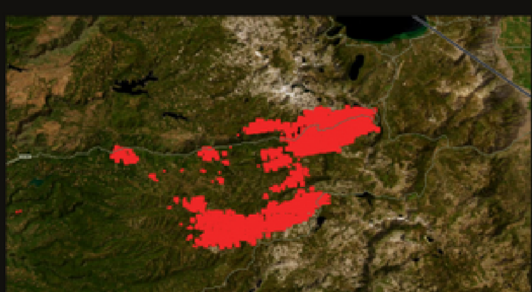
Video data is scraped from the web, using live camera feed on https://www.alertwildfire.org/ from multiple cameras that captured the event of the Caldor fire. The data is captured as a stream of distinct video frames (jpeg images). First, the metadata of the camera location and each image timestamp are extracted using Optical Character Recognition (OCR). Then, a time sequence of video frames is constructed using the ordered timestamp series data. The final mp4 video is integrated into the VR application. The camera metadata (tilt, pan, height, etc.) is also extracted from the video images and is used to reconstruct the 3D location of the camera inside the VR application. Note that at the time of writing this report, the historical video footage from the camera was not available. The application shows what would be possible if the video stream was from the time of the fire event.



Fire Perimeter Data

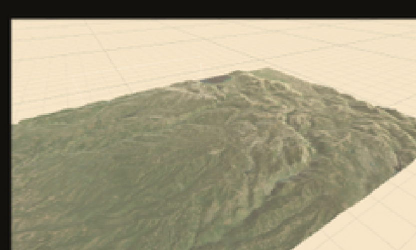
Fire data from the VIIRS satellite is collected from the official NASA FIRMS (Fire Information for Resource Management System) https://firms.modaps.eosdis.nasa.gov. We collected the data for all fire events from the dates August 14, 2021, to October 6, 2021, which was the timeframe for the Caldor fire. The data downloaded is in GeoDataframe format, which can be read with Python GeoPandas library. Each row of the table contains information about a specific coordinate and time that a fire was detected. We then isolated the fire points to the regions affected by the Caldor Fire using the bounds on longitude and latitude for the terrain data, and then separated the points by date. Then, we generated the fire perimeter for each date.





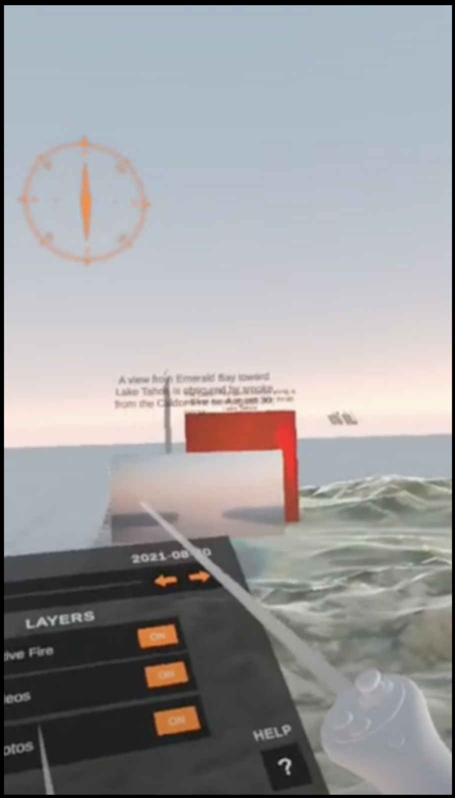
3D Terrain Data

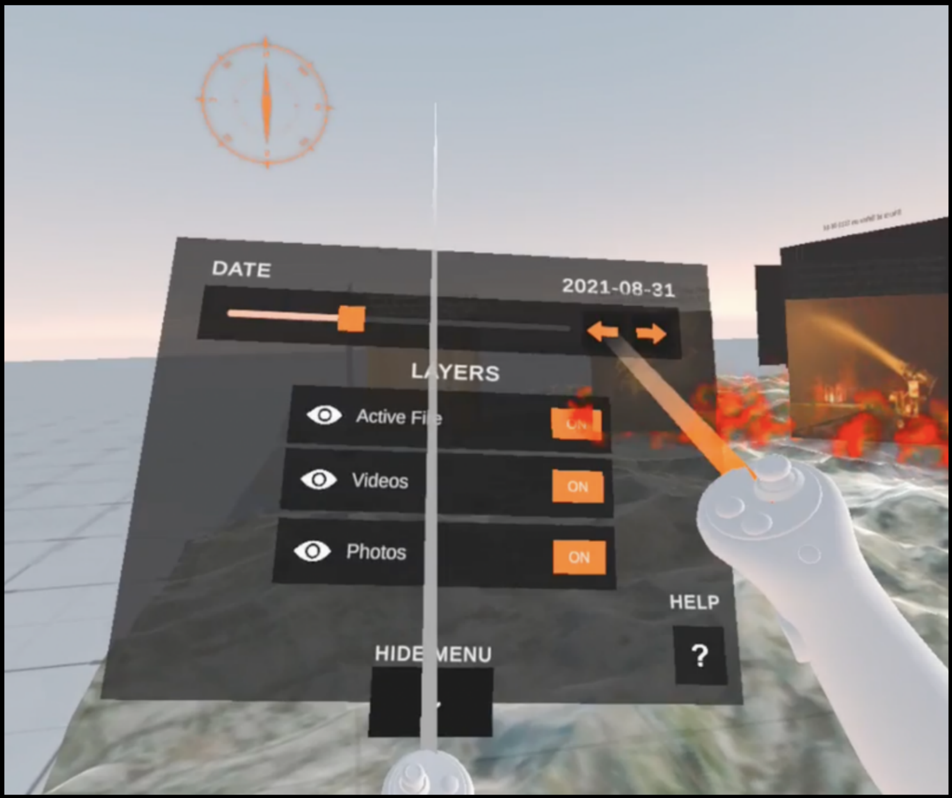
The wildfire visualization requires a terrain model as the base to display fire perimeter data and camera feed data and to produce a real-world measurement. The Topographical terrain data we use came from the OpenStreetMap database, while the satellite image data was sourced from the Mapbox Satellite database. We use Blender-OSM to automatically generate the terrain model with a high-resolution satellite image overlay.



We integrated three components into the Unity application.
First, we integrated the 3D Model generated in Blender. The terrain data came from OpenStreetMap and satellite image overlay came from Mapbox. We also computed a height map of the 3D terrain. Second, we integrated fire perimeter data from the Visible Infrared Imaging Radiometer Suite (VIIRS) satellite. Third, we integrated video streams from lookout stations and photographs from the media.

We collected video data from the AlertWildfire website via a web scraper. Putting these three data sources together, we added fire particles and a time slider that shows the spread of the fire over time as well as relevant videos and photos based on the chosen day. We visualized the burnt areas using fire perimeters by shading the areas that fall inside the perimeter. Finally, the user interface attached to the left controller allows the player to adjust the scale and viewing angle of the map and select layers of information to display. The Help menu provides detailed information about available interactions.





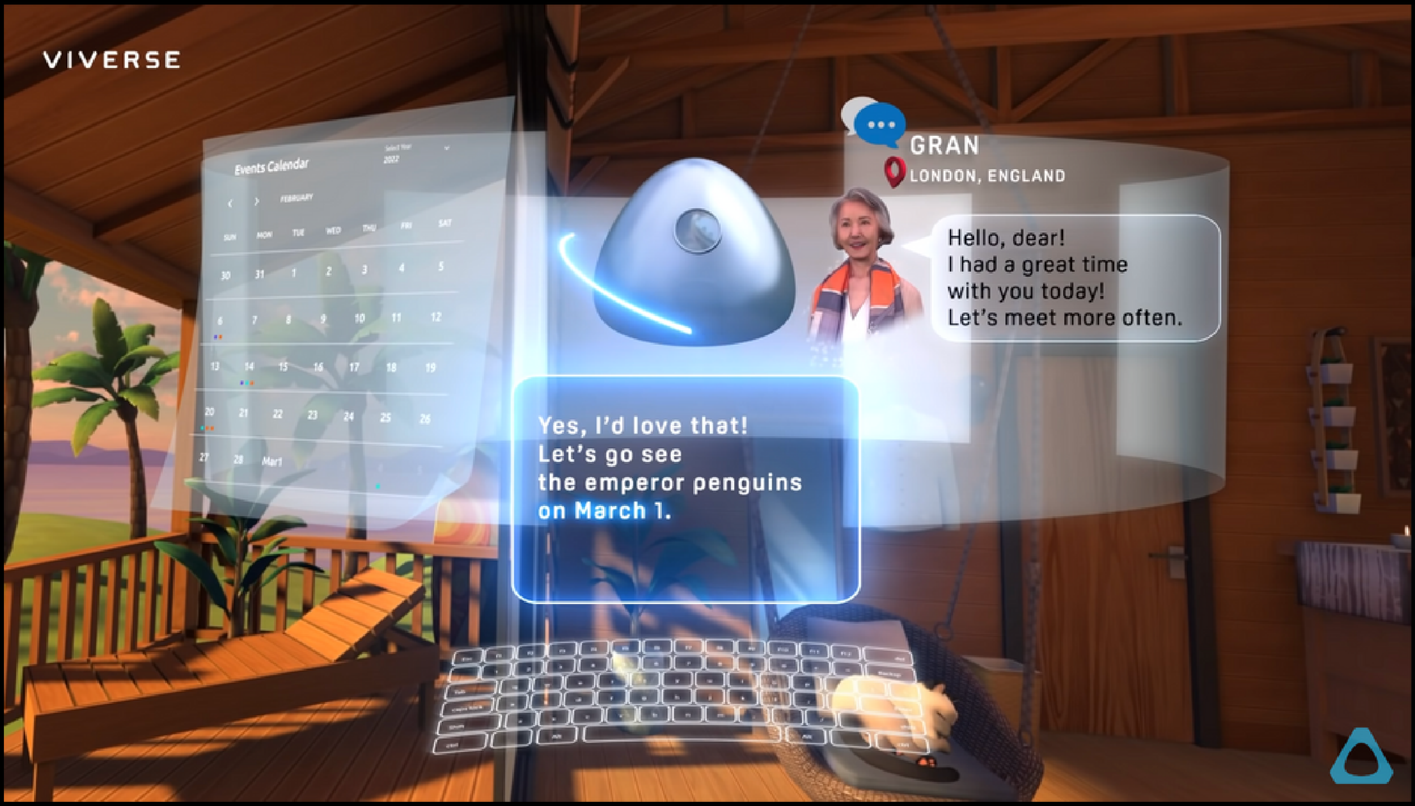
DESIGN@ HTC

ABOUT HTC CREATIVE LABS
HTC Creative Labs is a product design, prototyping, and incubation studio that provides design strategy for all of HTC. It is a cross-functional team comprising designers, artists, developers, and researchers, responsible for HTC's most significant product, the HTC VIVE.

MY ROLE
I work in the UX Team and I am currently a member of the Viverse project. My responsibilities include designing the user experience, including UI/UX, conducting research, ideation, spatial experience design, and prototyping in Virtual Reality for HTC Vive Elite.

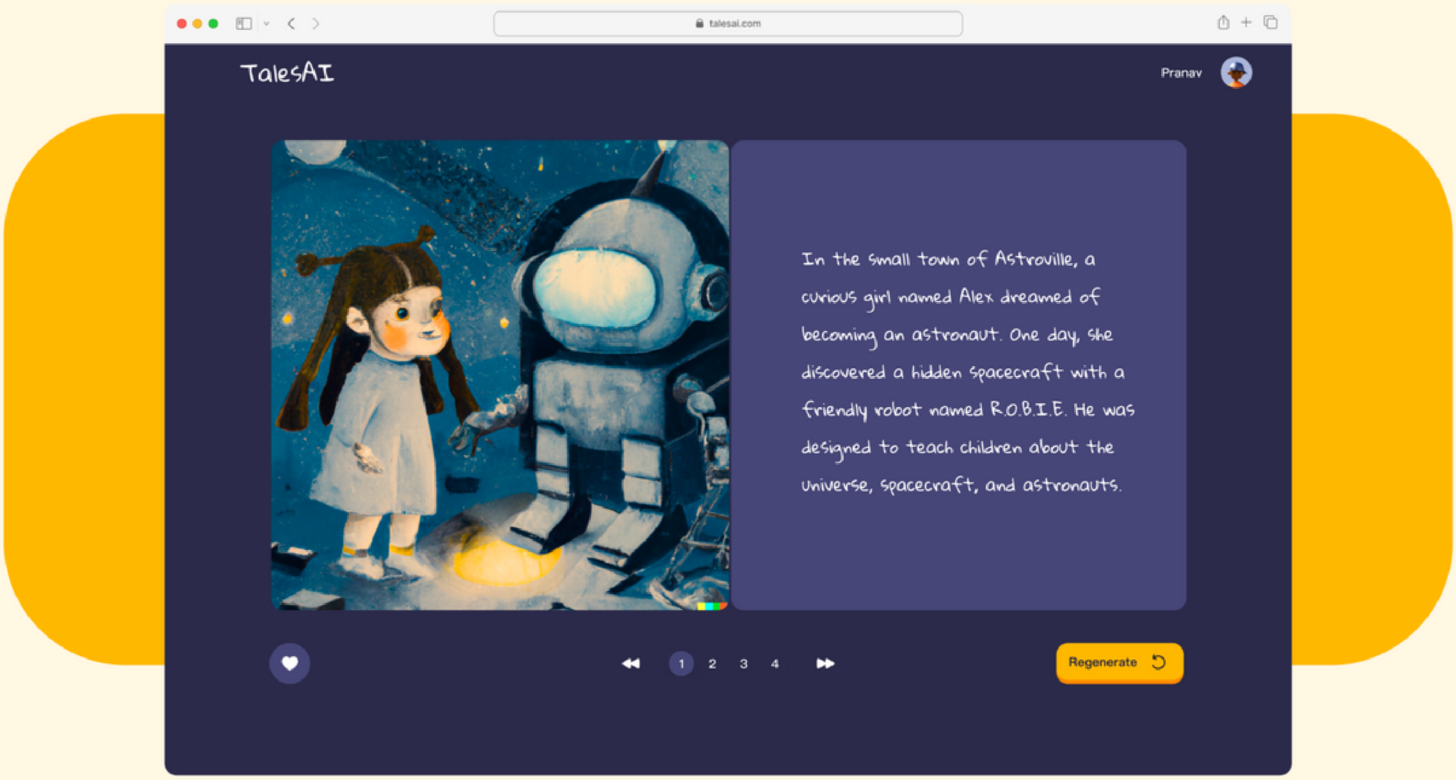
TIME
JUL 2023 - AUG 2023, FULL-TIME
AUG - PRESENT 2023, PART-TIME

POSITION
CONCEPT DESIGNER AT UX TEAM



In the summer of 2023, I joined HTC to embark on an exciting journey of creating intuitive user experiences and envisioning the future of XR technologies. I collaborated with a talented group of individuals, including a creative directors, 3D artists, UX designers, and engineers, on projects that are part of the leading work in the AR/VR industry.

All of my projects during this experience are under a strict NDA. The videos shown below are publicly available products that were either designed by my team, or are related to my work. Please reach out if you would like to hear more.



STORY GENERATOR

TALES. AI

TIME
Jan 2022 - May. 2022 (Launched)

ROLE
Product Designer

TEAM
With Pranav Chopada, Zach Dive, Jahnavi Jambholkar

RESPONSIBILITIES
Product design, visual design, product strategy, user research

HMW MAKE READINGS MORE ENGAGING AND INTERACTIVE?

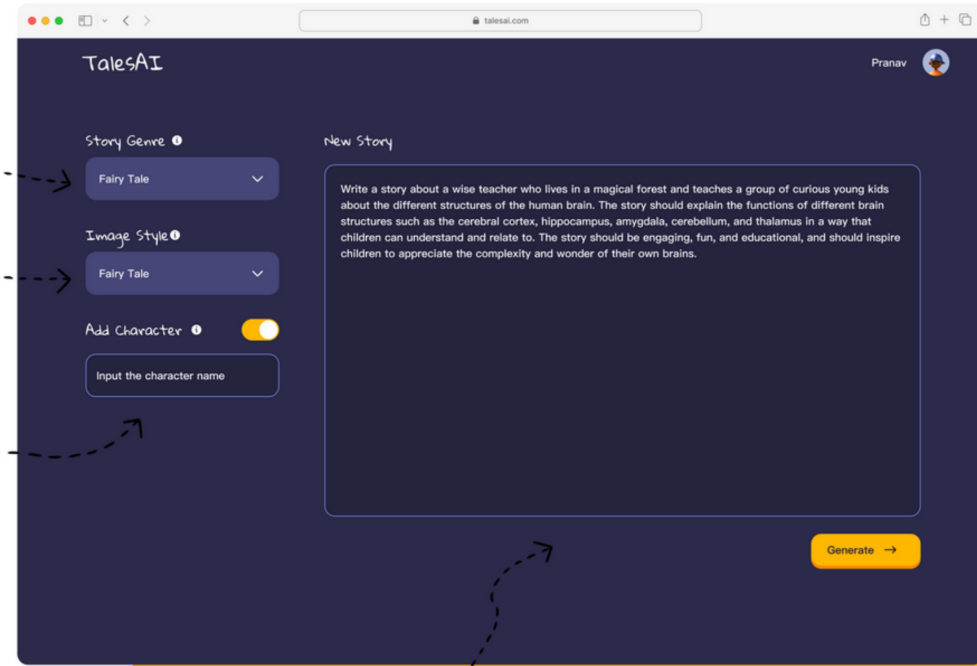
The primary education system fails to keep up with the changing technologies of our time and lacks the engagement and personalization needed to spark creativity in children at a young age. Tales AI is a story generator that aims to make class readings more engaging and interactive by involving students in the story and adding fun to learning.

In the User Interface Design and Development course at UC Berkeley, I worked closely with my team to create the Intelligent Application by following a complete product design and development process.In addition to leading UX/UI design and product strategy, I also contributed to front-end development. This experience has inspired me to view design from a higher level perspective.

Choose story genre:
Select a genre for the story, such as adventure, mystery, romance, or adventure.

Incorporate images:
Select a specific image style.

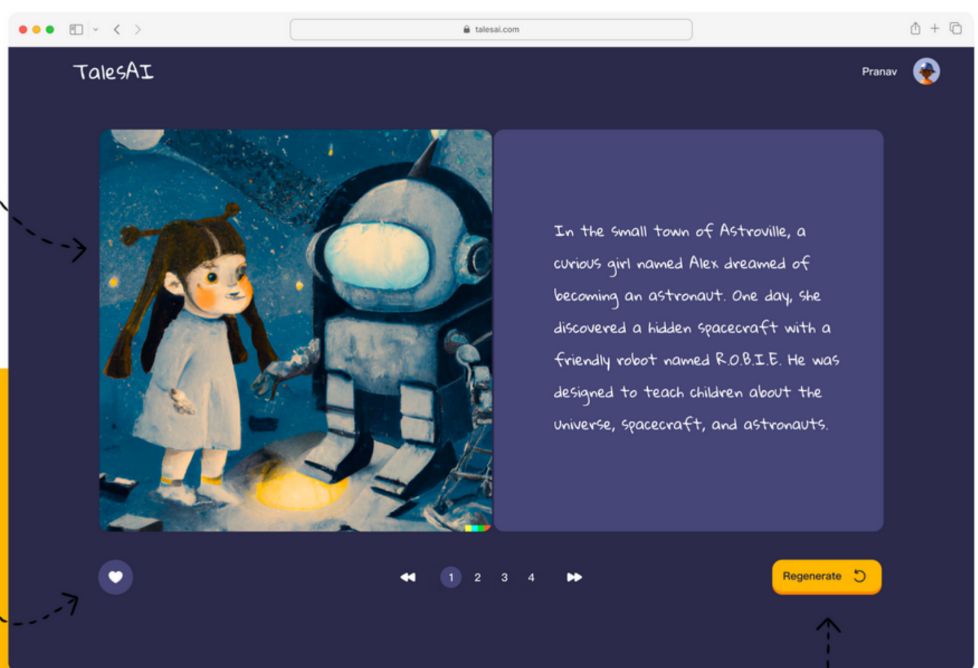
Add specific character:
Add a character name to incorporate into the generated story.



Generate story:
Input a story prompt and click generate button to create a story. The backend will generate a story based on the input prompt and display it to the user.

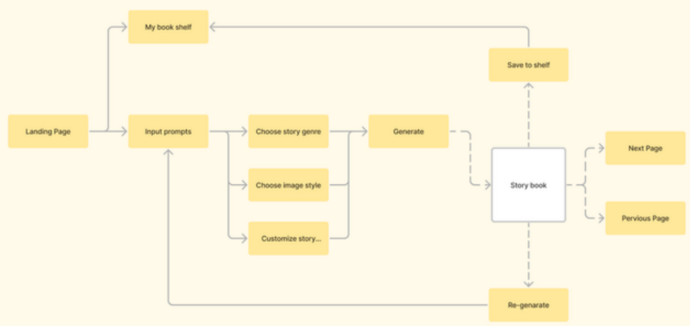
Add specific character:
We incorporate images generated by DALL-E into the story.

Save the story:
Click the heart button to save the generated story.



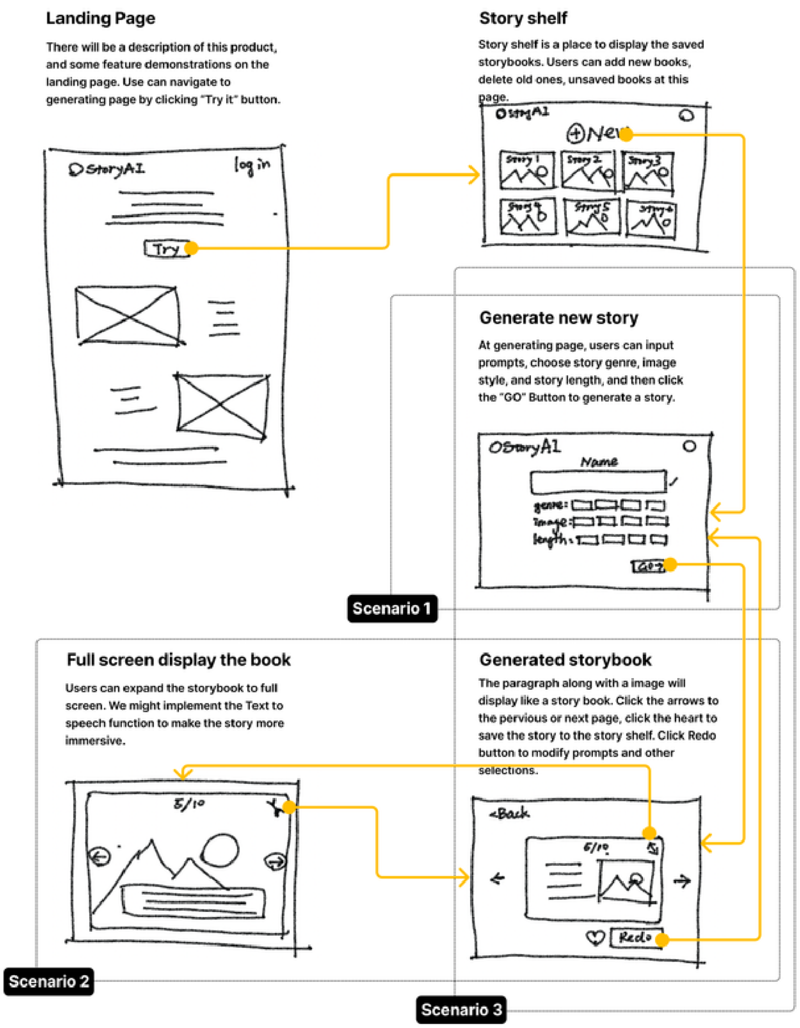
Regenerate
Click this button to generate a new story.

User Flow



Our goal is to create and develop personalized user stories through minimal user effort. This is possible by leveraging intelligent systems (GPT-3.5, Dall-E-2) to create engaging, personalized stories for children to stimulate imagination and foster learning. The application will be inclusive with an option to create visual stories with a simple button click. We plan to incorporate voice-based story narration for people with special accommodations if time permits.

User Interface



IMAGINE TALES.AI: PROVIDE AN INNOVATIVE AND INTERACTIVE EDUCATIONAL EXPERIENCE FOR STUDENTS.

Our mission is to provide an innovative and interactive educational experience for students by leveraging generative AI to create personalized storybooks that engage and educate young minds. We want to empower students to unleash their imagination and become lifelong learners through the power of personalized storytelling.

The evolution of robots demands intuitive interfaces for enhanced human-robot interaction under the ROS framework. Current methods, largely screen-based, fall short in addressing the varied robot types, resulting in gaps in usability and interaction efficiency. Prior efforts have typically focused on specific robot categories, neglecting a holistic approach, leaving unaddressed challenges in the interface spectrum. The diversification in robot types, each with unique navigational nuances, underscores the need for a universal AR-enhanced interface. This research sets forth to engineer such an interface, bridging existing shortcomings and establishing a more immersive and encompassing interaction paradigm. This study employs a dual-faceted strategy: designing a universal AR interface that mirrors the robot's digital presence onto its real-world manifestation, and introducing the groundbreaking 6D pose estimation algorithm for accurate robotic representation. Given the expansive scope of robots, this study primarily targets those under the ROS framework, excluding non-ROS robots from its ambit. By redefining the interaction metrics, this research has the potential to revolutionize the domain of human-robot interaction, setting a new standard for intuitive and holistic interface design. Post completion, the insights gleaned pave the way for further optimization of AR interfaces, potentially spurring deeper investigations into non-ROS robotic systems and further AR innovations.

ENABLING MULTI-TYPE ROBOT NAVIGATION

AR-Enhanced Interface For Robot Control

Yue Fan, Zixun Huang

AR-Enhanced Interactions

From the perspective of AR-enhanced human-robot interaction, three distinct spaces exist for the AR interface, each catering to the display of various interface components:

Display Space: Defined by the viewing area provided by the headset (Billinghurst et al., 2005). While it doesn't offer interactive capabilities, it's pivotal for presenting information panels (Reipschlager et al., 2020). These panels can hover or be affixed, providing insights into a robot's internal or external condition (Urbani et al., 2018; Leutert et al., 2013). Information ranges from basic textual details, like a drone's height, to complex visual representations, like operational flowcharts.

Ego Space: The interactive arena within the AR setting, accessible and modifiable by human users (Seo and Lee, 2013; Kim and Lee, 2016). Key elements include:

- Controls and Grips: Interface components allowing humans to steer robots using virtual grips and present control metrics (Hashimoto et al., 2011).
- Menus: Visual lists streamlining interactions between humans and robots (Gao and Huang, 2019; Ostanin and Klimchik, 2018).
- Monitors and Screens: Serving as windows to distant locations, e.g., live camera streams (Villanueva et al., 2021).

Digital Twin Space: Tied to the object, allowing data anchoring directly onto it. Elements in this space display the robot's operating behavior (Lv et al., 2021; Malik and Brem, 2021). Key elements include labels and descriptions, which offer insights or cues about items (Dam et al., 2020).

Interaction Methods: In robotic interfaces, spatial gestures, gaze, and voice commands enhance user interaction (Suzuki et al., 2022). Examples include spatial gestures in HMD interfaces (Arevalo Arboleda et al., 2021; Chan et al., 2018; Bambušek et al., 2019), gaze techniques (Mohammad et al., 2010; Park et al., 2021), and voice commands (Alvarez-Santos et al., 2014; Andronas et al., 2021; Qian et al., 2019).

Leveraging these spaces and interactions, the goal is to create an optimized AR interface suitable for a spectrum of robotic entities.

3D Object Tracking Datasets

Existing object pose estimation algorithms predominantly test on real-world 3D object tracking datasets (Hinterstoisser et al., 2013; Marion et al., 2018; Xiang et al., 2018; Liu et al., 2020, 2021; Feng et al., 2023; Calli et al., 2015a, b, 2017). These datasets employ depth-from-stereo sensors or time-of-flight (ToF) sensors for data collection, such as YCB-Video (Xiang et al., 2018), LINEMOD (Hinterstoisser et al., 2013), StereoOBJ-1M (Liu et al., 2021), and TOD Liu et al. (2020).

6DoF Pose Estimation

Algorithms for 6D object pose estimation can be broadly categorized into:

Direct Methods: Directly regress the 6D pose from images or depth maps (Hu et al., 2020; Xiang et al., 2017; Tekin et al., 2018).

Perspective-n-Point (PnP) Based Methods: Extract 2D features and 3D correspondences to solve the PnP problem (Peng et al., 2019; Rad and Lepetit, 2017).

Template-Matching Based Approaches: Use reference images with pose details to identify similarities (Sundermeyer et al., 2018; Wohlhart and Lepetit, 2015; Sundermeyer et al., 2020).

Additionally, pose estimation methods are distinguished as 'open set' or 'closed set'. Open set methodologies adapt to unseen objects, whereas closed set techniques cannot. Current challenges and advancements in this domain are also discussed.

About Yue Fan

07/2023 - Present

HTC VIVE

Concept Designer, UX

02/2023 - Present

FHL VIVE CENTER

Graduate Student Researcher

12/2021 - 06/2022

VERSETECH

Product Designer

02/2021 - 11/2021

RAC STUDIO

Product Designer

07/2019 - 04/2020

CSWADI

Landscape Architect