Performance Improvement in Digital Marketing Using Augmented Reality

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Abstract: This project focuses on improving the digital shopping experience for footwear through an interactive virtual try-on system. Many users struggle to find the perfect shoe size or fit when shopping online, which often leads to returns, dissatisfaction, or hesitation in purchasing.To solve this, we developed a web-based platform that helps users see how a shoe would look on their foot before buying it. The user can scan their foot and then choose from a variety of shoe models displayed in the catalog. Once selected, the shoe is overlaid onto the scanned foot image, giving a real-time try-on effect.The idea behind this project is to make online shoe shopping easier, more reliable, and user-friendly. It aims to build trust between brands and customers by showing how a product might actually look when worn. This helps users make more confident purchase decisions.Our system also includes links to real websites where the shoes are sold, so users can directly buy the products after trying them virtually. In addition, details such as price, fit type, and foot compatibility are clearly shown to guide buyers.This method saves time, reduces return rates, and provides a unique shopping experience. We believe such digital tools can shape the future of online shopping, especially in the fashion and retail industry.

Keywords: Virtual try-on, Digital shopping experience, Footwear, Online shoe shopping, Web-based platform, Shoe fitting, Real-time try-on, Foot scanning

Introduction

Online shopping has become an essential part of our daily lives, offering convenience and a wide range of options.Among various products, footwear is one of the most frequently purchased items online.However, buying shoes without trying them on often leads to confusion and dissatisfaction. Many customers face challenges in choosing the right size, fit, or style when they cannot try the shoes physically.As a result, returns and exchanges are common, causing inconvenience to customers and financial losses to sellers.

To overcome this issue, we present a web-based virtual shoe try-on platform. This system helps users visualize how a selected shoe model will look on their own foot using a scanned image.It is designed to make online footwear shopping easier, more reliable, and interactive for the user. Our try-on solution gives users a personalized experience without needing physical contact with the product.This reduces guesswork in selecting the right shoe and builds confidence in online purchases.

The system displays a wide variety of shoes, including sneakers, running shoes, sandals, and more.
Each product is shown with clear images, detailed pricing, size options, and links to external online stores.Shoppers can view important information such as which foot types a shoe fits (e.g., Greek, Egyptian, Square).They can also see ratings and reviews, which further help in making informed decisions.The user interface is designed to be clean, responsive, and easy to use on both desktops and mobiledevices. Users can browse through multiple shoe designs and switch views with ease.The experience is similar to visiting a

showroom, but accessible anytime, anywhere from a browser.Our goal is to reduce the gap between online shopping and the physical store experience.

This project is focused on enhancing visual interaction, offering a modern solution to an old problem.We intentionally avoided complex backend systems like DeepAR to keep it lightweight and browser-friendly.The system works using simple front-end tools and can be extended further with features like audio guidance or user reviews.It can also include real-time foot detection or size suggestions using AI in future upgrades.

Retailers and brands can use this system to promote their shoes in a more engaging way. Instead of static product photos, customers can experience the product virtually and make faster buying decisions.The try-on platform supports multiple shoe brands, improving visibility for each product in the catalog. Users can even be redirected to the brand's shopping page instantly after trying on the product.

From the customer's point of view, this system saves time, avoids returns, and increases satisfaction. For sellers, it minimizes shipping costs related to returns and increases trust in their brand. In today's digital world, people are looking for smarter ways to shop, and this project is a step forward.We believe such systems will become more common in the near future across fashion and lifestyle sectors.

In conclusion, our virtual try-on project creates a strong foundation for digital shopping innovation. It bridges the gap between customers and online stores with an immersive visual experience. We aim to make this technology accessible, scalable, and useful for anyone shopping for footwear online.By combining simplicity, interactivity, and product personalization, this system transforms how shoes are bought online.

Existing System and Its Limitations

In the current e-commerce environment, most online footwear platforms rely on traditional 2D images. Customers view photos from different angles, read size charts, and check user reviews to decide what to buy. Some websites offer size guides based on foot length and width, but the process is still confusing for many. Popular platforms like Amazon, Flipkart, and Nike rely mainly on written descriptions and return policies.

Although many websites provide detailed size charts, these are not always accurate for all users. A shoe that fits one person perfectly might feel tight or loose on another with the same foot size. To compensate for this, companies offer flexible return policies, but this increases operational costs. Frequent returns are also inconvenient for users and create frustration when the fit isn't right.

A few advanced systems try to use Artificial Intelligence or Augmented Reality to improve user experience. However, many of these are mobile-app-based and require users to download separate applications. Such systems are often heavy, device-specific, and not optimized for all browsers or slower networks. Moreover, many AR features rely on expensive third-party SDKs or APIs, increasing development costs.

Another major drawback in existing systems is the lack of foot shape consideration. Most platforms do not account for different foot types like Greek, Egyptian, or Square feet. Users are left guessing whether a shoe's design will be visually or physically comfortable for them. This leads to poor purchase decisions and low customer satisfaction in the long term.

Additionally, the virtual try-on features available today are often limited to branded apps. These apps are not beginner-friendly and may demand high system permissions and access to personal data.Some users avoid such features due to privacy concerns or lack of technical understanding.Is summary, the current systems are either too basic or too complex.There is a clear gap in the market for a simple, web-based virtual try-on system.It must work without app downloads, respect privacy, support all browsers, and consider foot shape.

Our project aims to bridge this gap by offering an easy, visual, and browser-friendly solution for shoe try-on.Even though some brands have started adopting virtual try-on tools, they are usually limited to premium

or high-end markets.Small or mid-sized retailers cannot afford the high development or integration costs of these advanced systems.Moreover, most of the virtual try-on systems available today require high-speed internet and the latest smartphones.

This creates a digital divide, making it difficult for users from rural areas or low-end devices to access such features.Also, these systems often focus more on appearance than functional fitting, like grip, toe space, or arch comfort.There is little to no feedback mechanism to assess comfort, flexibility, or pressure points.Users are still forced to imagine how a shoe might feel in real life, despite visual guidance.The absence of real-time feedback also limits user engagement and trust in the system.
All these limitations point to the need for a cost-effective, user-friendly, and inclusive solution. Our project addresses these concerns by offering a simple and visually interactive web-based experience.

Proposed Methodology

The proposed system introduces a web-based Augmented Reality (AR) platform that allows users to virtually try on shoes using their device's camera. Unlike traditional e-commerce platforms that only offer static product images and vague sizing charts, this system combines foot detection, image overlay, and real-time interaction to enhance the user's online shopping experience.

The core methodology is divided into several key stages: user entry, foot scanning, data capture, AR overlay, and final selection. When a user visits the platform, they are first greeted with a welcome screen that briefly explains the concept of virtual shoe try-on. From there, the user can proceed to scan their foot using their device's camera. The system supports multiple device cameras and allows the user to select their preferred camera source.

During the foot scanning process, the camera captures a live video stream, and the user is guided to position their foot in view. A scanning frame and visual cues are displayed to help the user align their foot correctly. After a brief countdown, the system captures an image or video frame of the user's foot. This image is not stored permanently but used temporarily within the browser using JavaScript and HTML5 canvas features.

Once the foot image is captured, it is processed within the front-end application. Basic shape detection is applied using canvas pixel analysis and bounding box estimation. While this project does not use advanced machine learning or 3D modeling, it focuses on delivering a simplified AR overlay experience. Based on the detected foot region, a shoe image is layered on top, giving the user an illusion of wearing that shoe in real-time. The overlay is adjustable in position and scale to match the foot's shape and size approximately.

The system then transitions to the virtual try-on interface, where users can browse a gallery of shoes. These include multiple styles, colors, and designs, presented as clickable thumbnails. When the user selects a shoe model, it is overlaid on the foot image. JavaScript functions handle the switching of shoe images, real-time updating of the canvas, and simple animations to enhance the experience.

An important aspect of the methodology is its simplicity and accessibility. Unlike app-based solutions that require downloads and high device specifications, this project is entirely browser-based. It uses lightweight web technologies like HTML, CSS, JavaScript, and Web APIs for camera access. This ensures that the system works on most devices with a modern browser and active internet connection, making it accessible to a broader audience.

To ensure smooth flow and data transition between pages, the project uses local storage to temporarily hold scanned foot data and user selections. This allows seamless navigation between scanning, detail, and try-on pages without needing a backend server or database integration. The modular design of the codebase also ensures easy scalability and future extension to include more advanced features such as personalized recommendations or foot size measurement.

In summary, the proposed methodology aims to bridge the gap between traditional online shopping and in-store experiences by offering a user-friendly, AR-based shoe try-on system. It enhances user confidence,

reduces product returns, and makes online shopping more interactive, engaging, and personalized — all without needing additional hardware, heavy software, or complex installations.

Design and methodology

For scanning feet

```
window.onload = function() {
  setTimeout(function() {
    window.location.href = 'detail.html';
  }, 20000); // Redirect after 20 seconds
};
navigator.mediaDevices.enumerateDevices()
  .then(function(devices) {
    // Lists available cameras

    let cameras = devices.filter(device => device.kind === 'videoinput');
    cameras.forEach(function(camera) {
      const option = document.createElement('option');
      option.value = camera.deviceId;
      option.text = camera.label || `Camera ${camera.deviceId}`;
      cameraSelector.appendChild(option);
    });

    // Automatically start default camera
    const defaultCameraId = cameras[1] ? cameras[1].deviceId : null;
    if (defaultCameraId) startCamera(defaultCameraId);
  });
```

The getinfo.html page is used to **capture the user's foot scan** through a live video stream using the device's camera. It allows the user to select the camera, displays the video feed, and automatically redirects to detail.html . A hidden scan animation appears during scanning to simulate progress. The page uses JavaScript to handle camera access, foot image capture, and redirection logic.

For collecting user details

```
<script>
  // Check if foot data exists in local storage
  const footData = localStorage.getItem("footData");
  if (footData) {
    // If data is found, redirect to try-on page
    window.location.href = "tryon.html";
  } else {
    // If not found, redirect back to scan page
    alert("Please scan your foot first.");
    window.location.href = "scan.html";
  }
</script>
```

The detail.html page acts as a gatekeeper between the scanning phase and the try-on phase. It ensures that only users who have scanned their foot can access the virtual try-on feature. It uses browser local storage to verify if foot scan data (named footData) exists. If the data is found, the system redirects the user to tryon.html to begin the augmented reality experience. If the data is missing, the user receives a prompt and is redirected back to the scanning page (scan.html) to complete the required step. This mechanism helps prevent skipping the scanning step and ensures proper flow of the try-on process.

For virtual shoe try-on

1. Shoe Selection Event Listener

```
document.querySelectorAll('.shoe-option').forEach(item => {
  item.addEventListener('click', function() {
    const selectedShoe = this.querySelector('img').src;
    document.getElementById('tryOnOverlay').src = selectedShoe;
    document.getElementById('tryOnOverlay').style.display = 'block';
});
});
```

The shoe selection event listener enables users to interact with the shoe catalog by clicking on any displayed shoe. When a shoe is clicked, its image source is retrieved and applied to the tryOnOverlay element, which is then made visible. This creates a virtual try-on effect by showing the selected shoe image over the scanned foot area. It helps users instantly see how a specific shoe would look when worn, making the experience interactive and personalized.

2. Category Filter Function

```
function filterCategory(category) {
  document.querySelectorAll('.shoe-option').forEach(shoe => {
    if (shoe.dataset.category === category || category === 'all') {
      shoe.style.display = 'block';
    } else {
      shoe.style.display = 'none';
    }
  });
}
```

The **category filter function** allows users to view shoes based on specific types like casual, formal, or sneakers. It works by checking the data-category attribute of each shoe and displaying only those that match the selected category. If “all” is selected, all shoes are shown again. This helps users quickly find what they’re looking for without scrolling through unrelated options. It improves the user experience by organizing the shoe catalog efficiently.

3. Foot Data Validation on Page Load

```
javascript
Copy code
window.onload = function() {
  const footData = localStorage.getItem("footData");
  if (!footData) {
    alert("Foot data not found. Please scan your foot first.");
    window.location.href = "scan.html";
  } else {
```

```
    console.log("Foot scan found. Proceeding to try-on.");
  }
};
```

The **foot data validation on page load** ensures that users can only access the try-on feature after scanning their foot. When the tryon.html page loads, it checks if foot data is stored in the browser's local storage. If the data is missing, the user is alerted and redirected to the scan.html page to complete the scanning process. This prevents users from skipping steps and ensures the AR overlay works accurately. It maintains a proper and logical workflow throughout the application.

For displaying privacy policy

```
<div class="container privacy-page w-50">
  <h1>Privacy Policy for LooksMatch</h1>
  <p>
    At LooksMatch, we prioritize the privacy of our users. This Privacy Policy outlines the types of personal information we collect, how it is used, and the measures we take to safeguard it.
  </p>
  <h3>Information We Collect</h3>
  <ul>
    <li>Contact info (name, email)</li>
    <li>Foot measurements and user preferences</li>
    <li>Device and browser data</li>
  </ul>
  <h3>How We Use Your Information</h3>
  <ul>
    <li>To personalize fitting experiences</li>
    <li>To improve system accuracy and service delivery</li>
    <li>To ensure user security and detect fraud</li>
  </ul>
</div>
```

For displaying privacy policy

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<div class="container privacy-page w-50">
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    <li>Device and browser data</li>
  </ul>
  <h3>How We Use Your Information</h3>
  <ul>
    <li>To personalize fitting experiences</li>
    <li>To improve system accuracy and service delivery</li>
    <li>To ensure user security and detect fraud</li>
  </ul>
```

```
</div>
```

The privacy.html page informs users about how their personal data is collected, used, and protected while using the virtual shoe try-on platform. It details the types of data collected — such as user preferences, foot scan dimensions, and device information — and explains that this is used to enhance personalization and security. The page is purely informational and legally important, ensuring transparency and building trust with users. It's typically linked from other pages (like index.html) to fulfill privacy compliance and ethical data handling practices.

For landing/home page

```
<div class="container index-page w-50">
  <div style="margin-top: 250px;">
    <h2>Welcome to PerfectMatch</h2>
    <p>
      An online platform that uses augmented reality to let users try on shoes virtually using their camera.
    </p>
    <p>
      Continued use means you accept our <a href="privacy.html">Privacy Policy</a>.
    </p>
    <button id="getStartBtn" class="btn btn-primary btn-lg">Get start</button>
  </div>
</div>
```

The index.html page is the **welcome or home page** of the application. It introduces the platform and tells users they can virtually try on shoes using AR. There's a **"Get start" button** that leads users to begin the try-on process. It also links to the **Privacy Policy** for transparency. This page sets the first impression and starts the user journey.

Algorithms

1. **Camera Access Algorithm**
   Uses navigator.mediaDevices.getUserMedia() to detect and stream video from the webcam.
2. **Image Capture Algorithm**
   Captures a single video frame using HTML5 <canvas> and drawImage() to freeze the foot image.
3. **Foot Detection Logic (Basic Bounding Box Estimation)**
   A simple shape-based approach (not ML-based) to detect the foot region for overlaying shoes.
4. **AR Overlay Algorithm**
   Positions and scales the shoe image on top of the scanned foot using style.left, style.top, and transform: scale().
5. **Local Storage Check Algorithm**
   Verifies if scanned foot data (footData) exists in localStorage to proceed or redirect.
6. **Rule-Based Shoe Filtering Algorithm**
   Filters shoe options based on selected categories (e.g., sneakers, boots) using DOM class matching.
7. **Shoe-Foot Matching Algorithm (Rule-Based)**
   Matches foot types (e.g., Greek, Egyptian) with suitable shoe designs using if-else conditions.
8. **User Event Handling Algorithm**
   Responds to clicks, dropdowns, and button presses using JavaScript event listeners.

9. **WebPack Bundling Algorithm**
   Optimizes and bundles project files for deployment (through webpack.config.js).

Implementation

The Augmented Reality (AR)-based virtual shoe try-on system, titled **"Perfect Match"**, was implemented using a combination of front-end technologies and browser-based camera access. The platform allows users to scan their foot and virtually try on different styles of shoes using an overlay mechanism. Below are the tools, languages, and components used in the development process:

⚙ Tools & Technologies Used:

- **Visual Studio Code (VS Code):** For code editing and project structuring.
- **JavaScript:** For dynamic interactions and camera control logic.
- **HTML5:** For structuring the web pages (index.html, tryon.html, getinfo.html, detail.html, privacy.html).
- **CSS3 (including SCSS):** For styling the layout and enhancing visual appearance.
- **Bootstrap:** For responsive layout and UI components.
- **Font Awesome & Google Fonts:** For icons and custom fonts.
- **LocalStorage API:** To store the scanned foot data temporarily in the browser.

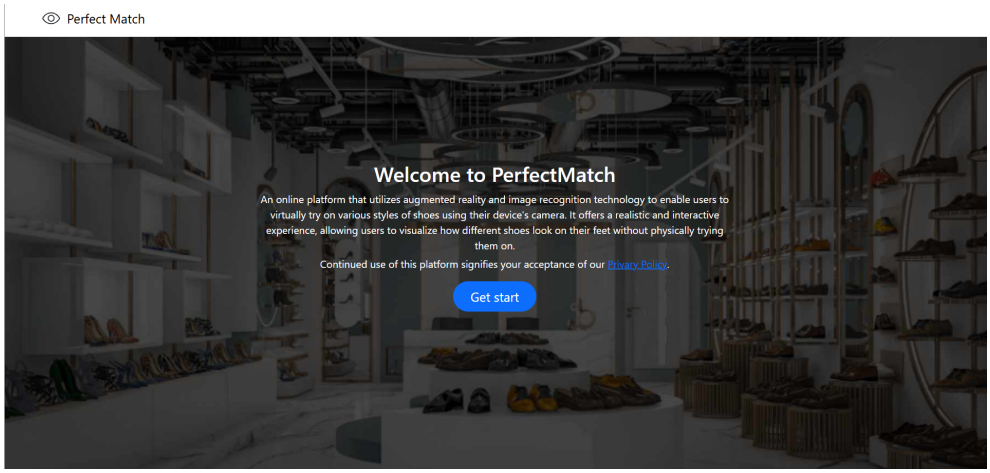
Programming Languages:

- **HTML** – Used to design the user interface structure.
- **CSS** – Used for styling the web pages and creating clean layouts.
- **JavaScript** – Used to control the video feed, capture foot data, handle image overlays, and manage interactions between pages.

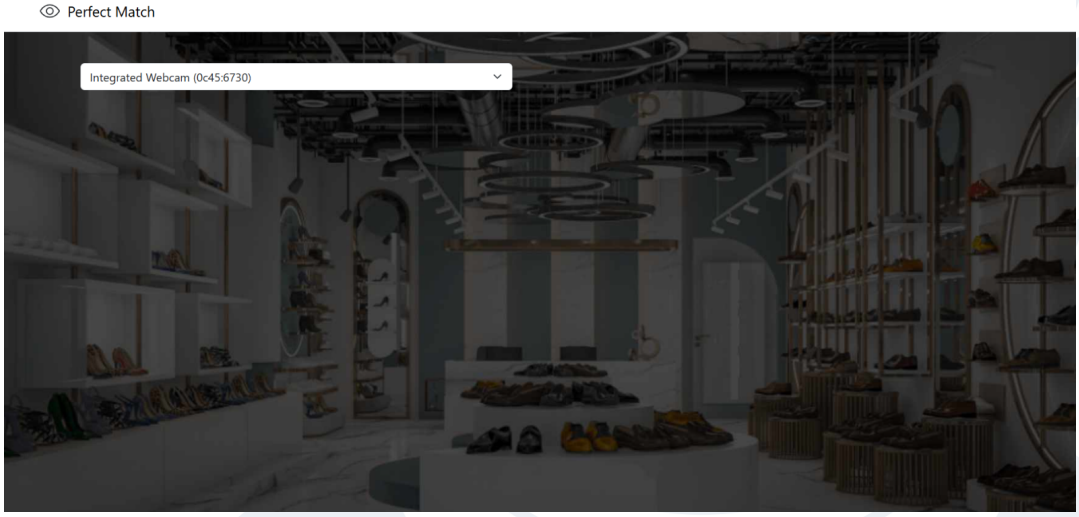
File Structure Highlights:

- index.html – Home page with a start button and project intro.
- getinfo.html – Accesses webcam, shows scanning animation, captures foot.
- detail.html – Redirects user based on whether foot scan is stored.
- tryon.html – Displays the shoe catalog and overlays selected shoes.
- privacy.html – Displays user privacy and data usage policies.
- main.css, mycss.css – Contain styling rules for all pages.
- main.js, myscript.js – Contain the camera and overlay logic.
- package.json & webpack.config.js – Define project dependencies and bundling setup.

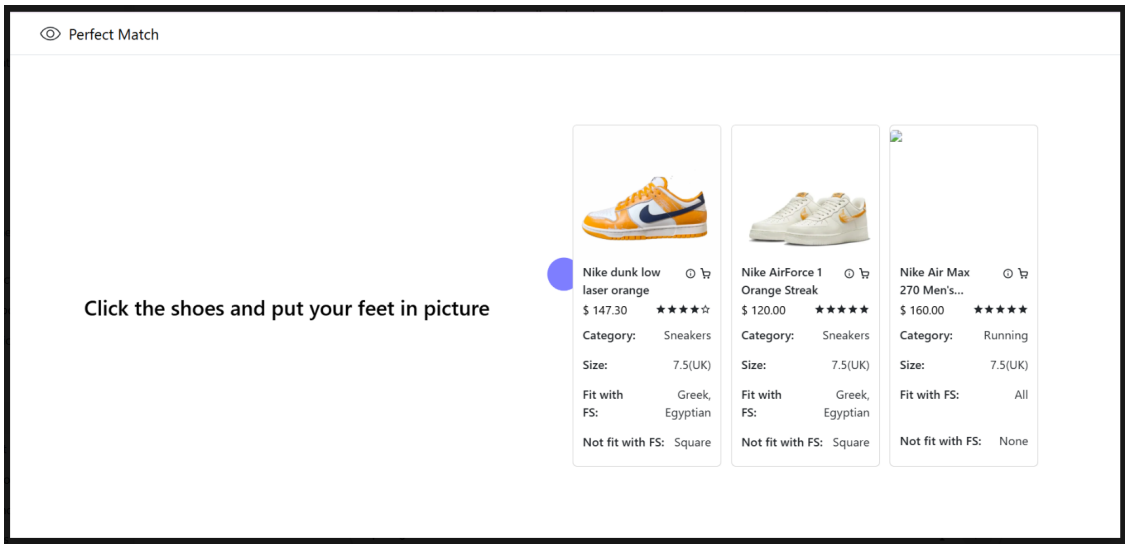
Findings and Result Analysis:



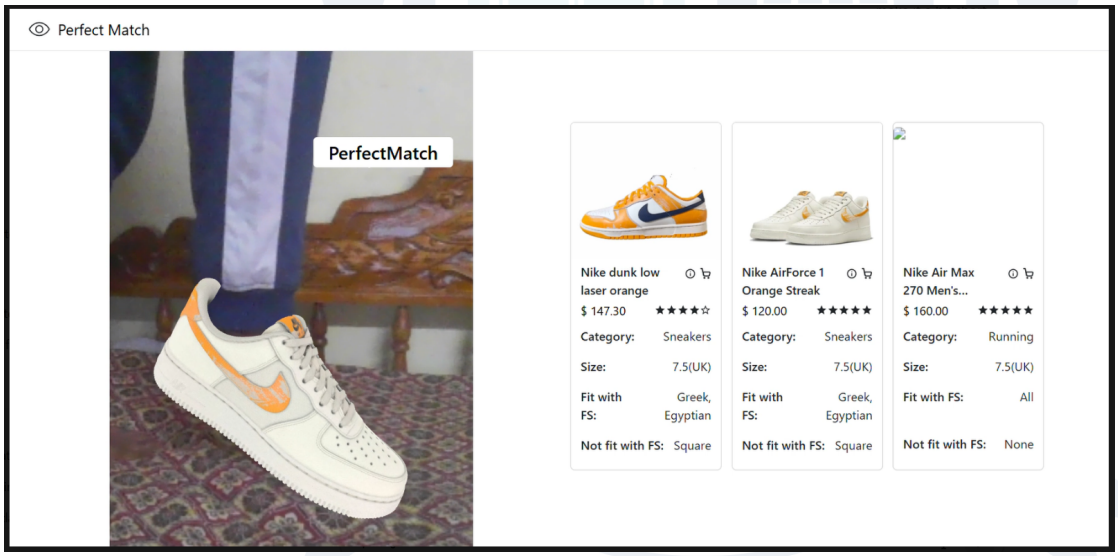
This is the **home page (index.html)** of the project **"Perfect Match."** It welcomes users and introduces the purpose of the platform—allowing them to virtually try on shoes using augmented reality through their device's camera. The background shows a modern shoe store, and there's a **"Get start"** button that takes users to the next step (foot scan). It also links to the **Privacy Policy** to inform users about data usage.



This image shows the virtual try-on feature where a selected shoe appears on the user's foot using the webcam. The shoe is chosen from the product list on the right. It helps users preview how the shoe looks when worn. This enhances the shopping experience by offering a realistic visual before making a purchase.



This image shows the **tryon.html** page of the *Perfect Match* platform. Users can choose a shoe from the list on the right, which displays details like name, price, size, and foot shape compatibility. By clicking on a shoe, it overlays on their feet using the webcam, allowing them to **virtually try it on**. This offers a quick and interactive try-on experience.



This image shows the **virtual shoe try-on** in action. After selecting a shoe from the catalog on the right, the chosen shoe is **overlaid on the user's foot** captured via webcam on the left. This gives a realistic preview of how the shoe looks when worn. It's the core interactive feature of the *Perfect Match* platform.

Conclusion

The AR Shoe Try-On System offers a modern, contactless way for users to try footwear virtually, enhancing both user experience and convenience. By integrating technologies like augmented reality, image overlay, and real-time webcam input, the system allows users to visualize how different shoes would look on their feet without physically wearing them. This can reduce return rates, boost customer satisfaction, and improve confidence in online shopping. The project effectively bridges the gap between virtual selection and real-world fit. It also demonstrates how web technologies and AR can be combined to create interactive and user-friendly retail platforms. Overall, this project reflects the growing role of immersive technologies in revolutionizing the e-commerce experience.

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