

AI Hand Builder

An augmented reality application that uses AI hand tracking to build 3D structures in real-time.

🚀 Features

- **AI Hand Tracking:** Uses MediaPipe to detect and track hand movements
- **Multiple Build Modes:**
 - **Free Build:** Create custom colored blocks of any size
 - **Building Mode:** Use predefined building parts (walls, windows, doors, roofs, floors, columns, stairs, balconies)
 - **Solar System Mode:** Place celestial objects (Sun, planets, moons, asteroids, comets) with realistic colors and sizes
- **3D Building:** Create 3D structures in space using hand gestures
- **Gesture Controls:**
 -  Index finger to move the cursor
 -  Pinch gesture to place blocks/objects
 -  Show 2 hands to rotate the camera view (see from all angles!)
 -  Spread fingers to resize blocks (in Free Build mode)
- **Customizable Colors:** Choose any color for your blocks in Free Build mode
- **Grid System:** Toggle grid and rulers for precise building
- **Secure Login:** User authentication system
- **Animated Objects:** Solar system objects rotate automatically

📁 Project Structure

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```
|—— index.html      # Entry point with auto-redirect  
|—— login.html     # Login page  
|—— login-style.css # Login page styles  
|—— app.html       # Main application  
|—— app-style.css  # Application styles
```

```
|--- app.js      # Main application logic  
|--- auth.js     # Authentication system  
└--- README.md   # This file
```

Login Credentials

Default demo accounts:

- **Username:** demo | **Password:** demo123
- **Username:** admin | **Password:** admin123

You can also register a new account using the "Register here" link on the login page.

How to Use

1. **Login:** Open index.html in a browser (will redirect to login page)
2. **Camera Access:** Allow camera access when prompted
3. **Select Mode:** Choose your build mode:
 - **Free Build:** For custom colored blocks
 - **Building Blocks:** For architectural construction
 - **Solar System:** For creating space scenes
4. **Build:**
 - Show **one hand** to the camera to build
 - Use your index finger to move the cursor
 - Pinch your thumb and index finger to place a block/object
 - Show **both hands** to rotate the camera view (see from all angles!)
 - In Free Build mode, spread your fingers to change block size
5. **Customize:**
 - In Free Build: Change block color using the color picker
 - In Building Mode: Select from 8 different building parts
 - In Solar System: Choose from 12 celestial objects
 - Toggle grid visibility
 - Reset camera view to default position
 - Clear all objects

Building Parts Available:

-  **Wall:** Large rectangular blocks for walls
-  **Window:** Transparent glass-like blocks
-  **Door:** Door-sized blocks
-  **Roof:** Wide flat blocks for roofing
-  **Floor:** Foundation and floor blocks
-  **Column:** Vertical support pillars
-  **Stairs:** Staircase blocks
-  **Balcony:** Extended platform blocks

Solar System Objects:

-  **Sun:** Large glowing yellow sphere
-  **Mercury:** Small gray planet
-  **Venus:** Bright yellow planet
-  **Earth:** Blue planet
-  **Moon:** Small gray satellite
-  **Mars:** Red planet
-  **Jupiter:** Large orange planet
-  **Saturn:** Orange planet with rings
-  **Uranus:** Bright blue planet
-  **Neptune:** Deep blue planet
-  **Asteroid:** Small rocky object
-  **Comet:** Object with glowing tail
- **MediaPipe Hands:** AI-powered hand tracking
- **Vanilla JavaScript:** No framework dependencies
- **LocalStorage:** Client-side data persistence



- Requires a webcam for hand tracking
- Works best in well-lit environments
- The authentication system uses localStorage (for demo purposes only - not secure for production)
- For production use, implement proper backend authentication

Security Notice

The current authentication system is for demonstration purposes only. For production:

- Implement server-side authentication
- Use HTTPS
- Hash passwords properly (bcrypt, argon2, etc.)
- Use secure session management
- Add CSRF protection

Browser Compatibility

Works best in modern browsers with WebGL support:

- Chrome 90+
- Edge 90+
- Firefox 88+
- Safari 14+

License

This project is for educational and demonstration purposes.