Here’s a refined explanation for the programming languages and frameworks used in your Memingo project, with a bit more clarity on each tool's role:

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I’ll be explaining the programming languages and frameworks we've chosen for the Memingo project.

1. \*\*Frontend Development\*\*:

- For designing the user interfaces, we’re using \*\*React\*\*, a JavaScript library that simplifies creating dynamic and responsive UIs. React provides reusable components, which will allow us to create consistent screens across the app, such as profile screens, authentication screens, leaderboards, and other related interfaces.

2. \*\*Backend Development\*\*:

- On the server side, we’re using \*\*Node.js\*\* with \*\*Express.js\*\*. Node.js allows us to run JavaScript on the server, enabling efficient handling of requests and responses.

- \*\*Express.js\*\* is a web application framework for Node.js that makes it easy to create APIs (Application Programming Interfaces). These APIs will connect our frontend with the backend, enabling the app to fetch, create, and update data, such as user details and preferences, from the database.

3. \*\*Database\*\*:

- For data storage, we’re using \*\*MongoDB\*\*, a NoSQL, document-oriented database. MongoDB is ideal for storing flexible, unstructured data. It allows us to store user details (like name, age, email, password) and personalized preferences. For instance, if a user wants to learn only finance-related content in German, we can store this specific preference as a key-value pair.

Overall, React handles the frontend, creating interactive user interfaces. Node.js and Express.js manage the server and API layer, connecting the frontend with the backend. Finally, MongoDB stores the data, allowing for efficient retrieval and updating of user-specific information.

For android app, we will be using Kotlin as officially declared language by google for developing android apps. For designing user interface of android app, we will be using XML and Jetpack compose and apis will be integrated with android app for synchronization between application and web application. Like sometimes if user want to use android app and sometimes he prefer web so providing him options to choose both to keep his progress synched on both end.

For AI features, we will be using Pytorch deep learning framework for sentence generation of specific language, (can you add more), Speech Recognition and Pronunciation Feedback, Grammar and Sentence Structure Correction, Vocabulary and Translation Assistance

(overview is like we can use audio scripts data for speech reconginition for model training)

Space for entitiy recoginition like detecting nouns, pronouns, articles in particular sentence, Sentence Parsing and Grammar Analysis, Use SpaCy’s POS tagging to give grammar feedback, like identifying incorrect verb conjugations or article-noun mismatches.

Use SpaCy’s tokenizer to split user responses into tokens (words or phrases).

Provide feedback on each token, like suggesting alternative words or correcting spelling

Use SpaCy to quickly parse and understand user input.

For our AR based feature, we are using combination of ARCORE framework and YOLO (you only look once model). YOLO for detecting objects and ARCORE to display the objects in specific translated language.

Future work;

Due to time constraints, we couldn’t implement all the features we planned, but we aim to add them in the future.

One of these features is an \*AI-based video call bot\*. This bot will act like a conversation partner, helping users with grammar corrections, pronunciation, and vocabulary, all without needing a real person on the other end.

Another feature is \*Mood-Based Learning\*. Our system will adjust the difficulty of exercises based on the user’s mood. For example, if the user feels energetic, it will provide more challenging lessons. If they seem tired, it will offer simpler exercises focused on basic grammar and vocabulary.

Lastly, to make learning feel more personal, our \*AI bot will adapt to the user’s tone and expressions\*. If the user is having a text-based conversation, the bot will adjust its responses based on their mood or sentiment. For video calls, it could even use facial expression detection to create a more human-like interaction, helping the user stay motivated and engaged.

To conclude, we are targeting to revolutionize the way of traditional learning by integrating combination of AI based features and one AR-Core feature. Memingo aims to increase the learning experience of users by exponentially minimum 20-30% targeting their understanding, and speed of learning.

Education is the most powerful weapon which you can use to change the world.' We hope Memingo can be a part of that change

**ARCore** is Google’s platform for building augmented reality (AR) experiences on Android devices. It uses your device's camera and sensors to understand its environment, track motion, and place digital objects in the real world. In a language-learning app, ARCore can bring a new level of interactivity and immersion to users.

**Purpose of ARCore:**

* **Interactive Learning**: ARCore can place virtual objects in the real world, allowing users to interact with vocabulary words or concepts. This makes learning more visual and hands-on.
* **Enhanced Engagement**: By blending virtual learning materials with real-world elements, ARCore can make lessons feel more dynamic and engaging.

**Examples:**

* **Object Labeling**: Users could point their camera at real-world objects, and the app would label them with the corresponding vocabulary in the target language. For example, if a user points their camera at a "chair," the app would display "Stuhl" (German for "chair") as an AR label on top of the object.
* **Immersive Lessons**: You could use ARCore to create 3D objects (like virtual animals, foods, or places) that help users learn vocabulary by exploring and interacting with these objects in AR. For instance, when learning food vocabulary, users could "place" a virtual apple on their table and see the word "Apfel" (German for "apple") floating above it.
* **Pronunciation Practice with Visual Feedback**: Users can interact with AR elements by speaking vocabulary words or phrases. If they pronounce a word correctly, the AR object could respond in some way (e.g., moving or changing color) as a form of visual feedback.

 **Vocabulary from Detected Objects**: If the user points the camera at a room with multiple objects, YOLO could recognize each item (e.g., "chair," "table," "lamp") and display the corresponding translations. This provides an interactive way for users to learn everyday vocabulary by engaging with their surroundings.

 **Augmented Reality Scavenger Hunt**: YOLO can help create a language-learning game where users are asked to find certain objects around them. For instance, the app could say, "Find an apple," and when the user points their camera at one, YOLO detects it and displays the word in the target language.

 **Learning through Context**: Suppose a user is in a grocery store. YOLO can detect items like "bread," "milk," and "fruit," providing words or sentences related to shopping in the target language. This contextual learning approach makes vocabulary retention easier because users learn in relevant, real-world situations.

Here's an explanation of how \*\*ARCore\*\* and \*\*YOLO\*\* can be used in your project, along with their purposes and examples.

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### \*\*2. YOLO (You Only Look Once)\*\*:

\*\*YOLO\*\* is a real-time object detection model that quickly identifies and classifies multiple objects in an image or video. YOLO can be very helpful in recognizing objects or scenes and providing language-learning content based on those detections.

#### Purpose of YOLO:

- \*\*Real-Time Object Recognition\*\*: YOLO can detect objects that the user points their camera at, enabling automatic vocabulary suggestions based on the detected items.

- \*\*Contextual Learning\*\*: By identifying objects in the user's environment, YOLO allows the app to offer relevant vocabulary or grammar tips, making learning contextual and meaningful.

#### Examples:

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### \*\*How ARCore and YOLO Work Together\*\*:

ARCore and YOLO can complement each other to create an immersive learning experience:

- \*\*Real-Time Labeling with AR\*\*: YOLO detects objects in the real world, while ARCore places language labels on or near those objects. For example, when a user points their camera at a scene, YOLO detects a "dog," and ARCore overlays the translated word ("Hund" in German) as an AR label on the dog.

- \*\*Interactive Language Practice\*\*: YOLO can detect items that the user interacts with, and ARCore can overlay vocabulary or sentence prompts, allowing users to practice speaking or reading based on detected objects.

### Summary

- \*\*ARCore\*\* makes learning more engaging by placing virtual language elements in real-world settings, enhancing interactivity and immersion.

- \*\*YOLO\*\* enables real-time object detection to suggest relevant vocabulary or content based on the user’s environment.

- Together, these tools create a dynamic learning experience, making language acquisition more practical, visual, and memorable.