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**Boston University**

**Electrical & Computer Engineering**

**EC464 Capstone Senior Design Project**

Customer Installation

**BUtLAR: Boston University Large Language Model Auditory Responder**

Submitted to

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by

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Submitted: 4/27/25

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# Customer Installation

On Friday March 18th, at 2:30 PM in PHO 113 (ECE Lab) all group members were present along with our Yobe client, Professor Nawab, to discuss the progress of BUtLAR and expectations for ECE day. Currently, BUtLAR is displayed on a Macbook laptop as a web-based product where users can start the session, be noted when to begin and end talking, ask their question and receive their answer from the BU database.

Additionally, our setup involves the usage of two Rode microphones housed on a 3D printed display on the laptop. Issues involved that were discussed in this meeting was the Yobe integration not applicable to due licensing issues. After relaying this to Professor Nawab, it was advised to continue with our current product that doesn’t use Yobe so that the live audio stream and query with the database can be shown.

Then, to proceed with the Yobe product, due to recent advancements made by Yobe that now allows Macbook usage (no longer Linux based) and one microphone needed, we will show this product alongside ours for ECE day. With Yobe’s new mac based binary product, added features include biometric capabilities (BioPSI - Biometric Personalization and Speaker Identification), one microphone, and Whisper AI for transcription.

# Requirements

1. Software: System Integration
   1. Yobe SDK
   2. Digital Human
   3. Knowledge Documentation/ Database Combination
   4. User Interface
2. Hardware: Product Design
   1. Two Microphone
   2. Speakers
   3. Raspberry Pi
   4. LCD Screen
   5. Minimalist Design
3. Demo: Use-Case Specific Framework

For the software requirements originally made, most of the requirements were met or if not met then modified. The Yobe SDK was integrated at the end of first semester however it works without the live audio stream therefore for the final product, it was not able to be implemented but we will be demonstrating Yobe’s product with their new mac based binary product on ECE day. The digital human aspect using D-ID is no longer implemented in the final product due to expensive costs and additional lag in the response time for the user. The database is implemented in the final product. This database method was modified over the prototyping process with decisions between using OpenAI for prompt engineering the database (as demonstrated in the final prototype testing) and Vanna AI (which will now be used for the final product on ECE day). For the user interface, BUtLAR is displayed on a web application using Django. For this user interface, users can click start to begin the session, ask their questions, and end the session by saying “Goodbye, BUtLAR.”

For the hardware requirements nearly all requirements were accomplished. The final product has two Rode microphones housed in a 3D printed house on the laptop, a Raspberry Pi 5, and a minimalistic design. The speakers and LCD screen are included as BUtLAR is housed on a laptop.

Lastly, for the use-case specific framework requirement, BUtLAR as seen in the prototype testing is applicable for multiple use-case examples. In the first prototype, the demo focused on professor office hours while in the second prototype the demo focused on all ECE professors and the time and location of their class. For the demo for ECE day the database will highlight the ECE teams presenting their project including descriptions and locations of the teams.

# Overall Assessment

From the meeting with Nawab, he approves of our current implementation. We met what was expected of us as there was emphasis on showing the integration of Yobe. Although Yobe won’t be fully implemented on ECE day for BUtLAR, we have plans of showcasing the binary product Yobe has, to emphasize how it can be integrated with our current display of live audio, user query from database information, and a prompt response.

While we didn’t meet some of the original requirements, we met the essential ones that are needed to show use cases of how Yobe can be integrated into. The main aspects are the live audio, transcription, and answering the user’s questions quickly and correctly. Therefore, on ECE day, with Yobe’s new product we will describe that their new product can be integrated into use case scenarios like BUtLAR.

For future senior design groups (or interns at Yobe) that could advance this can have next steps involved with the complete integration of BUtLAR with Yobe’s binary product.

# Customer Acceptance

In our meeting with Professor Nawab, he approved of our current product and added that for us to demonstrate Yobe’s product to have on the side the new mac based binary product that Yobe has recently designed.