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Quran sensoryREADY

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❖ **Dedication**

This work is dedicated to our families for keeping the flame of motivation to see our efforts through and allowing us to soar to such heights. It is also dedicated to all those who supported us, even with one word of encouragement. Last but not least, we dedicate this work to ourselves-to our perseverance and dedication.

❖ Acknowledgment

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❖ **Disclaimer**

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❖ Abstract

SensoryREADY is an educational technological tool designed to help teachers, therapists, and parents communicate more efficiently and enhance the delivery of information and knowledge to children between 3 and 12 years old. Currently, there are 10,000 students across 650+ preschools, primary schools, centres and homes that are using it on a daily basis.

The sensoryREADY relies on a unique model of communication: Controller, Receiver and User. The controller is the main input device through which the user interacts with the system. The Receiver is the main computation unit and output device.

The Quran application is a sensoryREADY application that helps children (and adults) to recite and remember the Quran.

The **Quran** app utilizes the interaction model of the sensoryREADY. Users are able to choose Surah, Ayah, or specific words to recite. The Receiver shows the Surah, Ayah and recites it. User is able to change the voice/reciter and control options using the Controller.

The application offers the following features:

Level 1 features

- Madani-compliant script.
- Audio playback for Surah, Ayah or a word (if the reciter library allows).
- Multiple recitations—at least including:
 - o Mahmoud Khalil Al-Husary – Muallim.
 - o Mohamed Siddiq al-Minshawi - Kids repeat.
 - o Mishari Rashid Al-` Afasy.
- Customizable repeat *Users are able to highlight an Ayah or more to repeat once or multiple times.*

Level 2 features

- Show tafseer of Surah or Ayah in the available ones.
- Translation in multiple languages.
- Progression report.

Level 3 features

- Make Surah available offline.
- Multiple recitations: Warsh, Hafs.
- AI-voice corrections: user is able to record his recitation, and application will clarify the correct pronunciation or mistakes.
- Recitation goals.

❖ Chapter1: Introduction

1.1 General background

Technology has been infused into education in the past years, which has completely changed the ways children learn, interact, and engage with information. Nevertheless, a lot of modern tools, such as computers and tablets designed for older children, do not take into account younger children ages 3 to 12 and their unique sensory, cognitive, and developmental needs. This gap in educational technology is especially pertinent within special education and religious learning, early childhood development, and early childhood care.

In response to these hurdles, SensoryREADY has been developed as a communication platform that is customizable, interactive, and sensory-friendly, providing help in various learning environments. With its use by teachers, therapists, and parents, the platform enhances learning and communication for children who require strong, structured, visual, and auditory stimuli.

One of the key innovations of SensoryREADY is its Controller-Receiver-User model, which guarantees a combination of high flexibility alongside low intuitive interaction. Adaptive learning interventions can be gained from this model, which are crafted to the needs of every single child.

The app's modern educational techniques make it stand out and provide purpose alongside the more advanced applications. Alongside the more advanced applications for the Quran, the app serves as a purpose-built aid for kids and adults, memorizing and reciting the Quran.

1.2 Objectives of the work

The primary aim of Quran App, on the SensoryREADY platform, is to facilitate Quranic learning among children in an engaging, developmentally fitting manner. The application is created paying attention to the educational and spiritual needs of children from ages 3 to 12, including those who are sensory or learning challenged.

The key objectives of the work are:

- Enable young learners to access Quran recitation and memorization.
- The app allows children with little adult supervision to access the Quran on their own using an intuitive interface.

- Incorporate sensory methods into religious education with the Controller–Receiver–User model, the app allows multi-sensory engagement, which aids children who are dependent on visual aids, sound, and touch.
- Providing a comprehensive platform for various educational needs, the app facilitates mainstream, special education, and supports homeschooling, providing educators, therapists, and parents the ability to manage learners of diverse levels.
- Promote correct and authentic learning of the Quran, the children are enabled to learn the Quran accurately using Madani compliant script and voice of reputable qaris through AI-aided pronunciation adjustment.

1.3 Significance of the Work

The Quran App signifies a purposeful advancement in the accessibility and engagement of Quranic education for children. This innovative application combines classical religious teaching with contemporary technology in a way that children, regardless of their ability or surrounding circumstances, can respond positively to the Quran. Its implementation in more than 650 institutions demonstrates the potential it has to change the approach taken to teaching and memorizing the Quran, aiding in the development of both spiritual and mental capacities throughout life.

1.4 Organization of the report

The main body of the report is divided into several chapters, each serving a distinct purpose. The first chapter, known as the Introduction, encapsulates the project’s general background, work objectives, significance, and the logical arrangement of the report. The second chapter, called” Theoretical Background and Previous Work,” puts the project in context with what is already known. It looks at past research and theories that support the current work. After that, the Methodology chapter describes the system, mechanism of action, and how any constraints encountered were dealt with. Then, the Results and Discussion chapter presents the project’s findings and engages in a discussion of the results. The Conclusions and Recommendations chapter, the final section, summarizes the project and offers valuable insights for refining and enhancing the approach in future endeavors.

❖ Chapter 2: Theoretical Background and Previous Work

2.1 Theoretical Background

Rendering, processing sound, developing mobile applications, and creating educational technologies. Understanding the challenge from every perspective is useful when creating an effective Quran application.

1. Arabic Words and Madani Script

To display Quranic text faithfully, one has to deal with the Arabic language, which in itself is a challenge because of its clockwise flow, ligatures, as well as diacritics. Qur'anic texts in the Madani script are commonly used in hardbound Mushafs due to their authenticity and clarity. The goal of this project is to provide mobile devices faithful rendering of Madani Script.

2. Quranic Audio Playback

The majority of the users wish to memorize and learn the Quran by purely listening to audio recitations. Therefore, Quranic audio should contain:

Accurate ayah and, at times, word-level precise playback.

A variety of reciters with distinct styles. (For instance, Husary is often used for teaching, Al-Minshawi for children.)

Repeat feature to assist focused memorization or revision.

Effective audio management, often supported with Android's ExoPlayer, and text-audio synchronization of the verses require efficient audio management.

3. Tafsir and Translation

In order for many users to broaden their understanding, there is a need to provide tafsir in their spoken language. These functionalities require appropriate integration of text databases as well as the need for localization, region-specific languages, and offline access.

4. Customized Education and the Application of Artificial Intelligence

The newest developments in technology have created AI-based learning tools that allow users to do the following:

Outline recitation objectives.

Record their voice and get feedback on pronunciation mistakes

Monitor progress over intervals.

These capabilities integrate speech recognition, natural language processing, and user data analytics, which marks a step towards intelligent Quran learning applications.

5. Mobile Learning (M-Learning)

Just as many people use mobile devices for educational purposes, Quran applications have become part of the M-Learning ecosystem. This advancement makes user experience (UX), app availability in offline mode, and responsiveness vital to the app's design.

2.2 Earlier Work

In general, Quranic texts, recitations, and various interpretations are available around the world and are available for use and download. Some of them require the Internet, while others can be accessed without it. However, the idea behind our project and application was the ability to combine mobile computing, word processing, artificial intelligence, and other features that were previously discussed in the abstract. There have previously been a number of applications that contained a number of these similar goals, the most important of which are:

Quran for Android: It is an open-source application that brings together a number of Quranic texts with multiple recitations and a number of translations. However, for example, it lacks the presence of the artificial intelligence feature.

Tarteel: is a more modern application that relies heavily on artificial intelligence, and from it we were inspired to develop the third level of the project.

Ayat (from King Saud University): It is known for its civil script and high sound quality, but it lacks customization, as it deals with the basics in a general way.

Muslim Pro: It offers a range of features, including audio for reading the Quranic verse and the translation, but it also lacks customization. For example, it is unable to repeat verses within a specific number or even teach a verse and specify it at the time of reading.

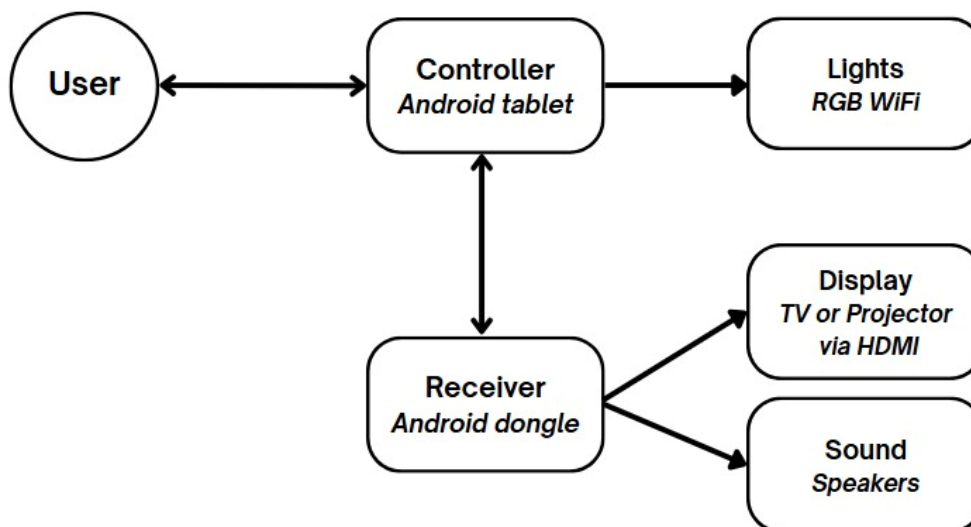
❖ Chapter 3: Methodology and Constraints

First, we will explain the system design of our application:

The user interacts with the **Controller**, which is an Android tablet responsible for managing the entire interaction: navigating between Surahs and Ayahs, controlling playback, and adjusting settings.

The Controller also connects to the **lights** through WiFi to synchronize lighting effects during playback for an immersive experience.

The **Receiver**, which is an Android dongle, is responsible for receiving commands from the controller, handling audio and video processing. It sends the audio output to the speakers and displays the verses on a TV or projector via HDMI.



One of the most important patterns that we used in our project, and we will discuss it as the **first pattern**, is the **model-view-controller**, which is widely used in software projects, especially in Android projects, to make sure that the code is organized, maintainable, and scalable.

So, if we try to take a general view of it, we will see that:

Model: will take the responsibility for handling the data and business logic.

View: will take the responsibility for handling everything related to the user interface (UI).

Controller: It acts as the bridge between the Model and the View; it handles user input and updates the View or Model accordingly.

Then, if we try to ask ourselves about why we have to use model-view-controller, we will see that in Android projects, especially in large ones like our app, separating logic into model, view controller will help us to:

- Avoid cluttered Activities or Fragments.
- Make the code easier to test.
- Allow independent development of the UI and the logic.
- Reuse components more easily.

And here in our quran application, we have used MVC since we deal with:
Rich user interfaces (Quran text, audio controls, tafsir displays).
Data manipulation (loading surahs, reciters, tafsir, bookmarks).
User interaction (play, pause, repeat, select ayah, etc.).

Then for another pattern which is the **second** pattern we used the **Adapter Pattern** which is very useful in android development especially when dealing with dynamic data and user interface components like lists or paginated view, so it is a structural design pattern that allows the objects with incompatible interface to be able to work together so it acts as a bridge between two interfaces that converts the interface of a specific class into another interface that the client expect so we use it in order to make the existing classes work with others without modifying their source code.

We **use** the adapter pattern **when**:

- We need to deal with an existing class, but it's not compatible with its interface.
- Try to integrate the code of a third library or legacy system with our code without rewriting it.
- We want to create a reusable class that cooperates with unrelated or unforeseen classes.

The **advantage** of this pattern is:

- Makes code more flexible for maintainability and scalability.
- flexibility by decoupling the interface and implementation.

Some **limitations** that this pattern are:

- Add a layer of complexity.
- May lead to less transparent code due to additional abstraction.

The **third** pattern that we used is the **Factory Pattern** creational design pattern that provides a way to create objects without specifying the exact class of the object that will be created. Instead, it relies on a factory method to create and return the object, typically based on some input parameters or configuration.

It has a lot of **advantages**, like:

- It encapsulates the creation logic of objects, allowing for flexibility and reuse.
- It provides a level of abstraction between the client code and the actual creation of objects.
- The pattern allows for objects to be created based on input parameters or other runtime conditions.

So this pattern is particularly useful when the creation process is complex or when the exact type of object needs to be determined dynamically at runtime.

The **fourth** pattern that we used is the **Builder Pattern**, which is one of the creational patterns to extract the object construction code out of its own class and move it to separate objects called builders.

The most important advantages of it are:

- Simplifies the object creation when an object has many optional parameters or complex construction logic, using constructors or factory methods can become messy. The builder pattern simplifies this by allowing step-by-step construction using a clear and readable API.
- Improves Code Readability and Maintainability.
- Avoids Constructor Overload.
- Encapsulates Construction Logic.
- Supports Immutability since the pattern makes it easier to create immutable objects. The object is fully configured and validated before calling `.build()`, and then it becomes read-only.

The **fifth** pattern that we used is the **Single Responsibility Pattern**, which means that every method or class, module, or package has a clear purpose and focus, and it is only one purpose each. This pattern contains a lot of advantages, like:

- Make the code easy to understand and clear for the programmer, especially when we have a team that works together, so when one of the team members comes and reads the code, they will see how readable it is.
- Makes the code easy to test, especially with unit testing.
- When we need to maintain a part, we could maintain it without seeing the effects on the other, since no direct relations between them result in having a single responsibility.

The **sixth** pattern is the **Resource Usage**, so in Android app development, one of the most practical ways to use resource files (resources) is to use them instead of directly entering values into the code. In my project, I made sure to organize static values such as strings, colors, and dimensions into their own files within the resolution folder. This makes the application more maintainable, facilitates language support (localization), and frees up space for development.

Now, for the process of the application, we will describe it in a sequential way and step by step.

So at first, once we start the application, we have something we call the **splash screen**, which is a screen that appears when we launch the program or the game, and it includes the branding elements like a logo, app name, something indicating that we are launching our program.

So in our program, our splash screen contains a picture that displays in a specific way with a specific sound.

Then, after the splash screen, we will see the main screen for our program, which looks like this:



Figure 1 Splash Screen

Then as we see here we have the above bar that contains the ability to choose the main screen as do you want it to display all the Quran or just juz Amma and once the controller click on it directly the result will appear on the receiver so here the screen if the controller choose the **whole Quran**:

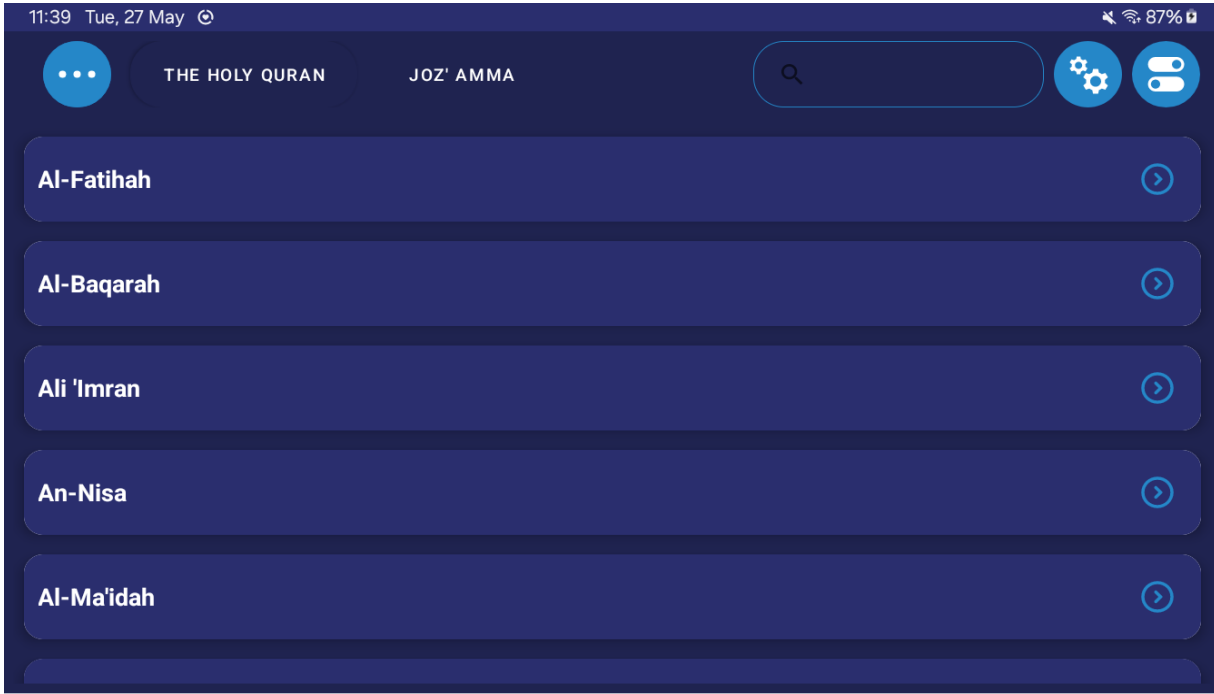


Figure 2 Main Holy Quran

And here the screen is if the controller chooses **juz' Amma** as the option:

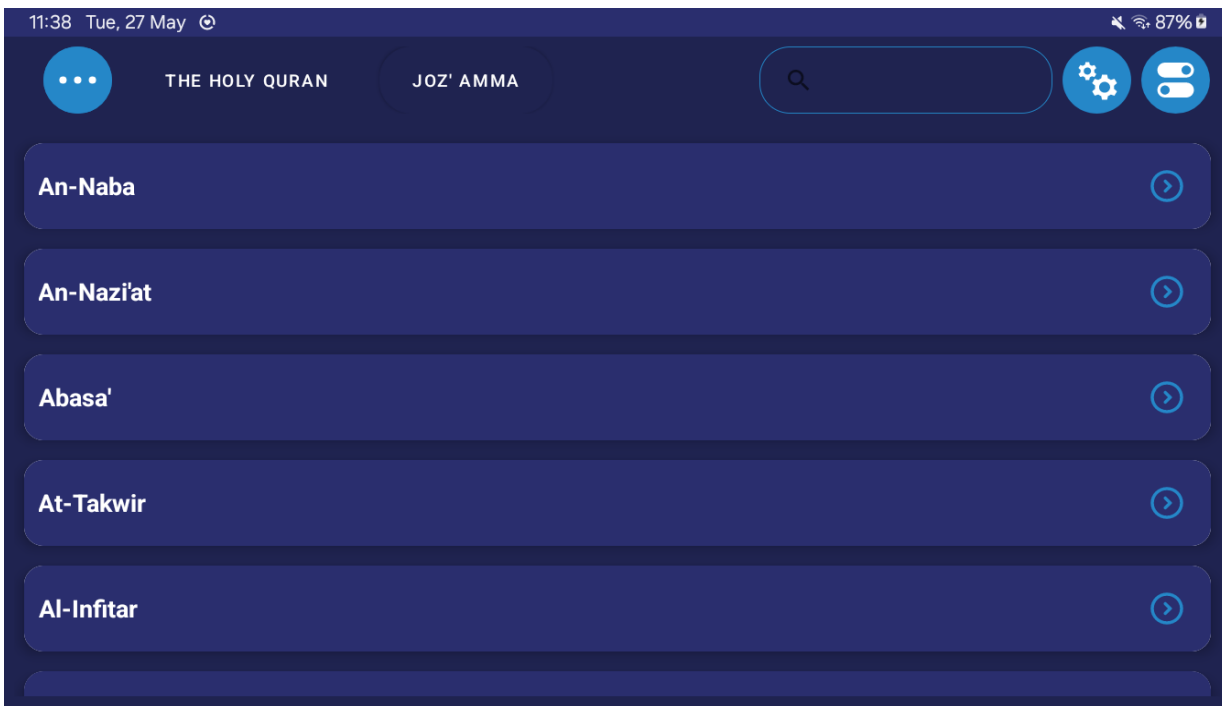


Figure 3 Juz' Amma

Then, as you see in the upper bar, there is an image view button with the shape of three horizontal points.

Another image view button is for the settings, so once the controller clicks on it to see what the setting concludes, it appears like that:

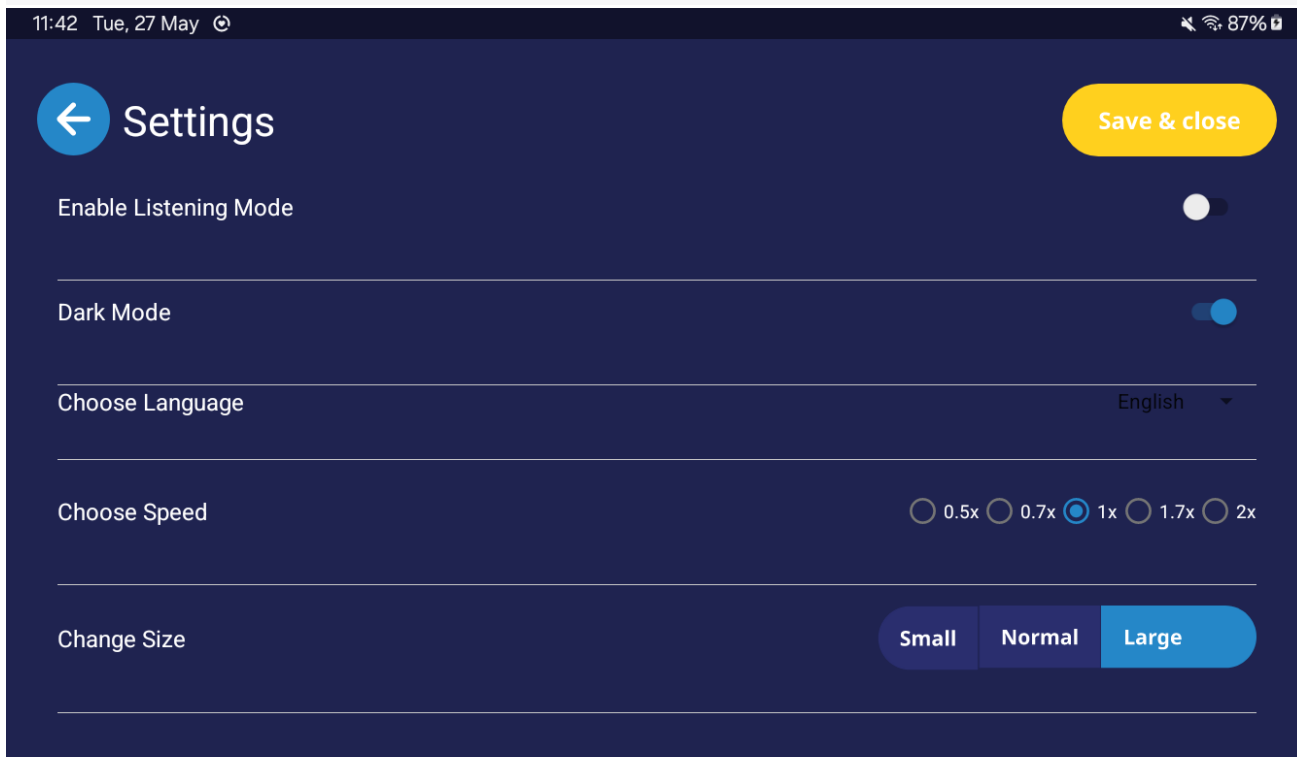


Figure 4 Settings

And each of them represents a feature that we will describe now.

For the **first** feature, which **chooses the reciter**, when the controller clicks on it, this screen will display on the receiver like this:

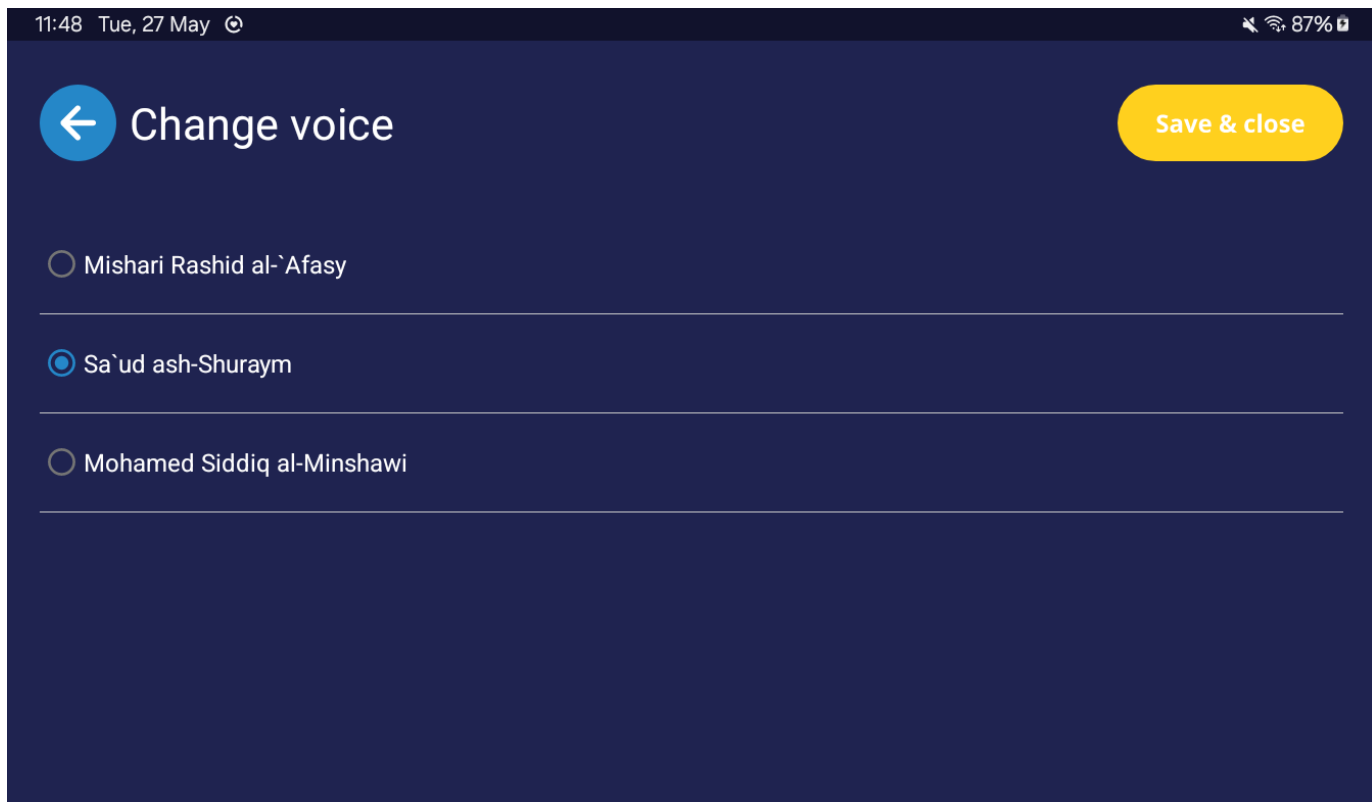


Figure 5 Choose Reciter

This feature represents the ability to choose the reciter that we need to listen to it and play this application with his voice, so we did that by using API that represents a get request with a parameter will represent the id for the reader that we want to play the application with it is voice and then retrieve the audio for it.

So here we have the fragment that will let me choose the reader by clicking on the circuit button that lies next to them, then you have to click on the button that lies above which is save and close since if we choose a reciter then return back by clicking on the back button the choice will not saved but if we choose save and close then the reciter will saved and passed to all the other pages and fragment to be able to used while we are in the application.

So, for the **second** feature, which talks about the **transliteration**, we deal with it as an enable button that works on the concept of a switch to detect if you want to choose it or not, so once the controller chooses that he wants it to display, which means let the transliteration appear.

So for the **third** feature, which talks about the **translation**, we deal with it also as an enable button that works on the concept of a switch to detect if you want to choose it or not, so once the controller chooses that he wants it to display, which means let the transliteration appear.

So, on the receiver side, after the controller chose both of these features:

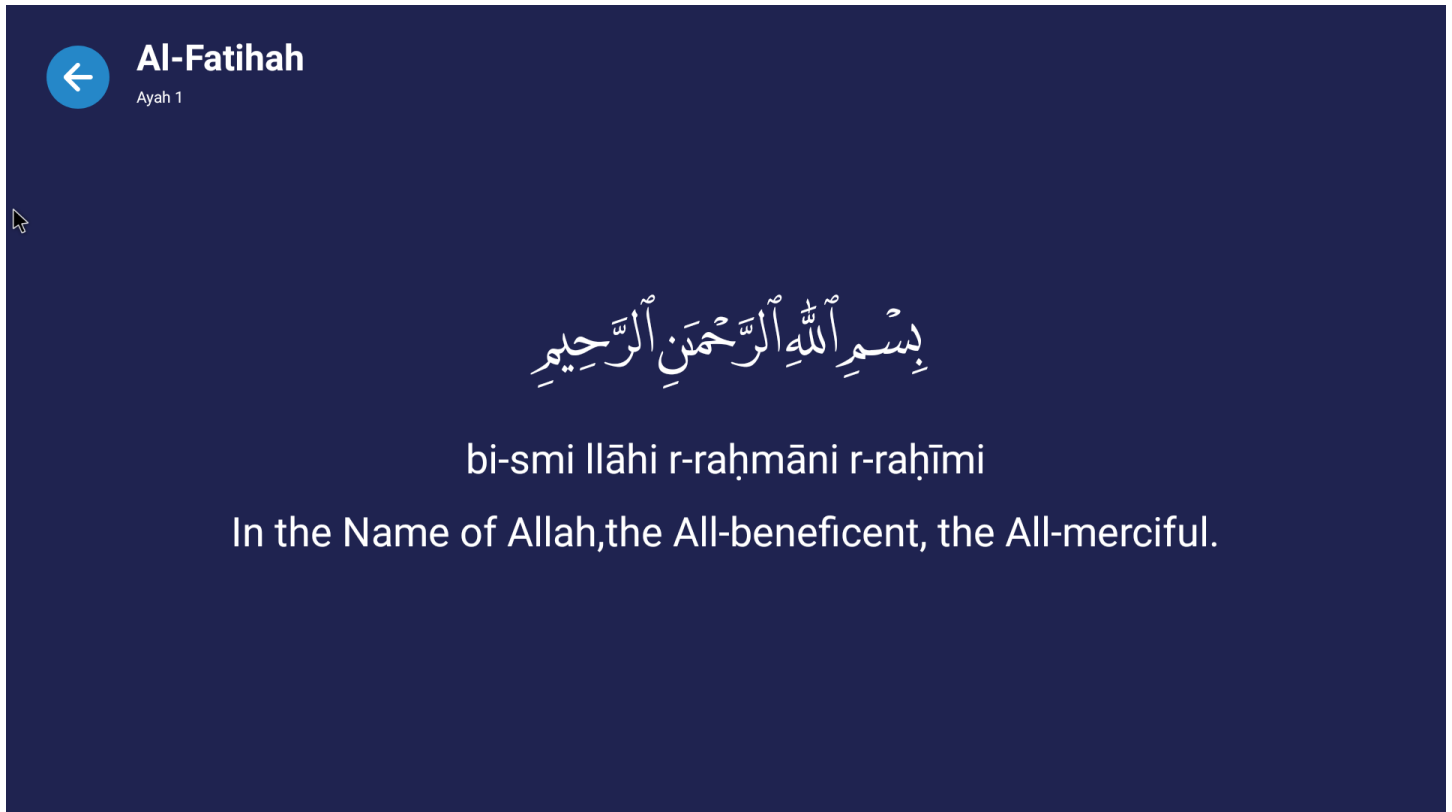


Figure 6 Receiver with Translation and Transliteration

So for the **fourth** feature which talk about enable **listening mode** we deal with it also as an enable button works on the concept of switch to detect if you want to choose it or not, so once the controller choose that he wants to display the ayahs on the receiver under each other as list, since the default way for the receiver is to display synchronously what the ayah that i have it on the controller to be on the receiver but here in the listing mode what happened is to display more than one ayah to be as list and make sure surely that we highlight the ayah that we listen and read it now, so the receiver after the controller choose this feature got like:



Figure 7 Listening mode

***Focus on how we highlight the chosen ayah to let the user know that we are in this ayah.**

Then for the **fifth** feature which talk about the **dark mode** we deal with it also as an enable button works on the concept of switch to detect if you want to choose it or not, so once the controller choose that he wants the application to work on the dark mode since the default way to our application is to work on light mode, all the slides that i have attached them until now was on the dark mode so once we complete all the features we will display the process again on the light mode.

The **sixth** feature which talk about the **language** that give us the ability to choose the language even Arabic or English and also focus that all the pictures that i attached them to display the process was for English, once we finish we will display the process again in the Arabic mode and describe how even the direction of the button also change to work in the Arabic mode.

For the **seventh** feature which talk about the **speed**, so it provides many options for the speed where the default for it is to work in the normal speed (*1) and gives us an ability to make the speed go more which means (faster) and the other option is to make it less which means (slower) so once the controller chooses one of them the speed will change directly.

For the **eighth** feature which talk about **change size** since the default for it is to be normal and you can get it bigger or smaller, but we have a problem once we make the line got bigger which i appears once we deal with the longest ayah that lies on surah AL-BAQARAH so we made the application treat it as normal line even we choose the biggest line to be able to put it in one page and make sure that it suites the size of the page that we have it, so the receiver side when the controller still on the normal size got as all the previous slides since we were dealing with the normal size like this option:

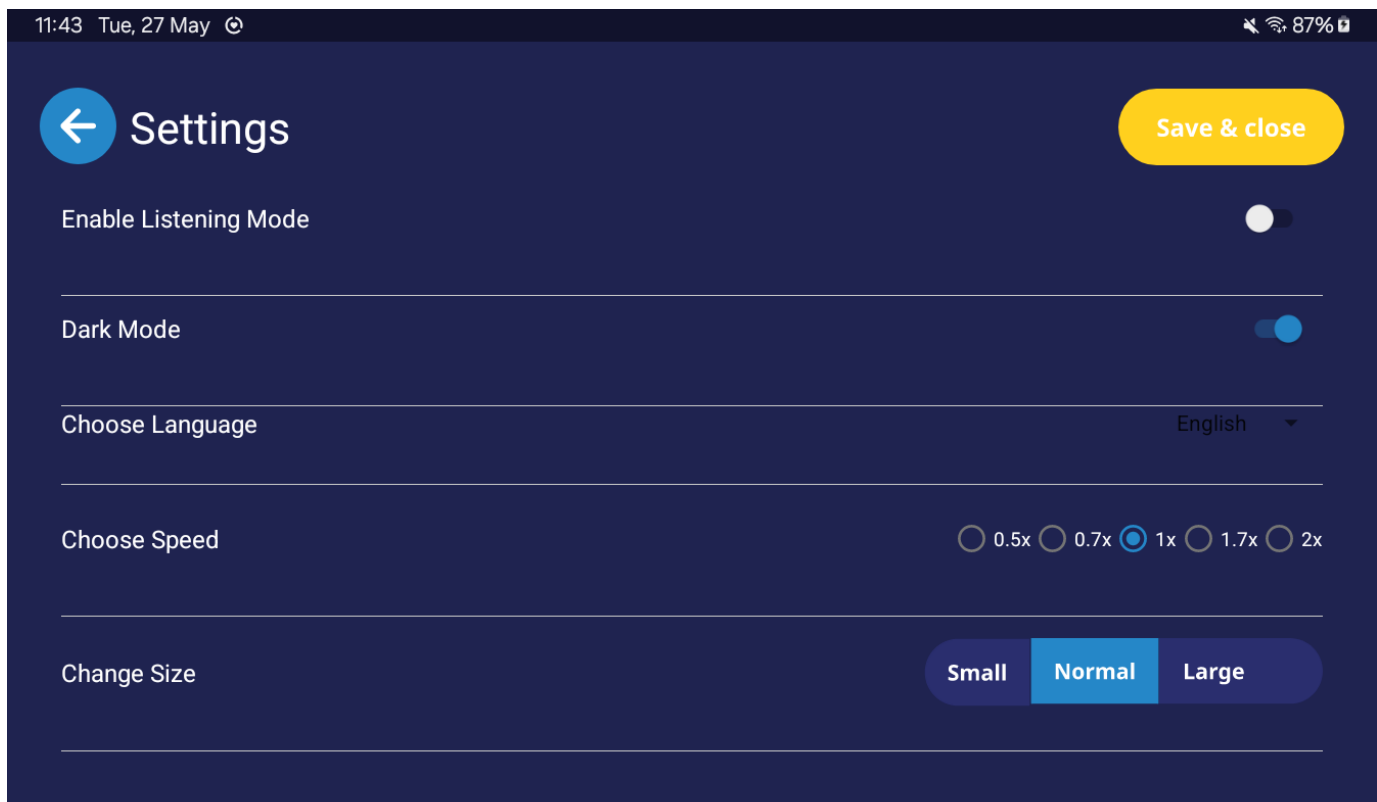


Figure 8 Set the Font Size

As you see, we chose the small, so now the receiver gets like:



Figure 9 Receiver Normal Font

Once the controller chooses the large size, the receiver will get like that:

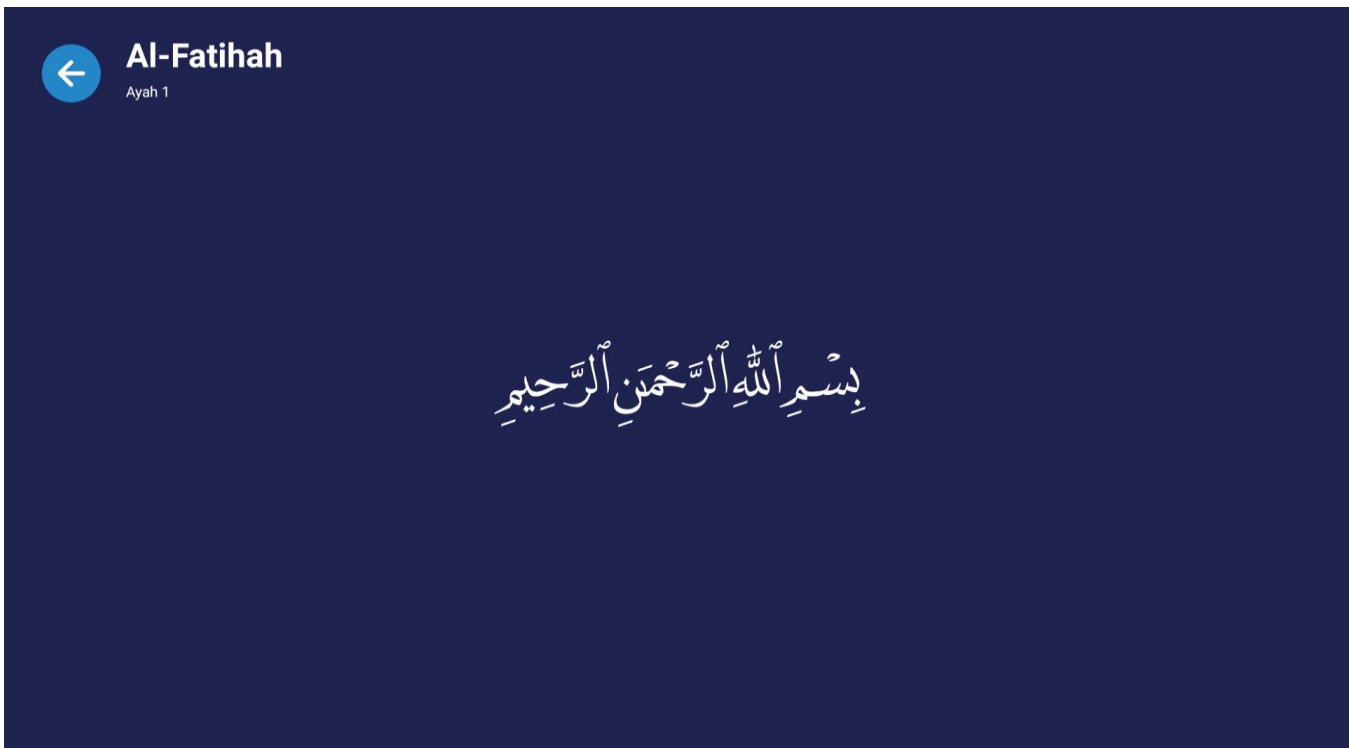


Figure 10 Receiver Large Font

So we described all the features that we put in the settings, now we will return to the above bar that appeared at first and complete the other features.

So as you see, once the controller starts, it appears like that:

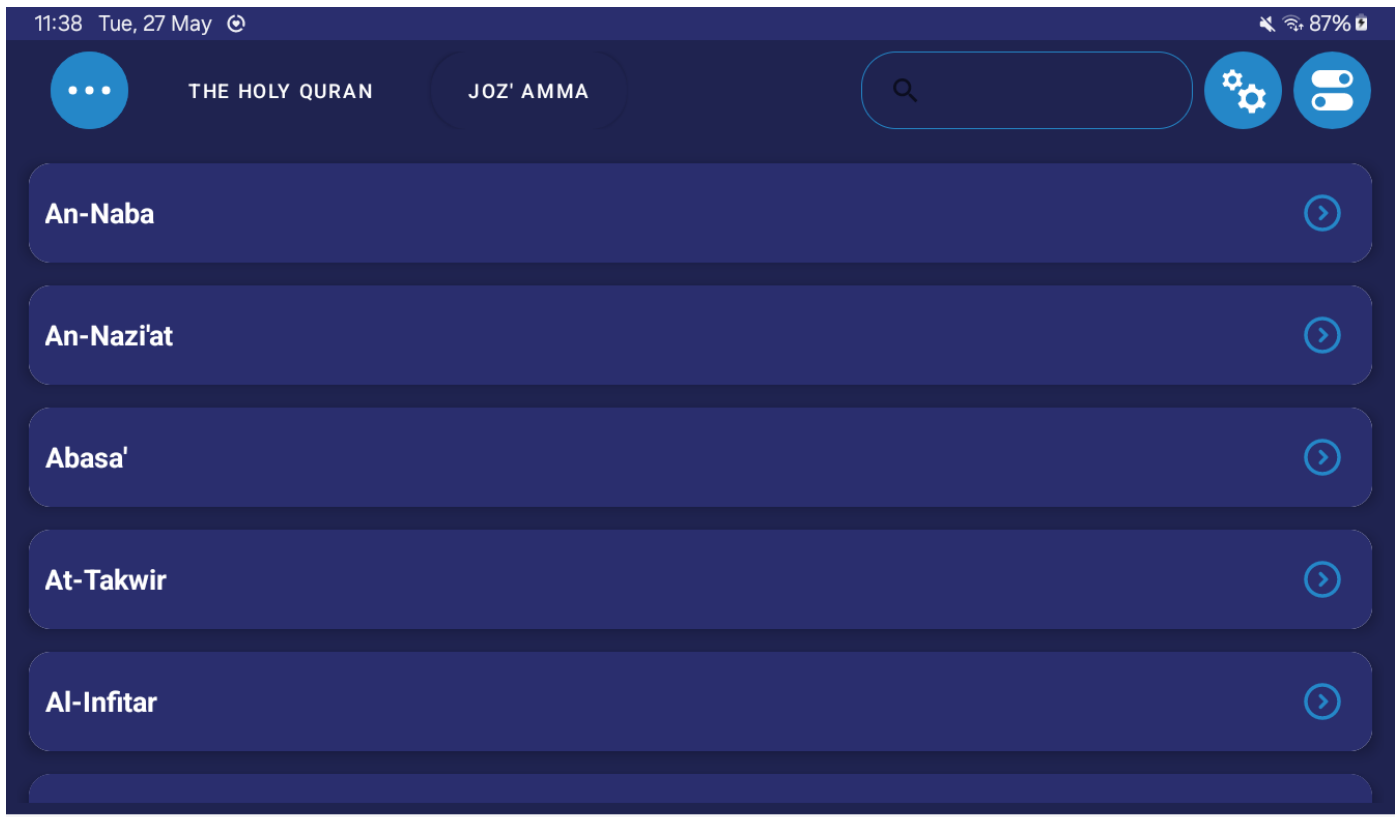


Figure 11 Main Controller

So we talked about the two buttons that we had used to choose the main screen as the holy Quran or Juz' Amma, then behind them we put a **search** bar to search for a specific surah, even in Arabic or in English, like that:

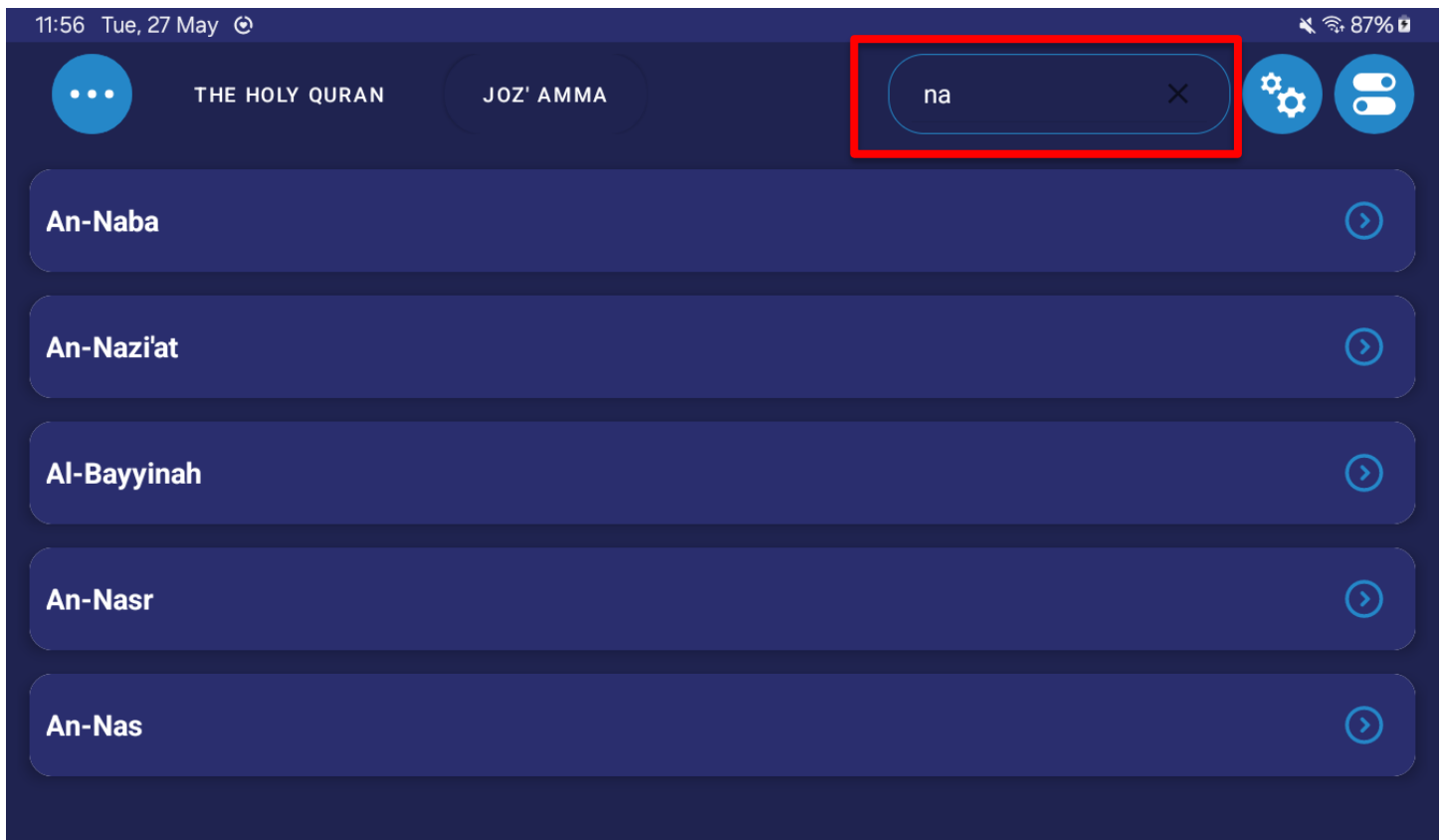


Figure 12 Search Surah

* So, as we attached that once we write (na), all surah's that start or contain the (na) section will appear.

Then, for the setting icon, we displayed all the features on it.

So now we will describe the details that display with each ayah on the fragment of ayah, since once the receiver starts, it appears like that:



Figure 13 Details Screen

So the details for this page got like that:

We have the (stop and play) button, as you see in the middle, then you can go to the next ayah or the previous ayah by the two buttons that we have. Here, we focus on how the direction should relate to the language, and this is one of the features that we worked on to make the direction of each button related to the chosen language.

And for the image view button that contains the shape of two arrows related to each other, it represents one of the feature that we did it which is the repeated feature that give the user the ability to choose the ayahs that he wants to repeat them with how many times he wants to repeat them like that:

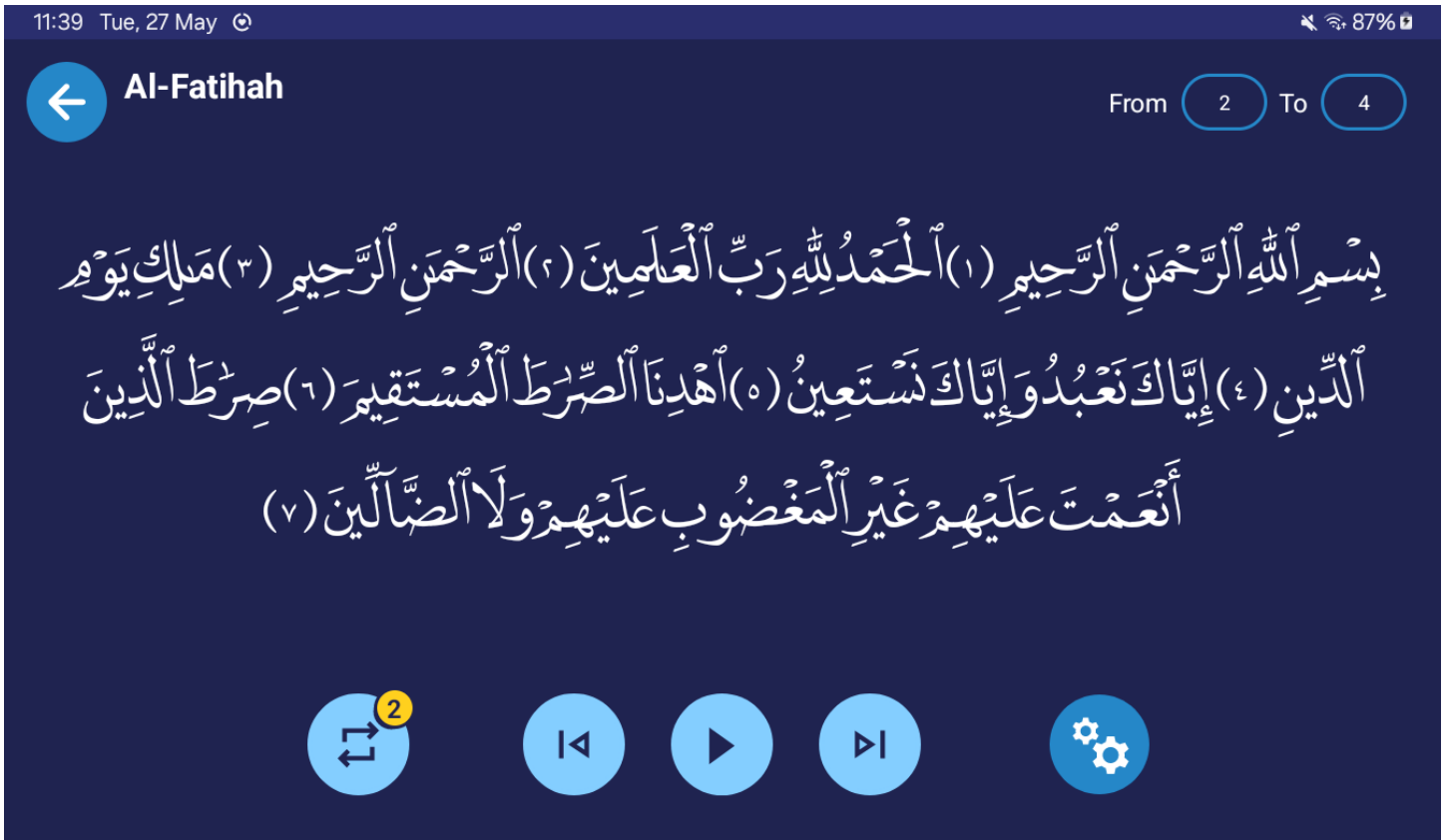


Figure 14 Custom Repeat

* So here for the above picture as you see we chose the number of ayahs that we want to repeat them which they are from 2 to 4 and both are included which means we will repeat 3 ayahs 2,3 and 4 and as you see the image view button that contains the shape of two arrows related to each other, once we click on it makes toggle to the count of the number that we want to repeat it, it is by default one but since we click on it in the above graph it turns to 2 so the application will repeat each ayah from the selected ayahs two times and once it finishes the second ayah will start.

Then on the controller side, there is an option to display the tafseer for the selected ayah, which means the ayah that the application reads now, so once the controller chooses and clicks on the tafseer button that it will be like that:

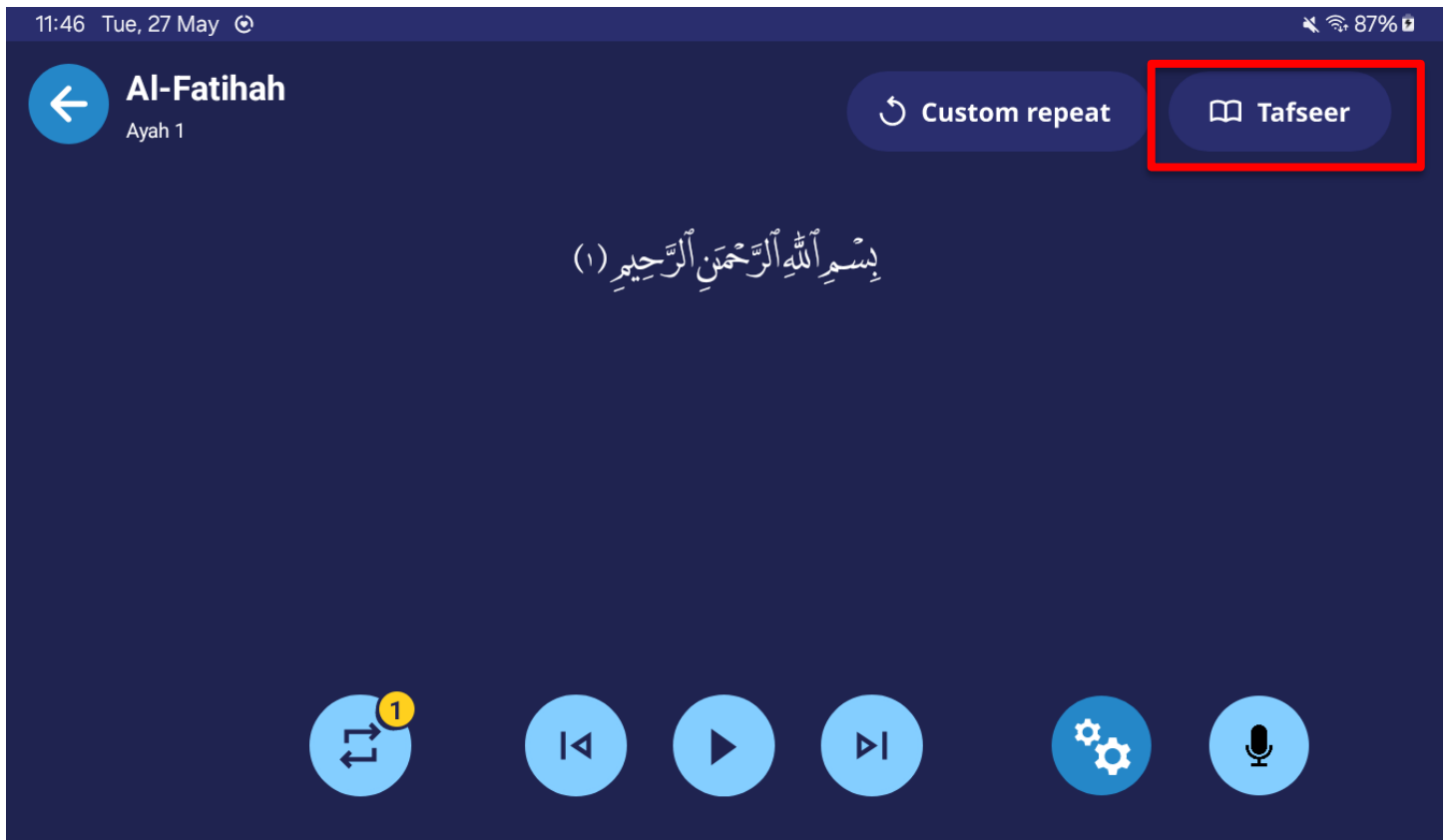


Figure 15 Choose Tafseer

So once the controller clicks on it, the tafseer will appear as another fragment since we made some extra features for the tafseer concept, so it appears like that:



Figure 16 Tafseer 1

So as you see here, the tafseer for selected ayah appears in this fragment (screen), and it provides another two features, which are:

- You can go to read the tafseer for the next or the previous ayah by clicking on the buttons that we have under the tafseer's text, and just as with the previous buttons, we made sure about their direction to be in a good way related to the chosen language.
- You can choose the tafseer for the person you want since we have three types or three references for the tafseer by clicking on the three buttons above (1,2, and 3) and make sure the default is tafseer with reference one.

So once the controller chooses the tafseer from the reference number 2 by clicking on button number 2 so it will be like that:

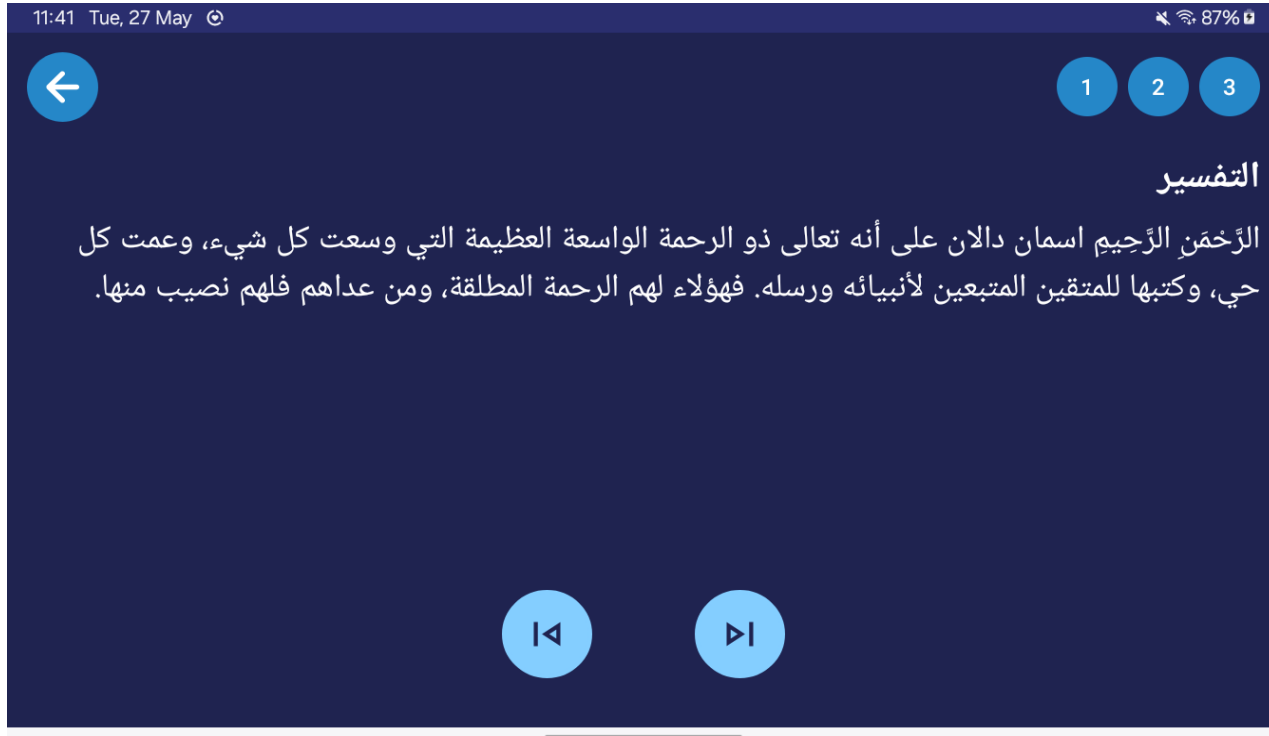


Figure 17 Tafseer 2

And once the controller chooses the tafseer from the reference number 3 by clicking on button 3 so it will be like that:

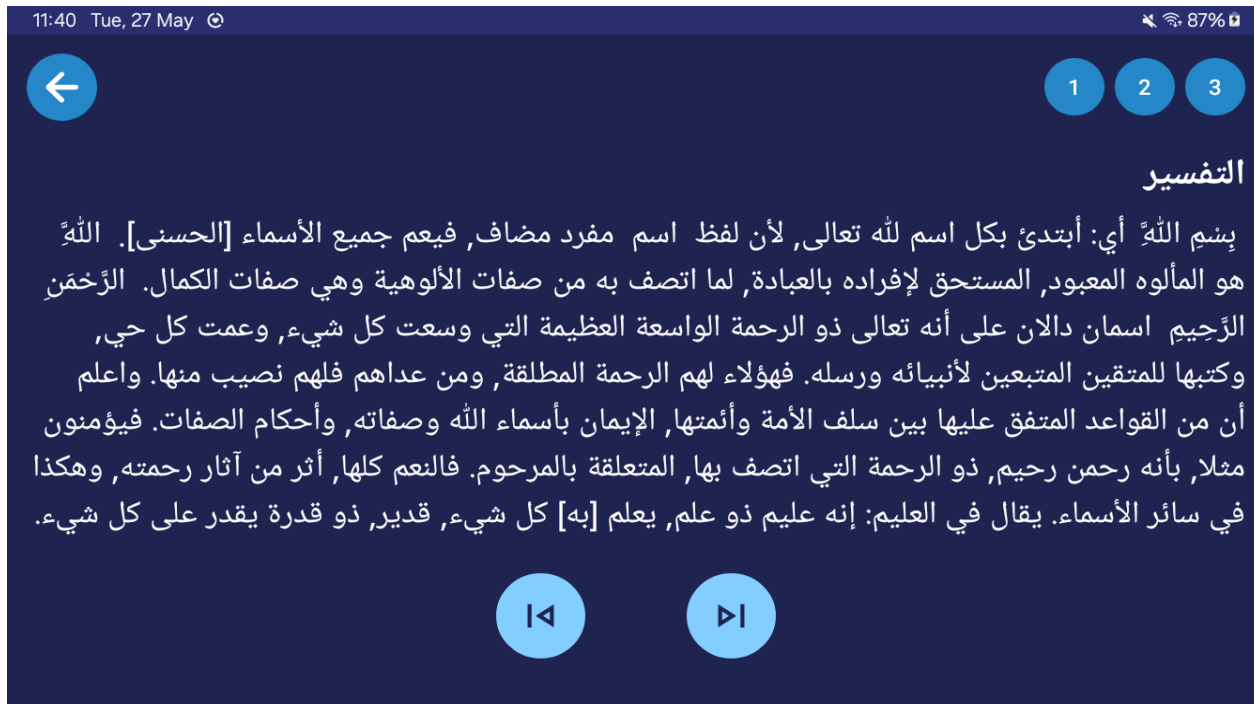


Figure 18 Tafseer 3

Now as you see in the detailed information fragment which is the main fragment here in the tafseer we have an image view button that represented by a voice picture since it provides another feature which is the voice correction that will listen the expected ayah from me since it expects the ayah that we click on the listing voice on the fragment related to it, so we click on it then got on the waiting state until the user talk the ayahs then the application will give the similarity's percentage then give us if it's correct and can be considered or can't consider so allow us to repeat it, so the sequential of the process got like that:

Waiting State:

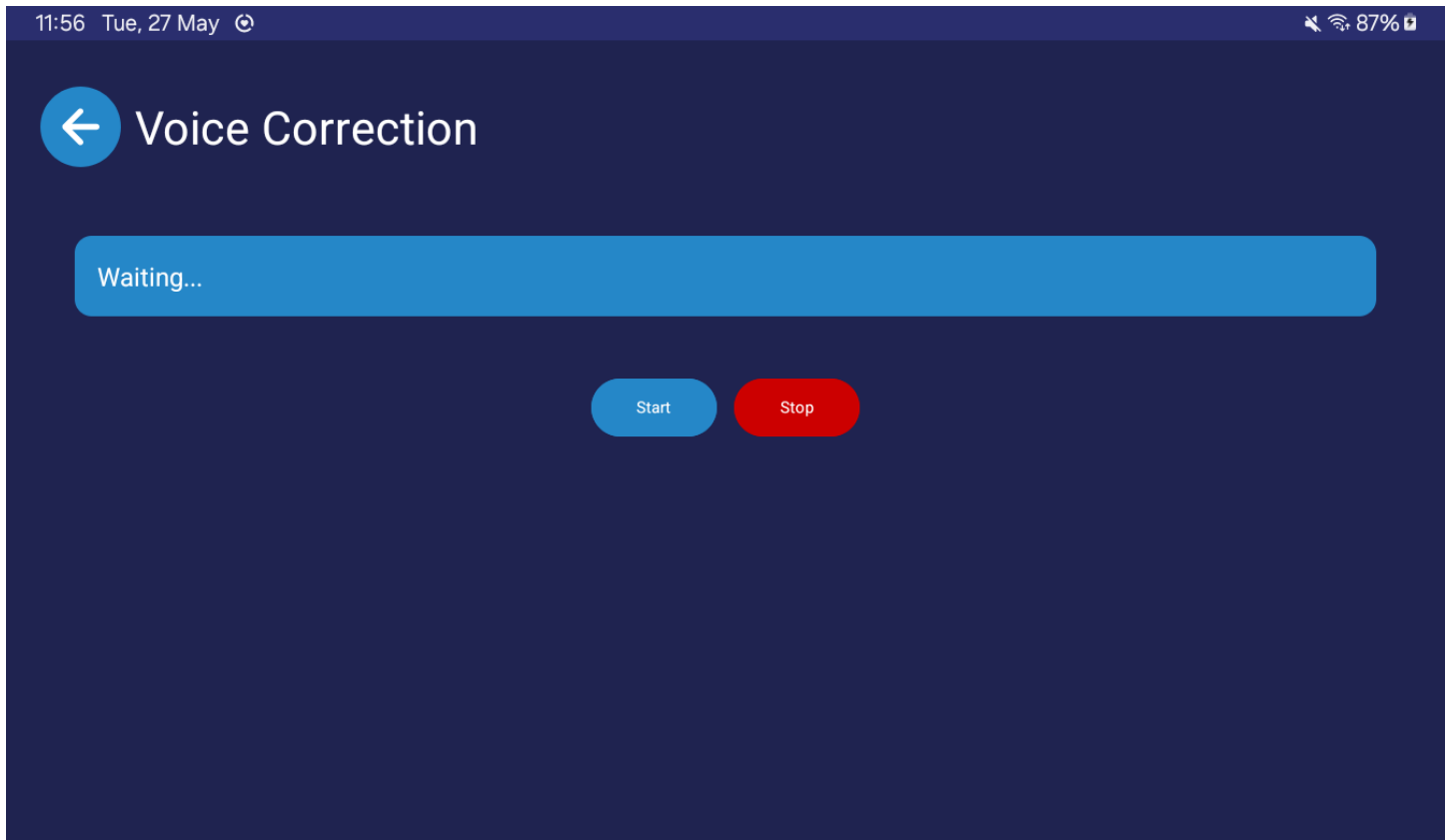


Figure 19 Voice Correction

Click on start speak, then once you finish talking, if the result is correct, the ayah script will be displayed, and you can start the next ayah:

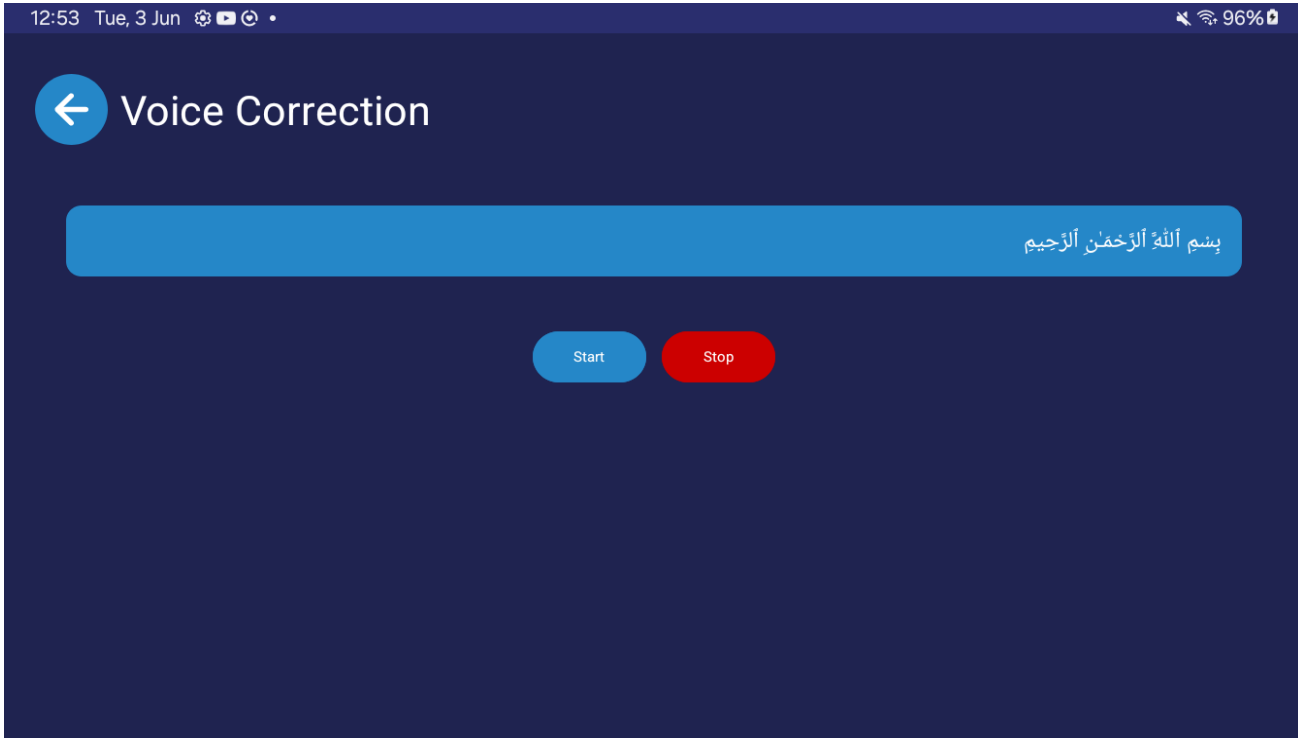


Figure 20 Correct Result

If you got the result with mistakes, you will see that you need to try again:

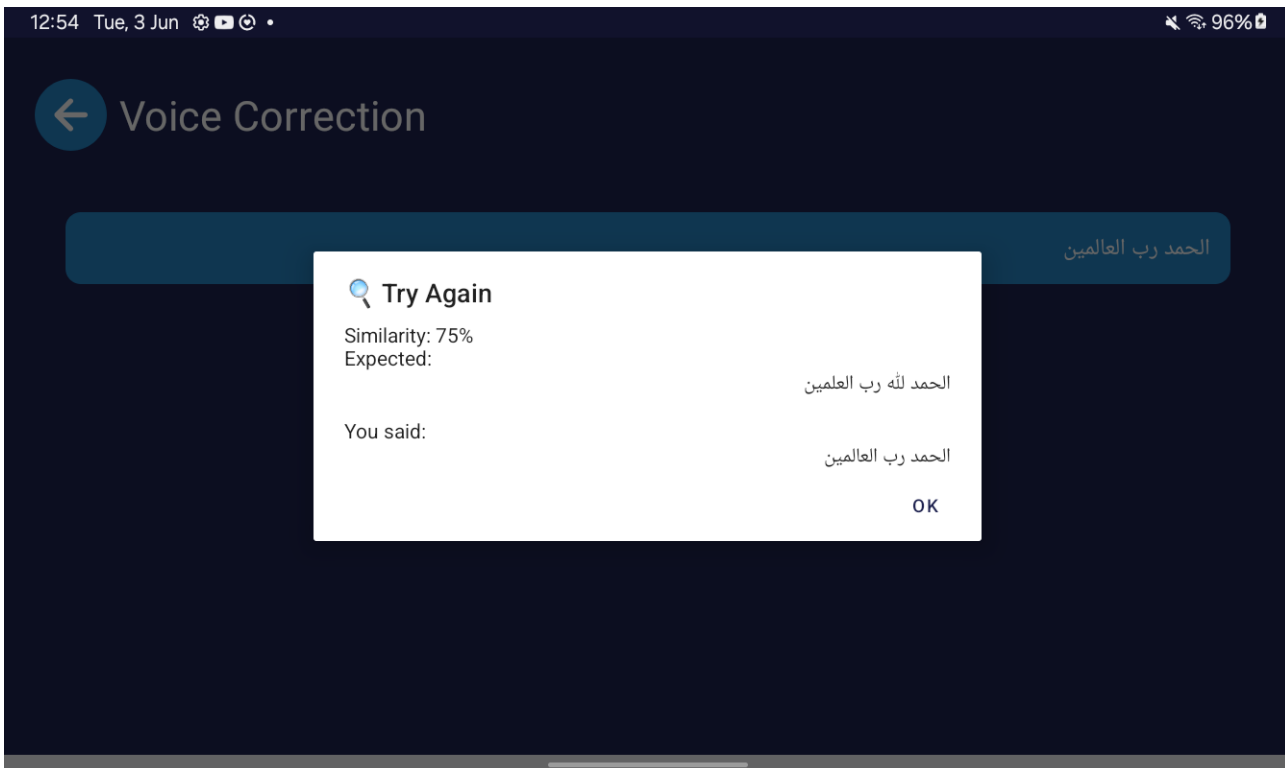


Figure 21 Bad Result

So now we will attach the process of the application in the light mode, still in the English language, so it will be like that:

Still the same, the splash screen with the voice once we open the receiver and start it:

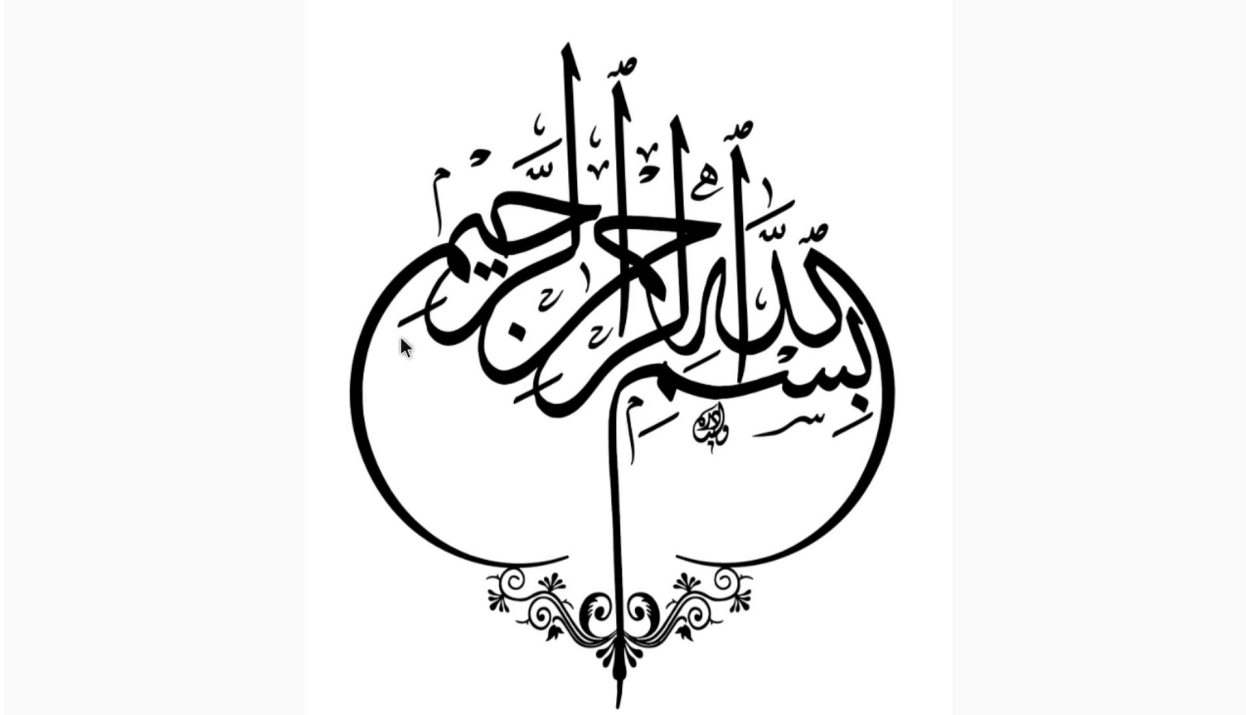


Figure 22 Splash Screen

The fragment that contains the ayah, which is the main screen in the receiver:

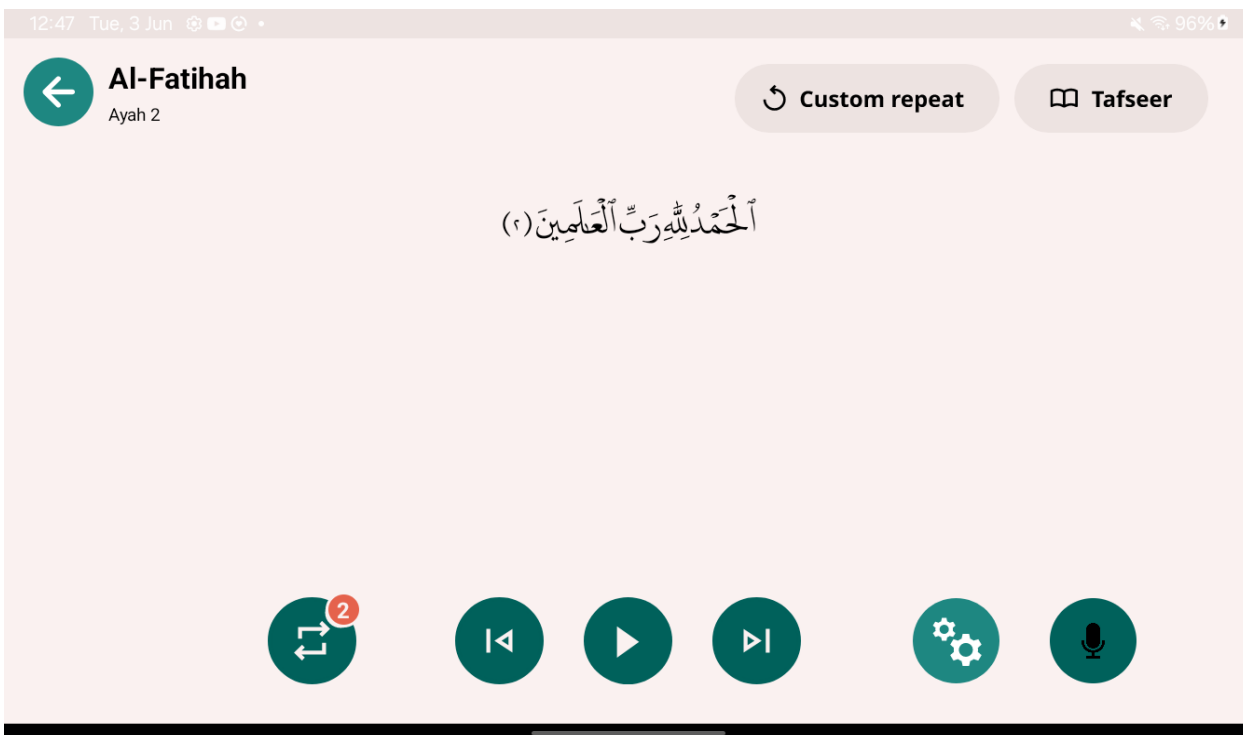


Figure 23 Details Screen

The controller side is to display the list of surah's according to what we choose, the holy quran button or Juz Amma, so this is in the controller side once we choose the holy quran:

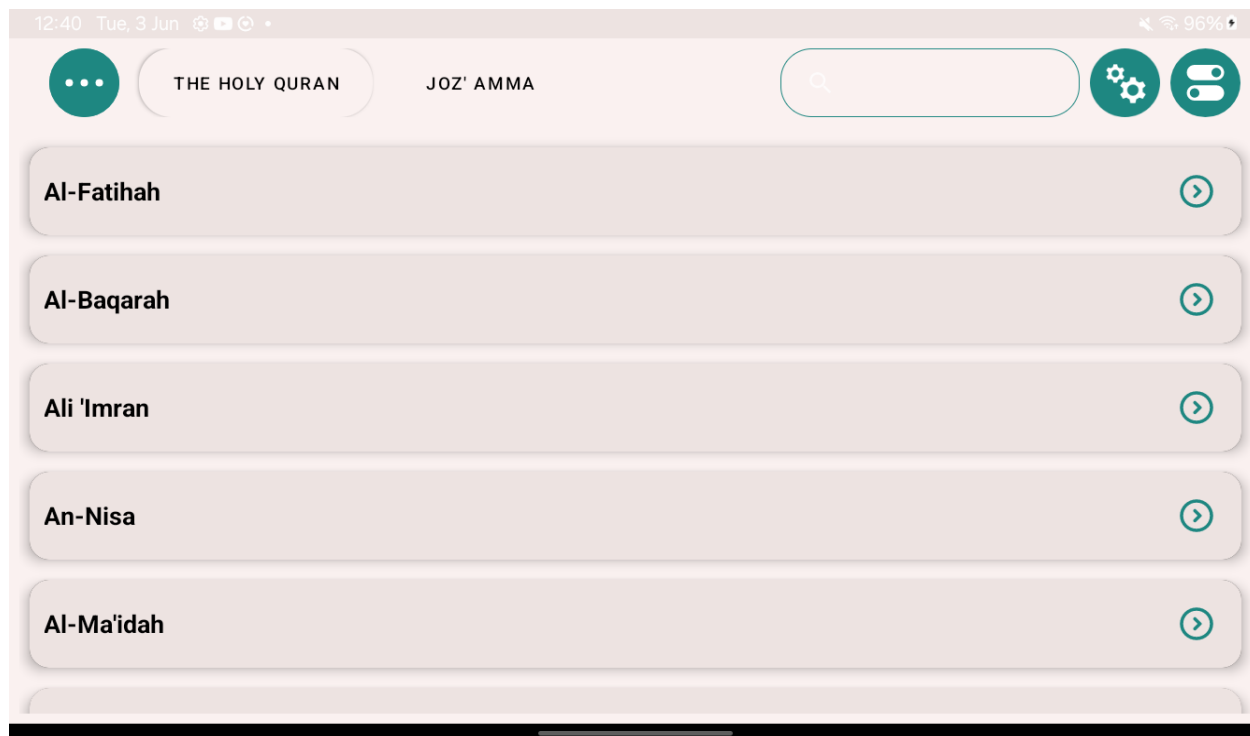


Figure 24 Holy Quran Surah

And this is when we choose Juz Amma:

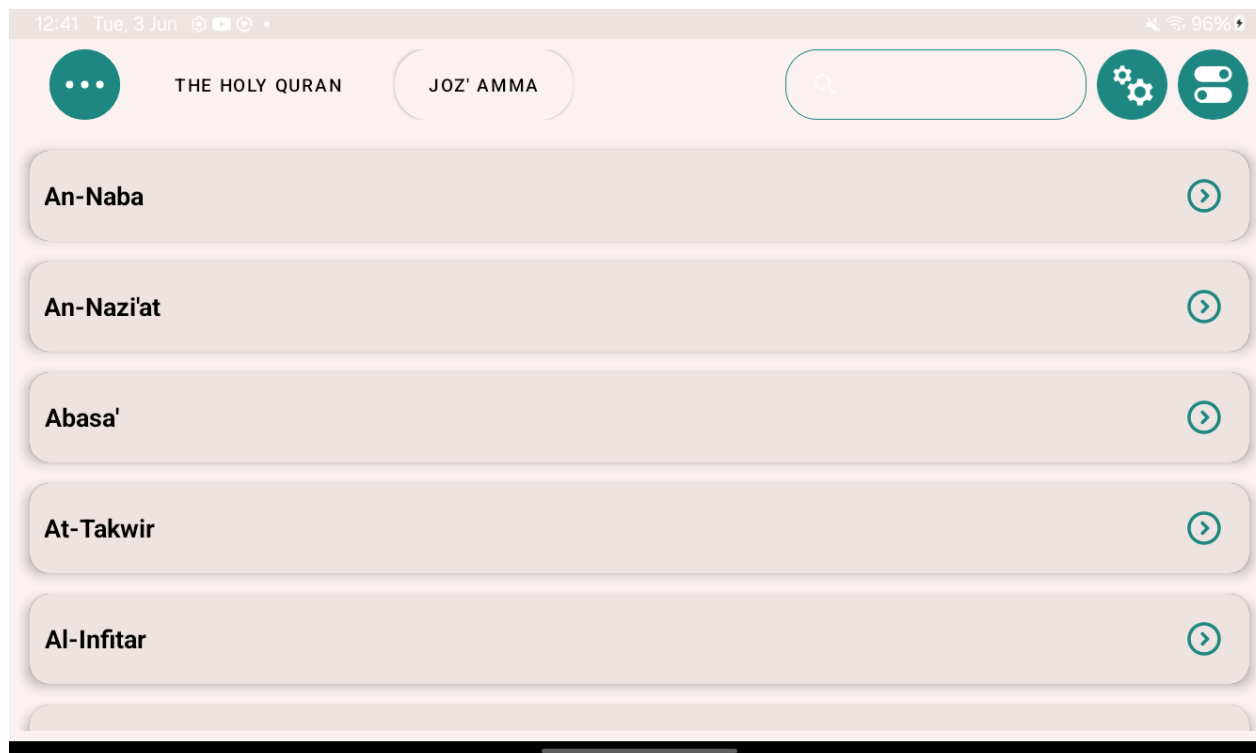


Figure 25 Juz' Amma

Then this is the setting icon on the controller side and all its options or the features that provide it:

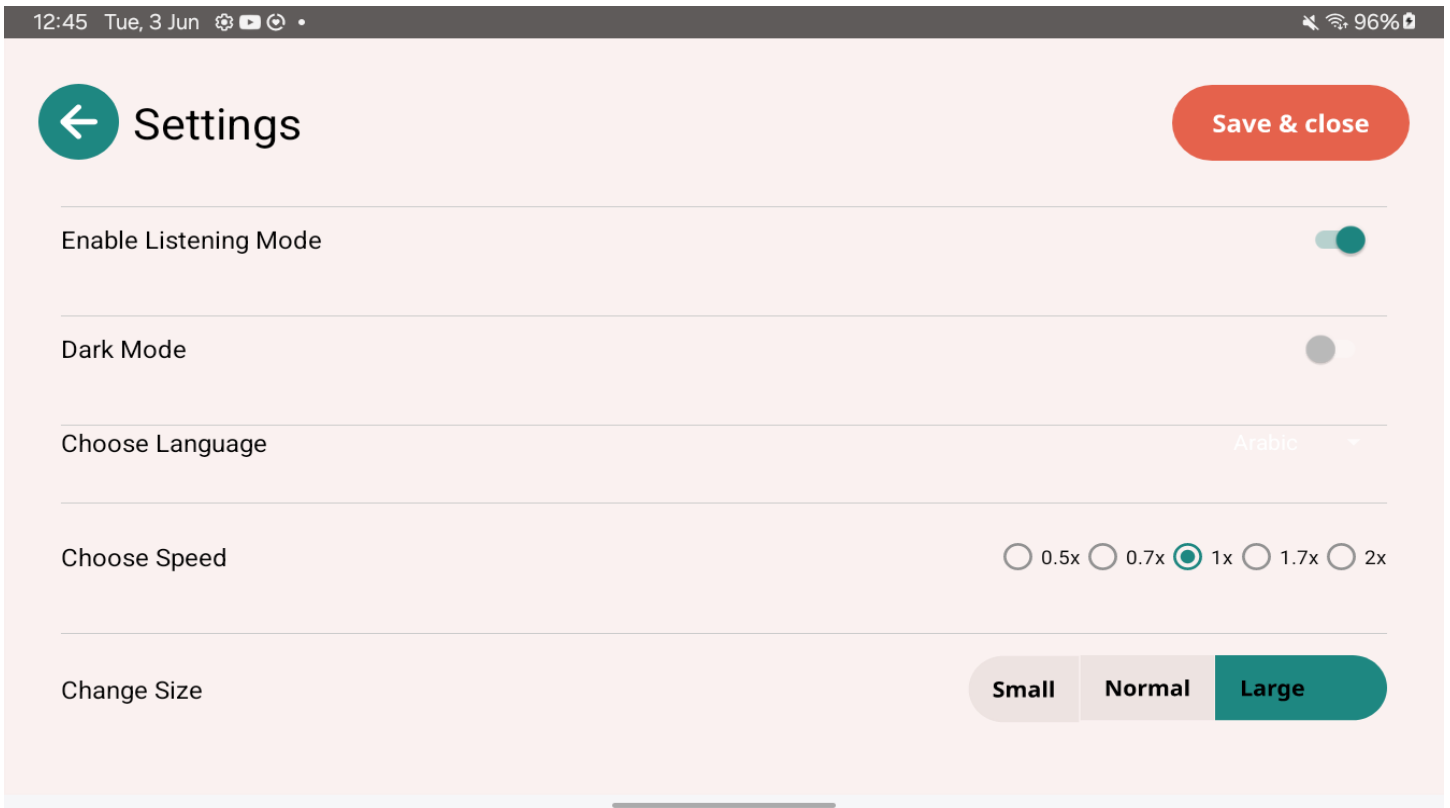


Figure 26 Settings

Once the controller clicks on choose reciter:

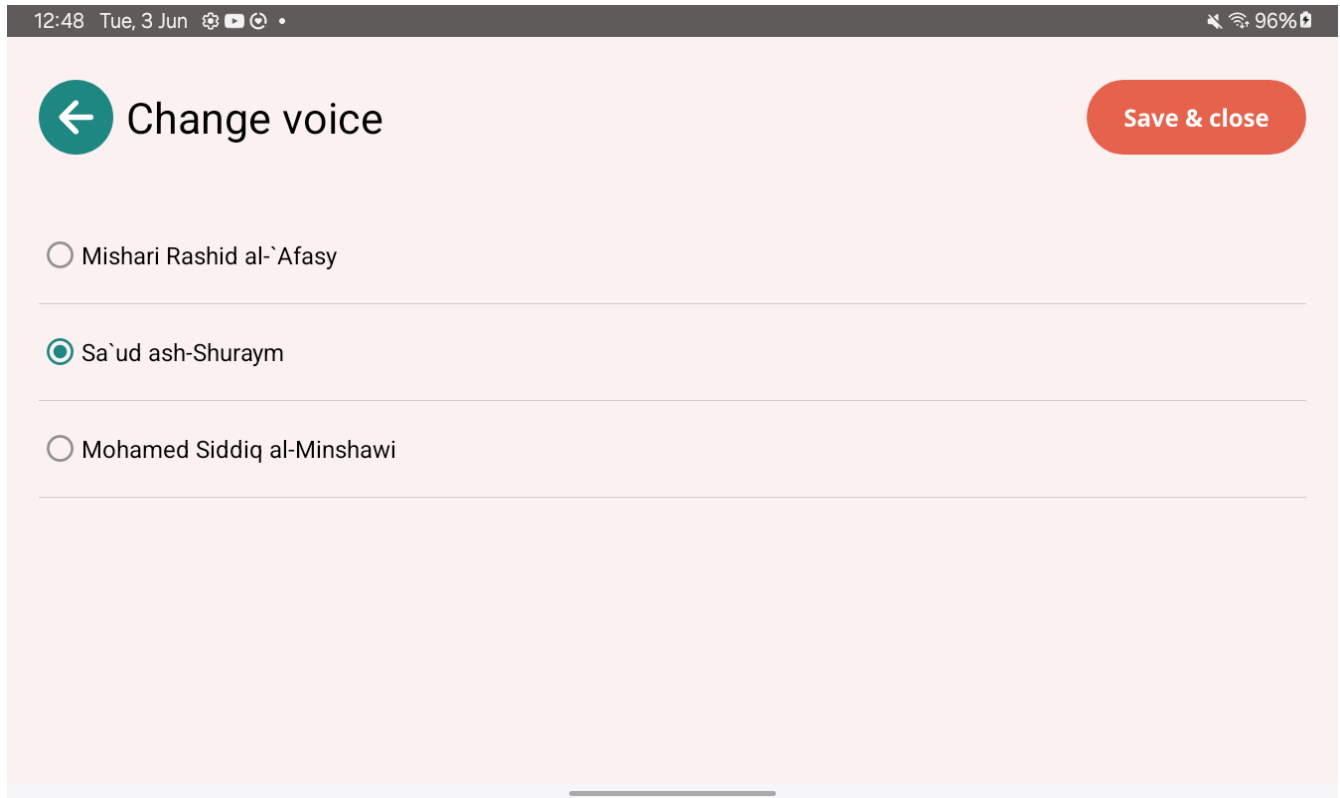


Figure 27 Choose Reciter

When the controller chooses from the settings to enable Transliteration and Translation enable so the receiver gets something like:

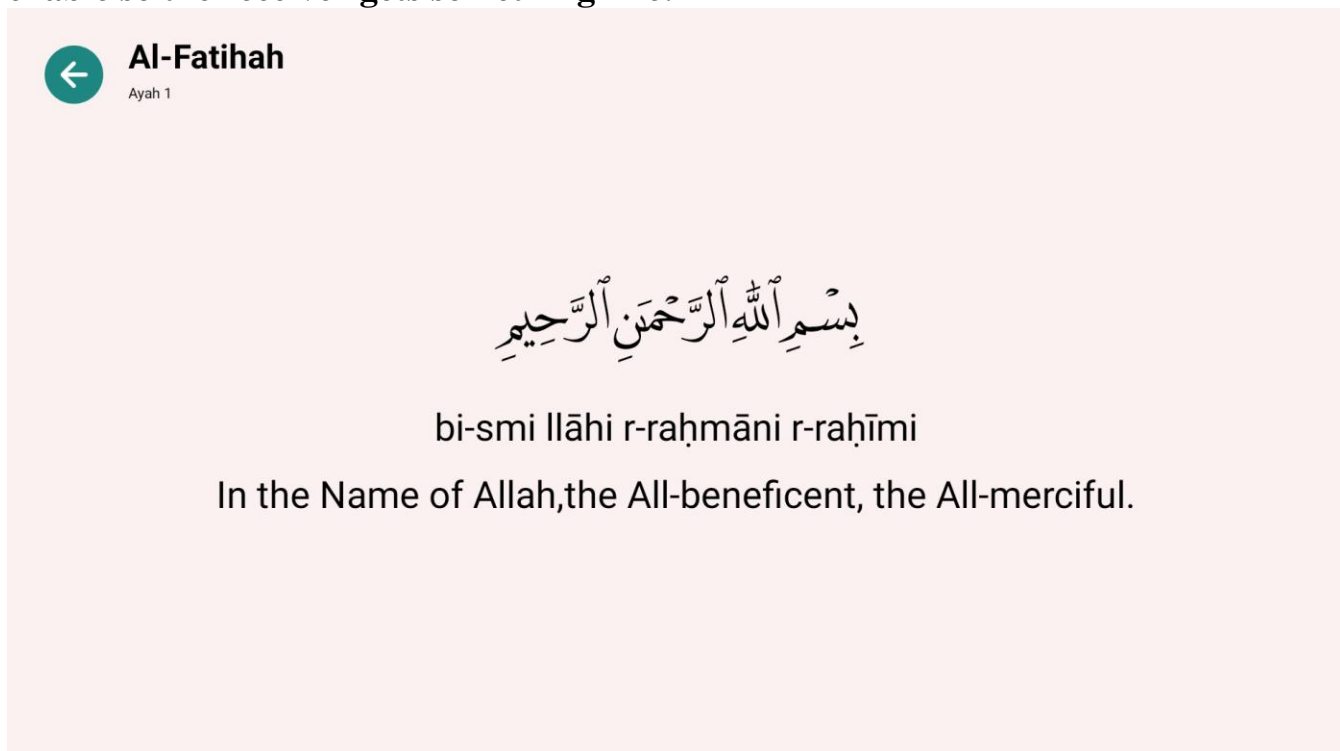


Figure 28 Receiver with Transliteration and Translation

When the controller chooses the listening mode and enables it so the receiver gets like:



Figure 29 Listening mode

When the controller changes the size from the settings, this is how the receiver gets:

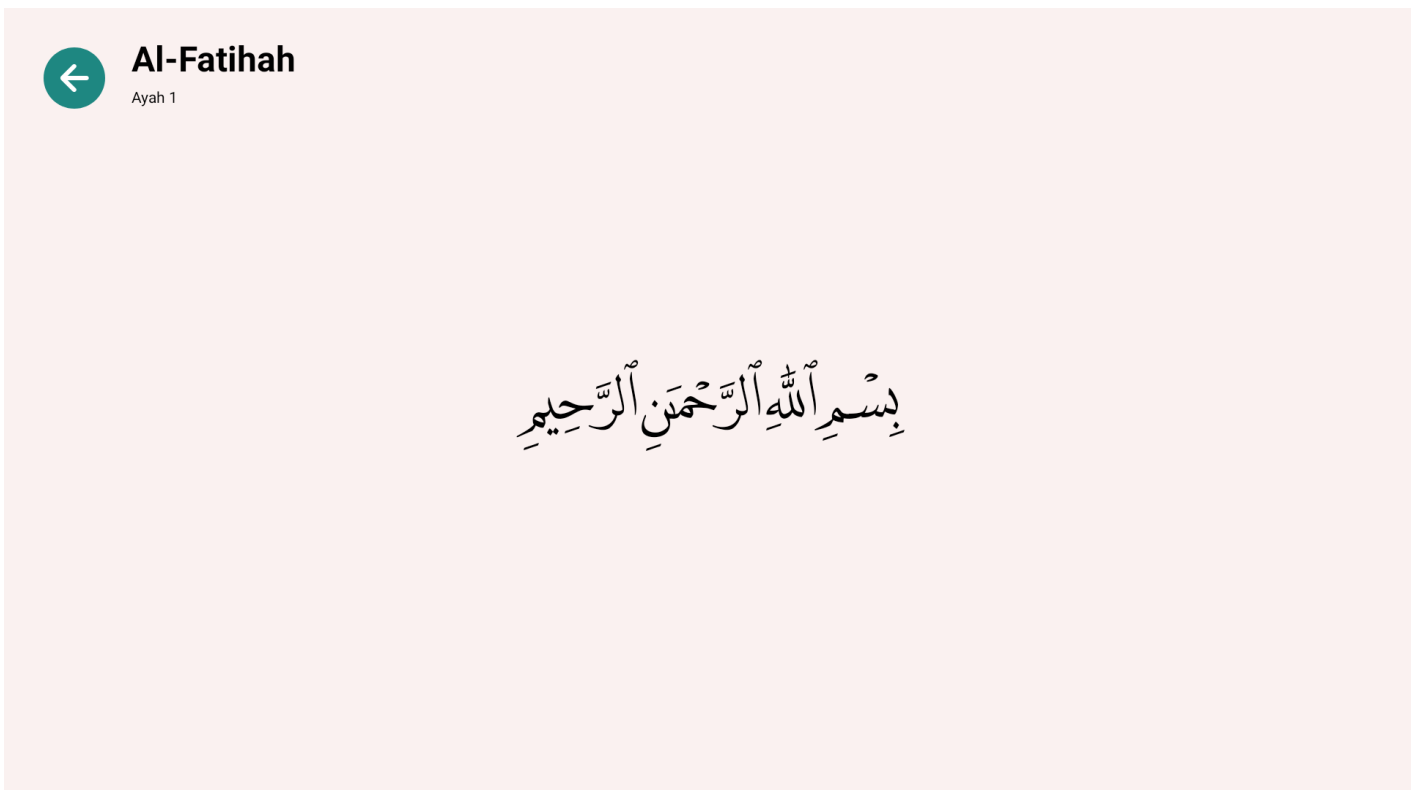


Figure 30 Receiver without Transliteration and Translation

Doing the operation of search on the controller side:

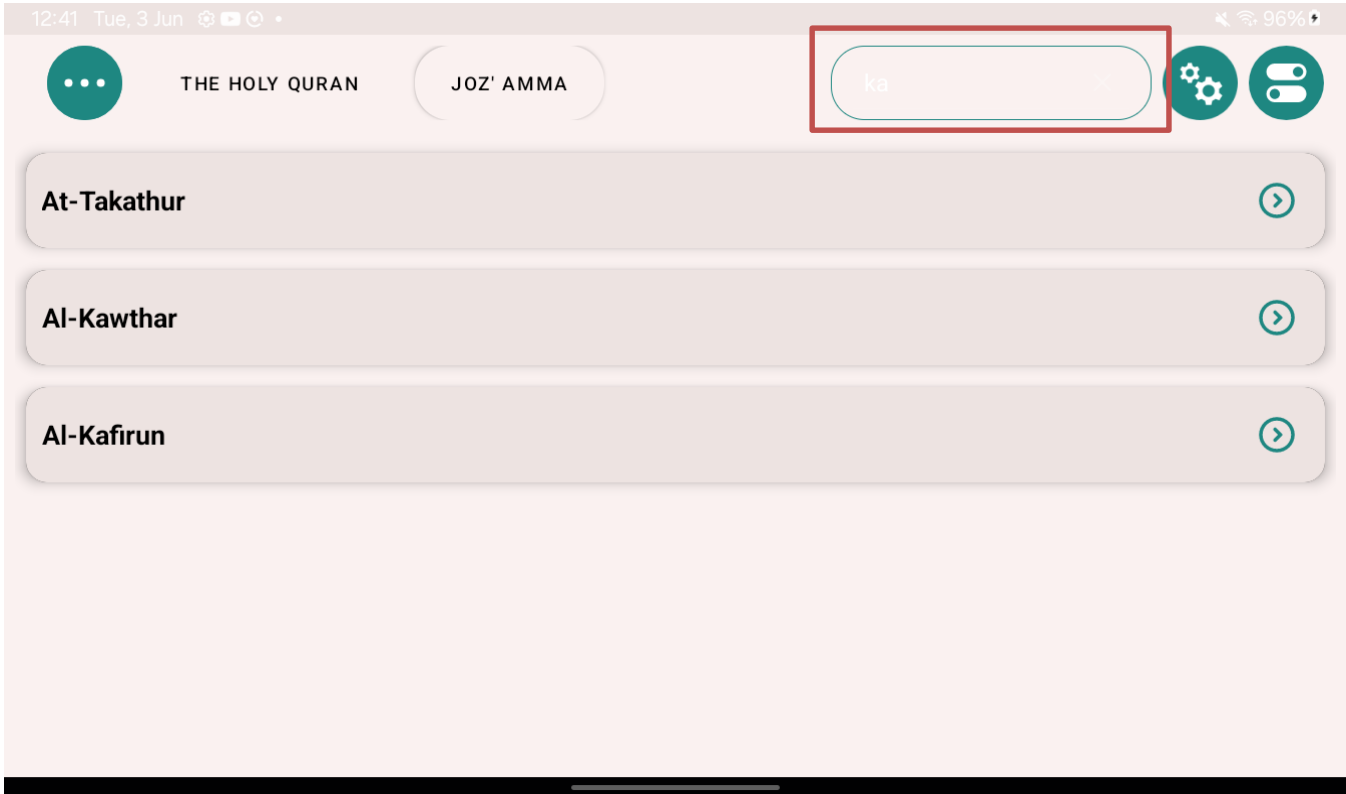


Figure 31 Search

The repeating operation on the light mode:

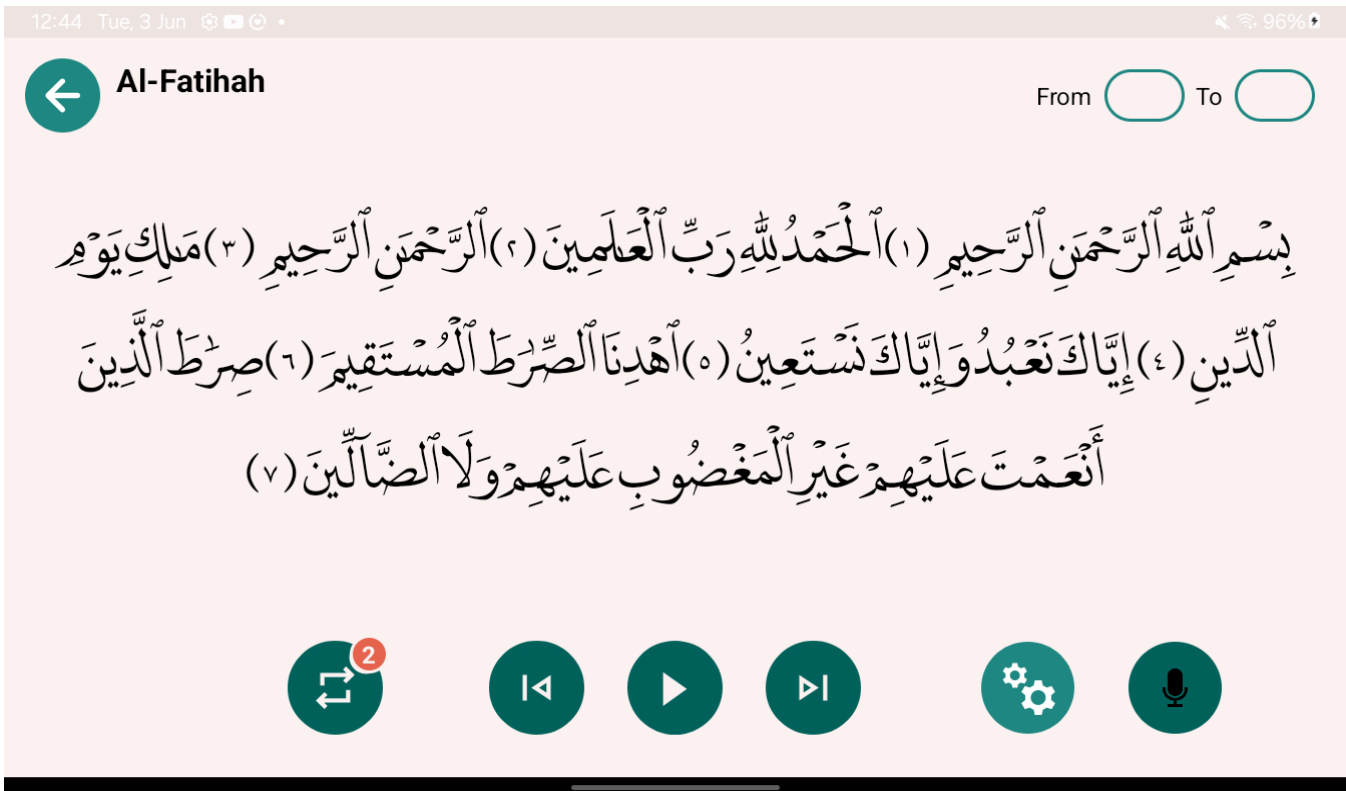


Figure 32 Custom Repeat

When the controller clicks on the tafseer button to display the tafseer, it gets like that:



Figure 33 Tafseer 1

As we described above there are a lot of features in the tafseer which they are the ability to choose the reference of the tafseer (1,2 and 3) and also the ability to display the tafseer for the next or the previous ayah, so let see the tafseer for the next ayah in the light mode:

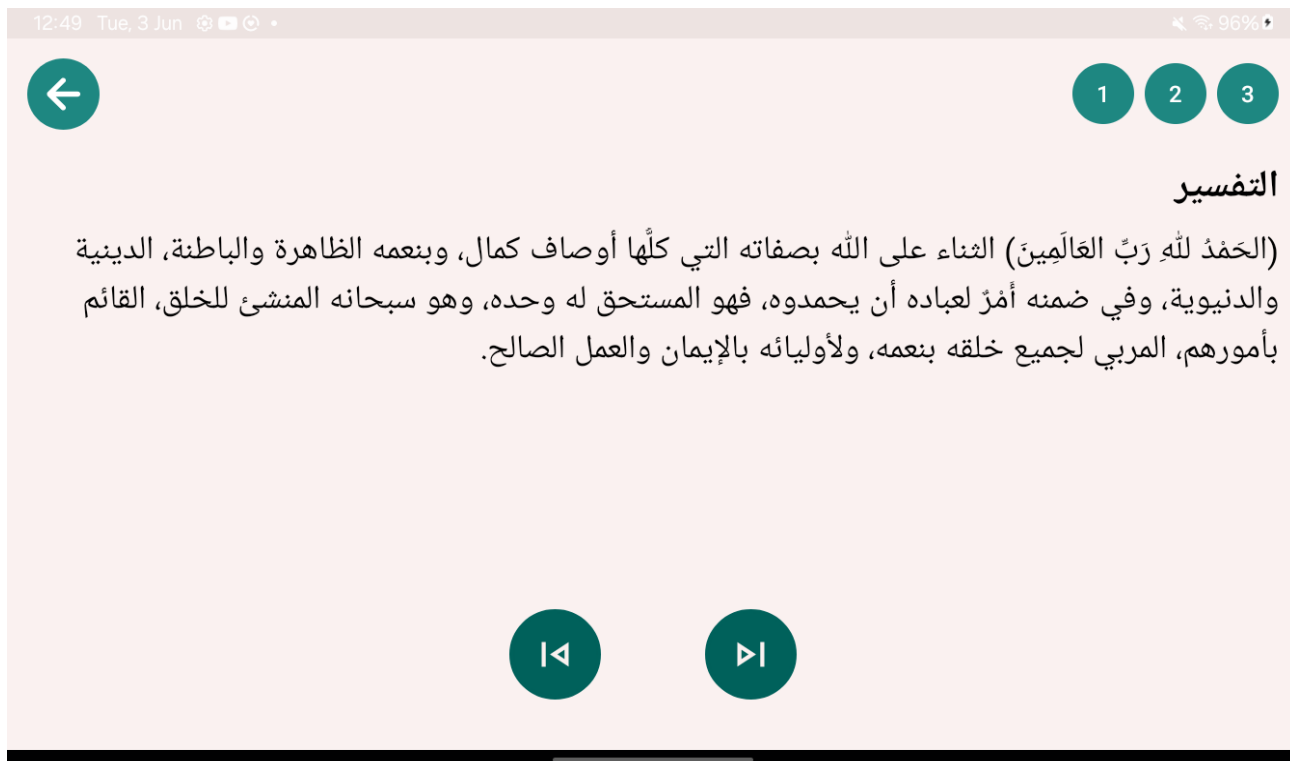


Figure 34 Tafseer Next

The sequential process of the voice correction:

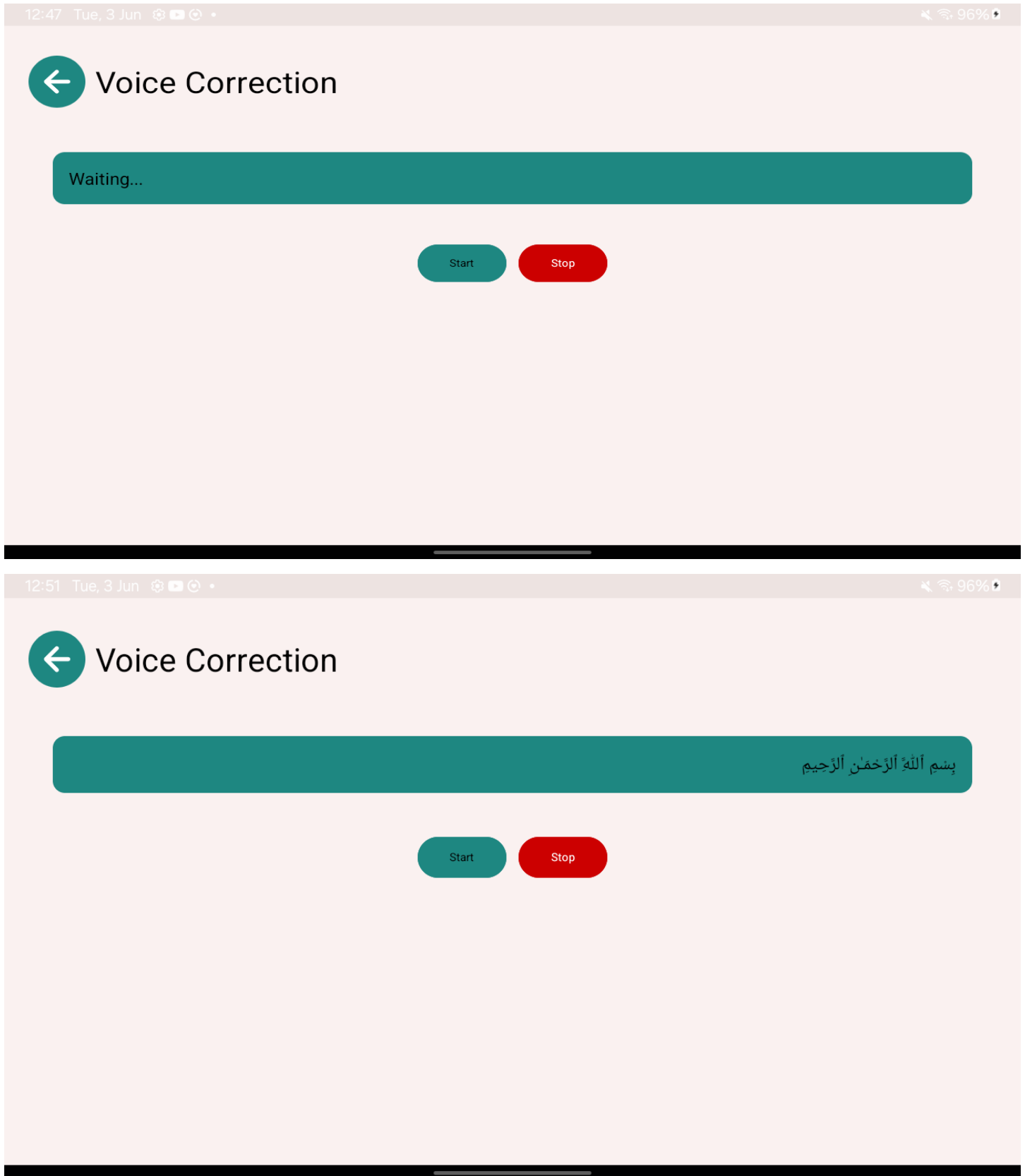


Figure 35 Voice Correction

← Voice Correction

Waiting...

Exit Voice Correction

Are you sure you want to go back?

CANCEL YES

Figure 36 Exit Voice Screen

Now, as we did previously, we will attach the process of the application in the dark and light modes, but we will change the chosen language to Arabic, so here is the process of the dark mode with the Arabic language.

Still the same, the splash screen with the voice once we open the receiver and start it:

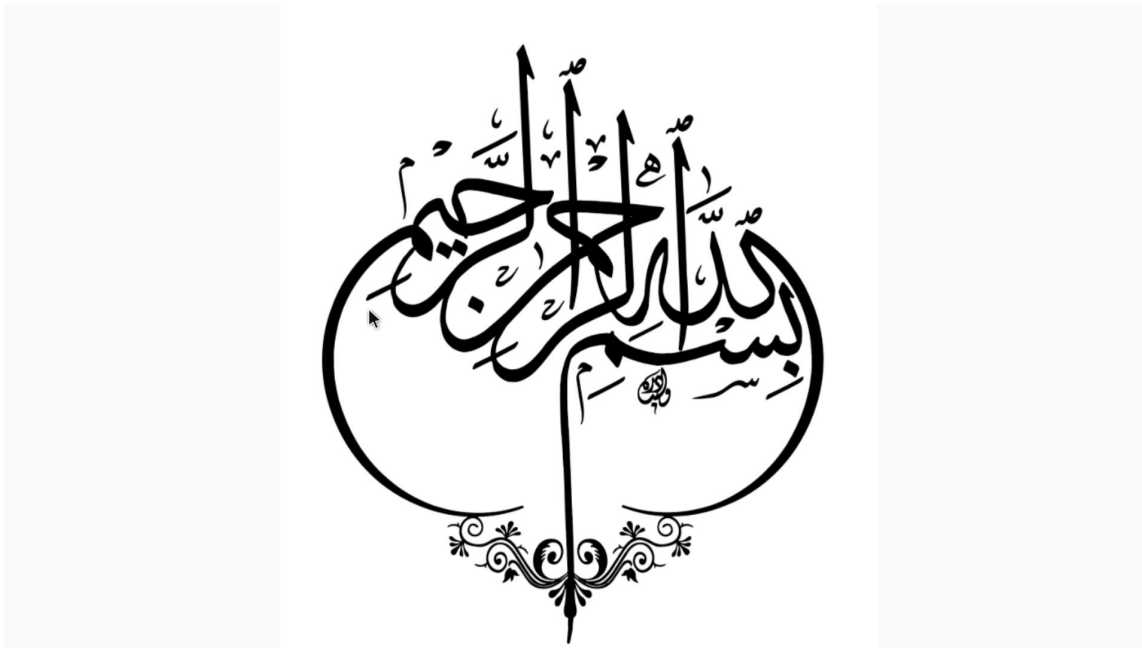


Figure 37 Splash Screen

The fragment that contains the ayah, which is the main screen in the receiver:

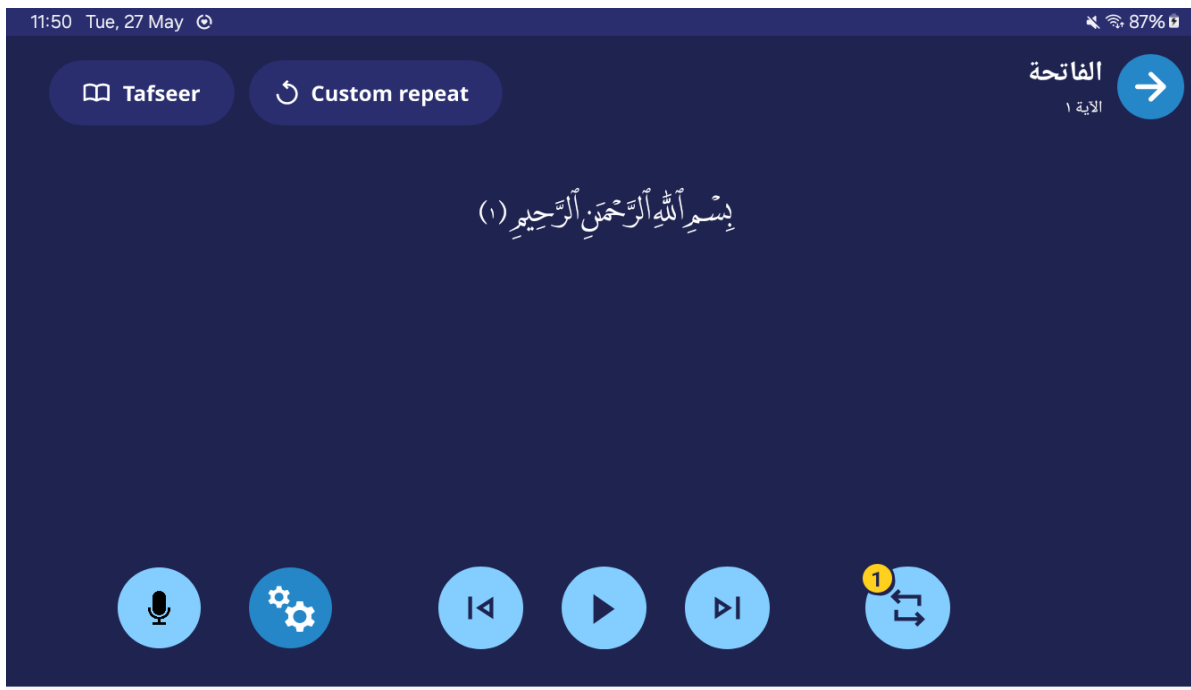


Figure 38 Details Screen

* Focus here on the direction of the buttons and how they are related to the Arabic language (all the buttons now are related to the chosen language).

The controller side is to display the list of surah's according to what we choose, the holy quran button or Juz Amma, so this is in the controller side, once we choose the holy quran:

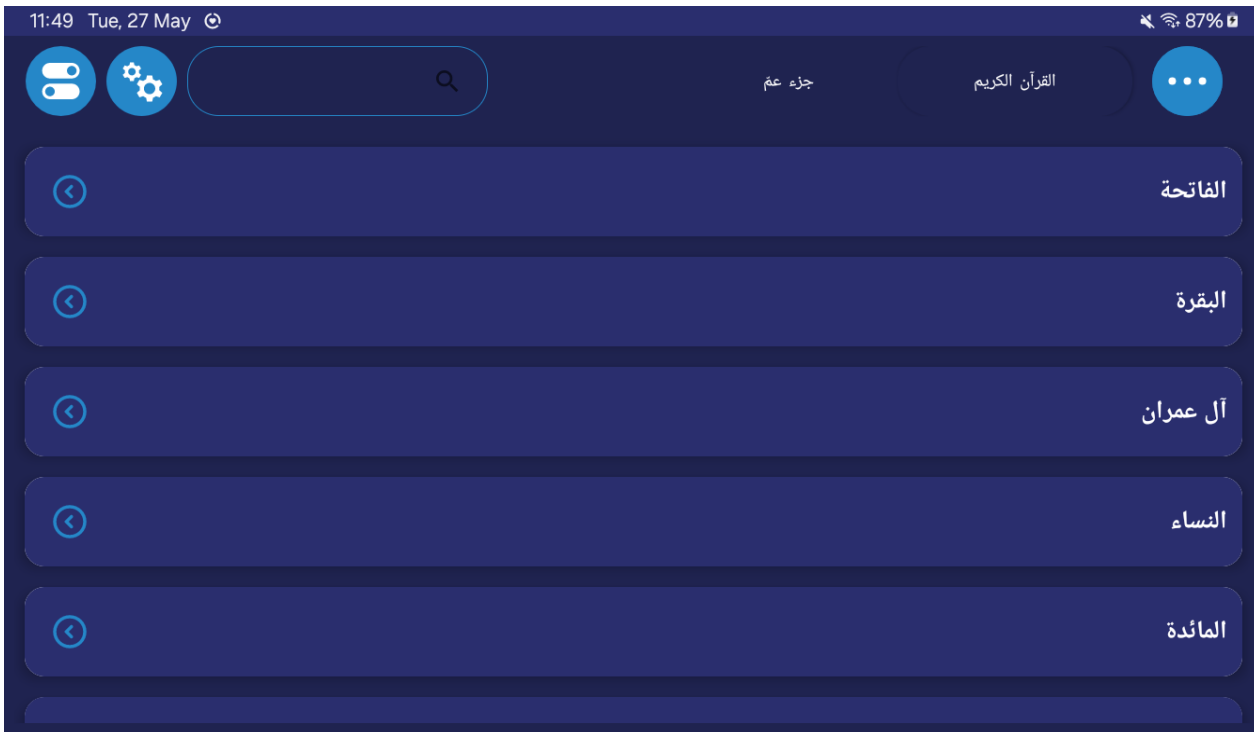


Figure 39 Holy Quran

And this is when we choose Juz Amma:

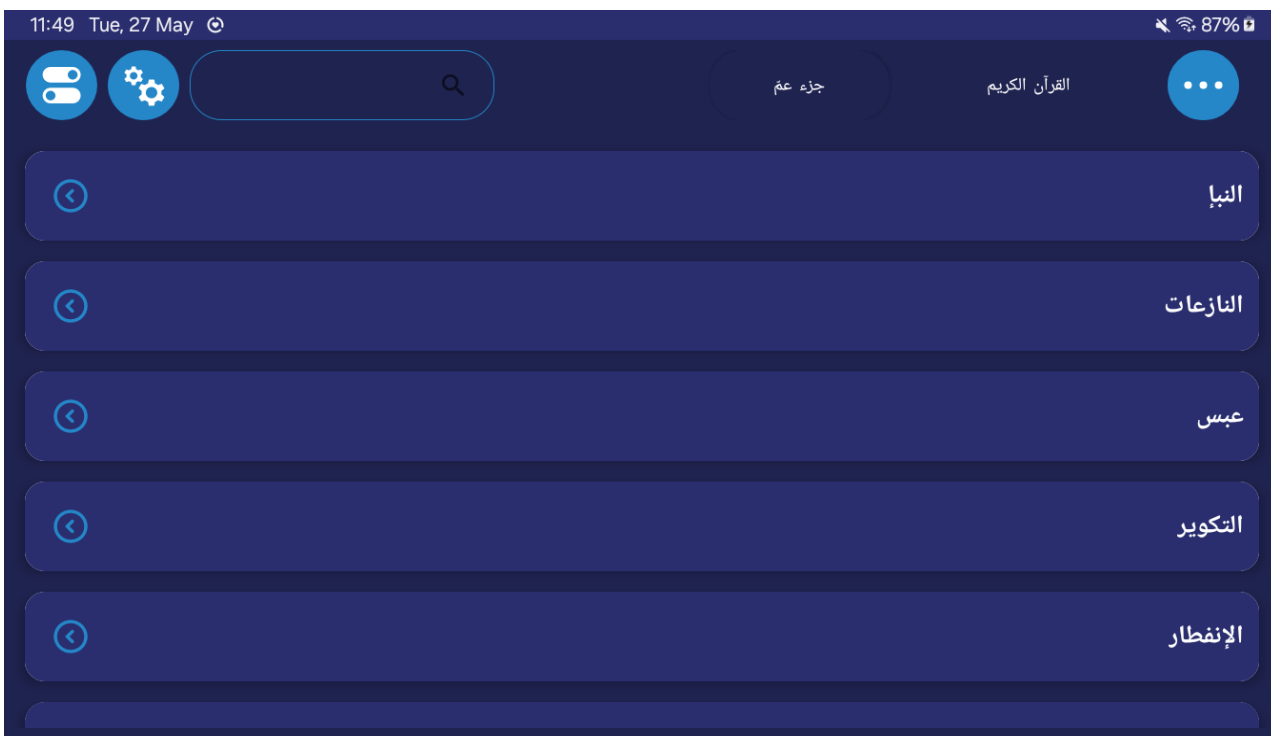


Figure 40 Juz' Amma

Then this is the setting icon on the controller side, and all its options or the features that provide it:

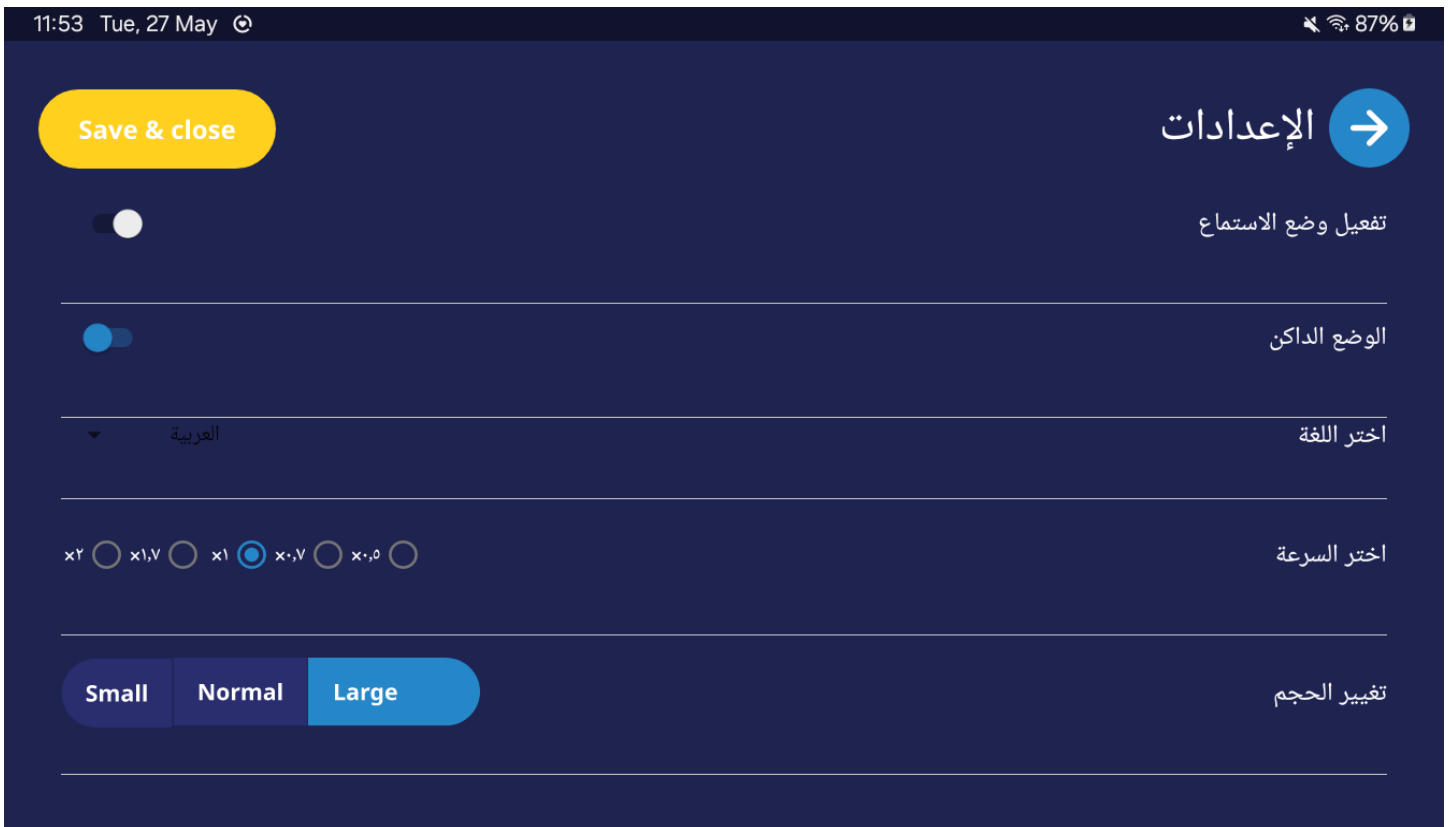
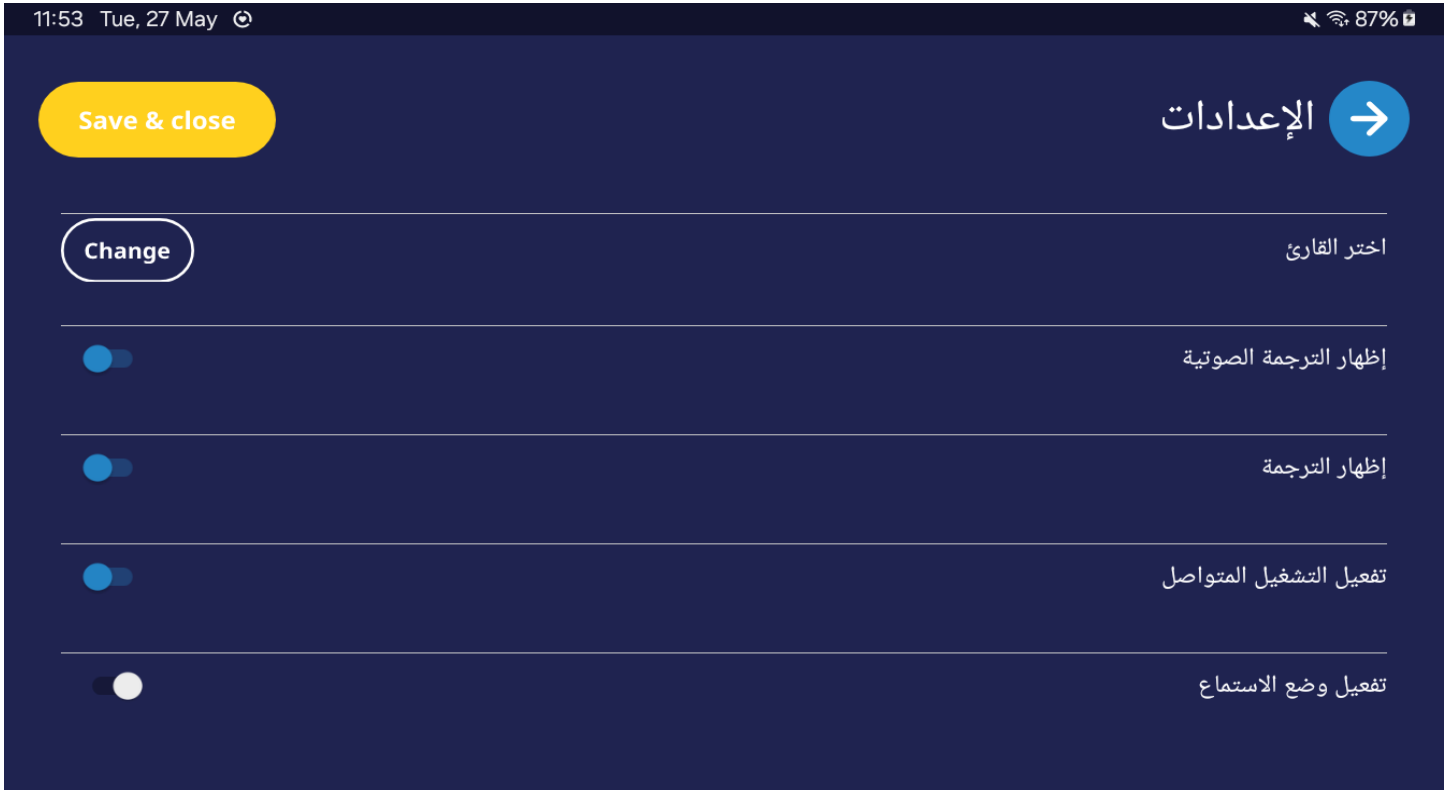


Figure 41 Settings Arabic

Once the controller clicks on choose reciter:

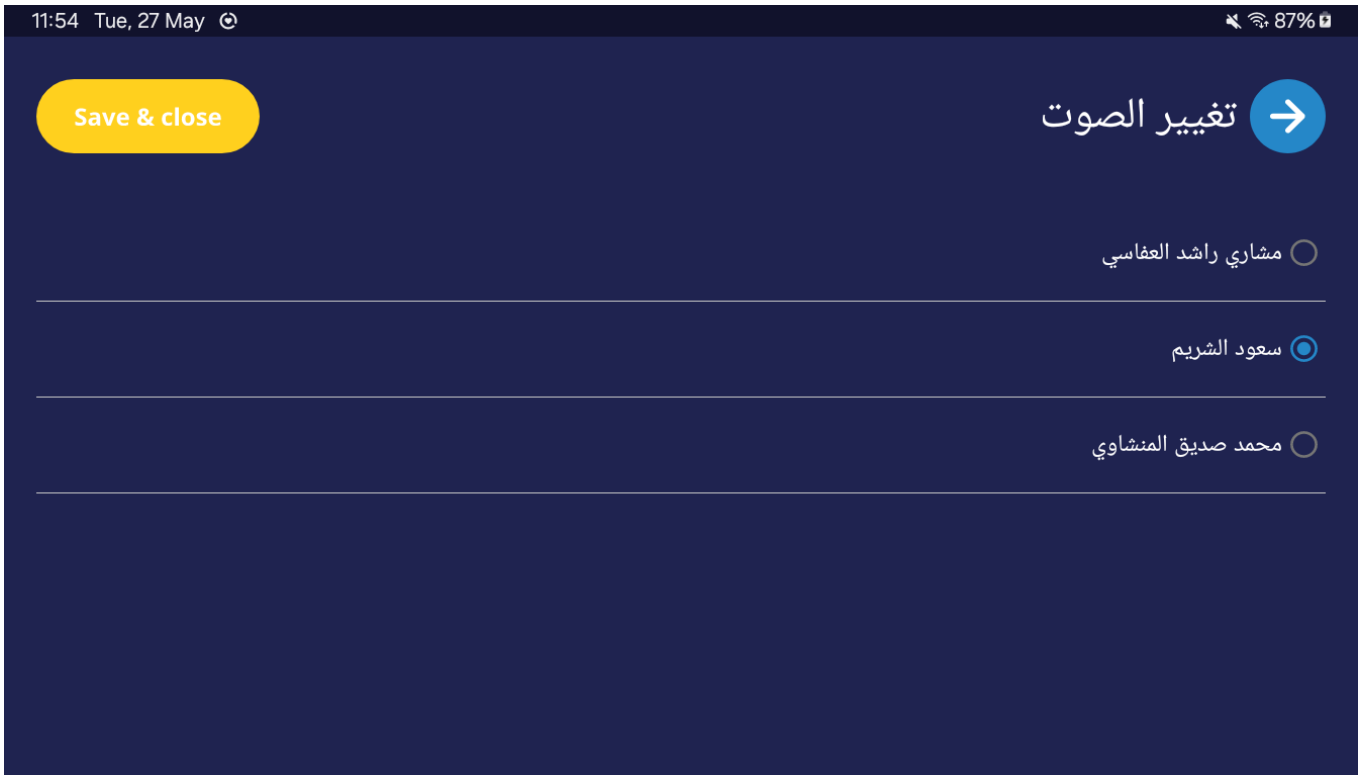


Figure 42 Change Reciter

When the controller chooses from the settings to enable Transliteration and Translation enable so the receiver gets something like:

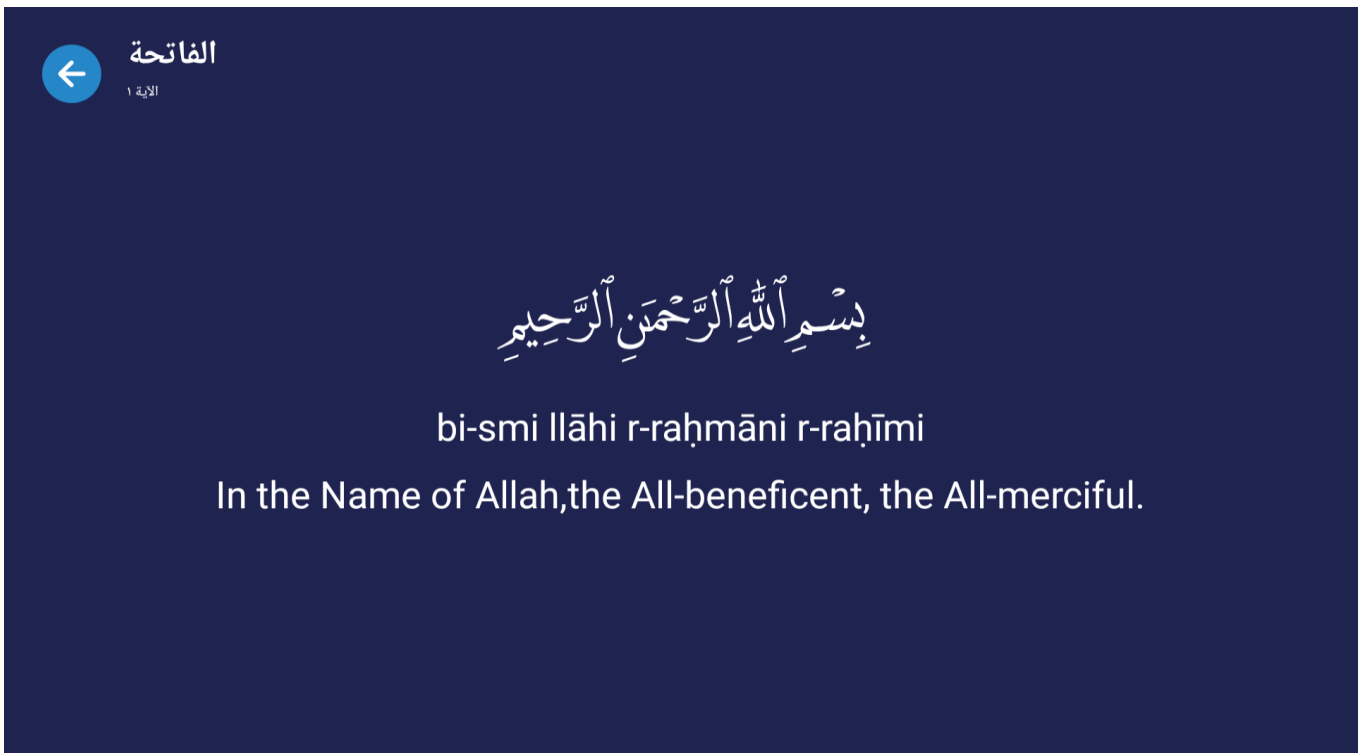


Figure 43 Receiver with Transliteration and Translation

When the controller chooses the listening mode and enables it so the receiver gets like:



Figure 44 Listening Mode

When the controller changes the size from the setting, this is how the receiver gets it:

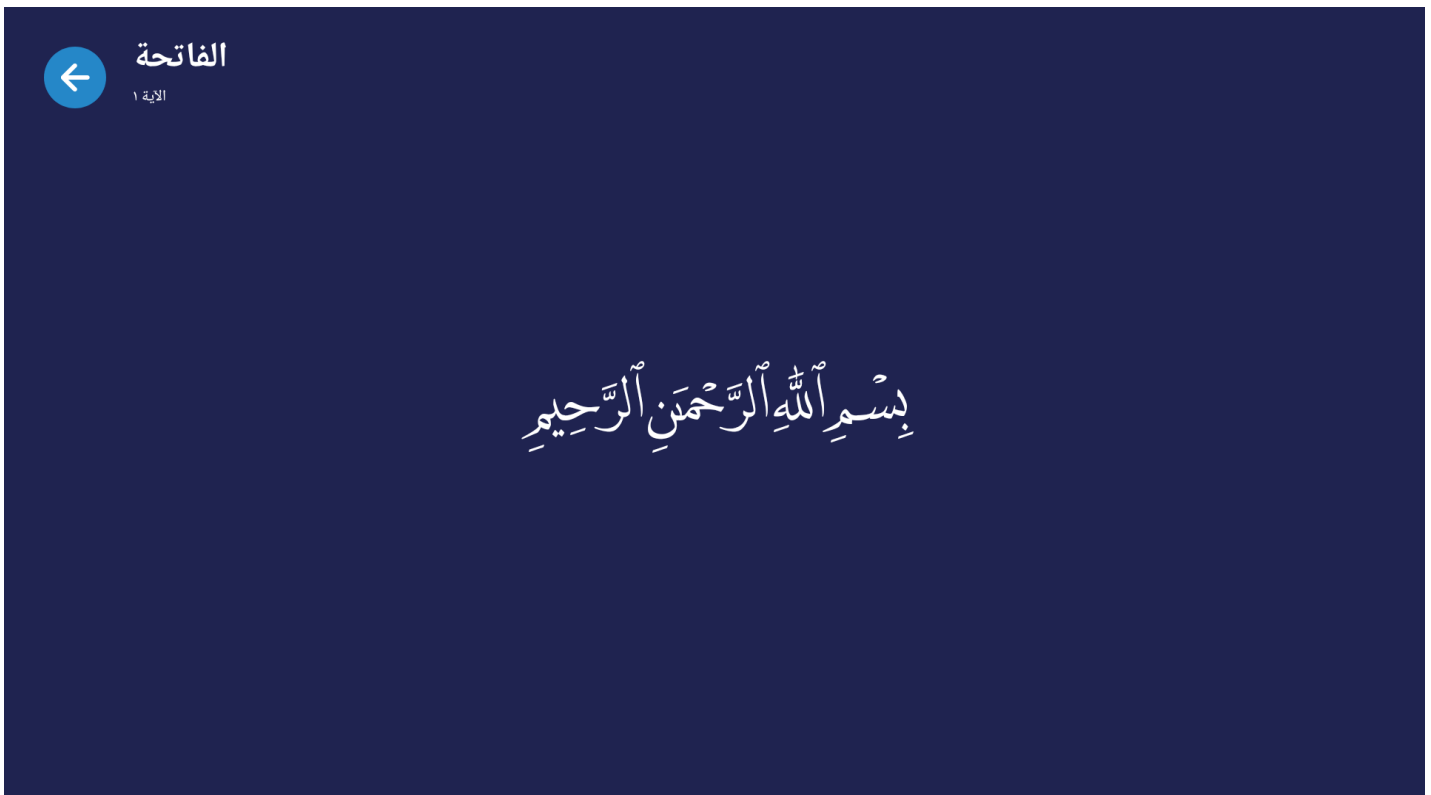


Figure 45 Receiver without Transliteration and Translation

Doing the operation of search on the controller side:

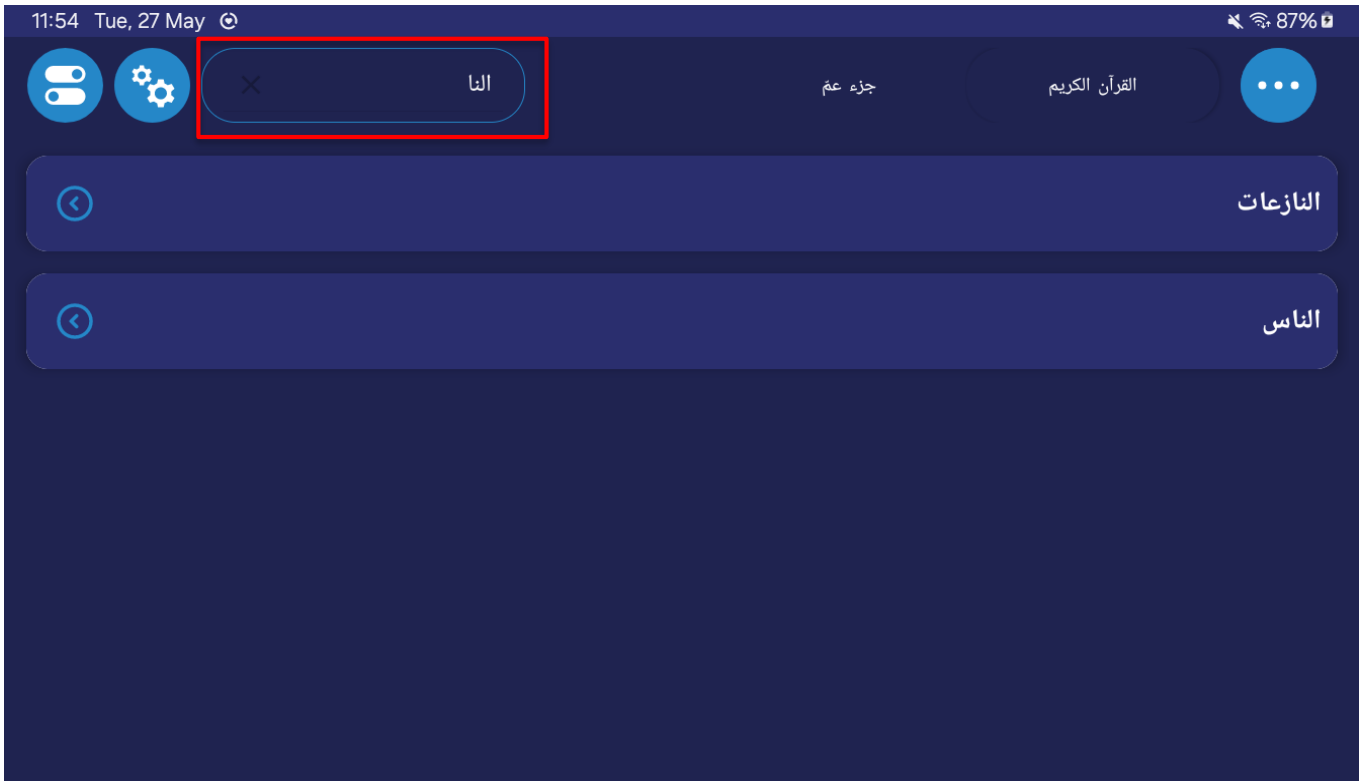


Figure 46 Search

The repeating operation on the dark mode:

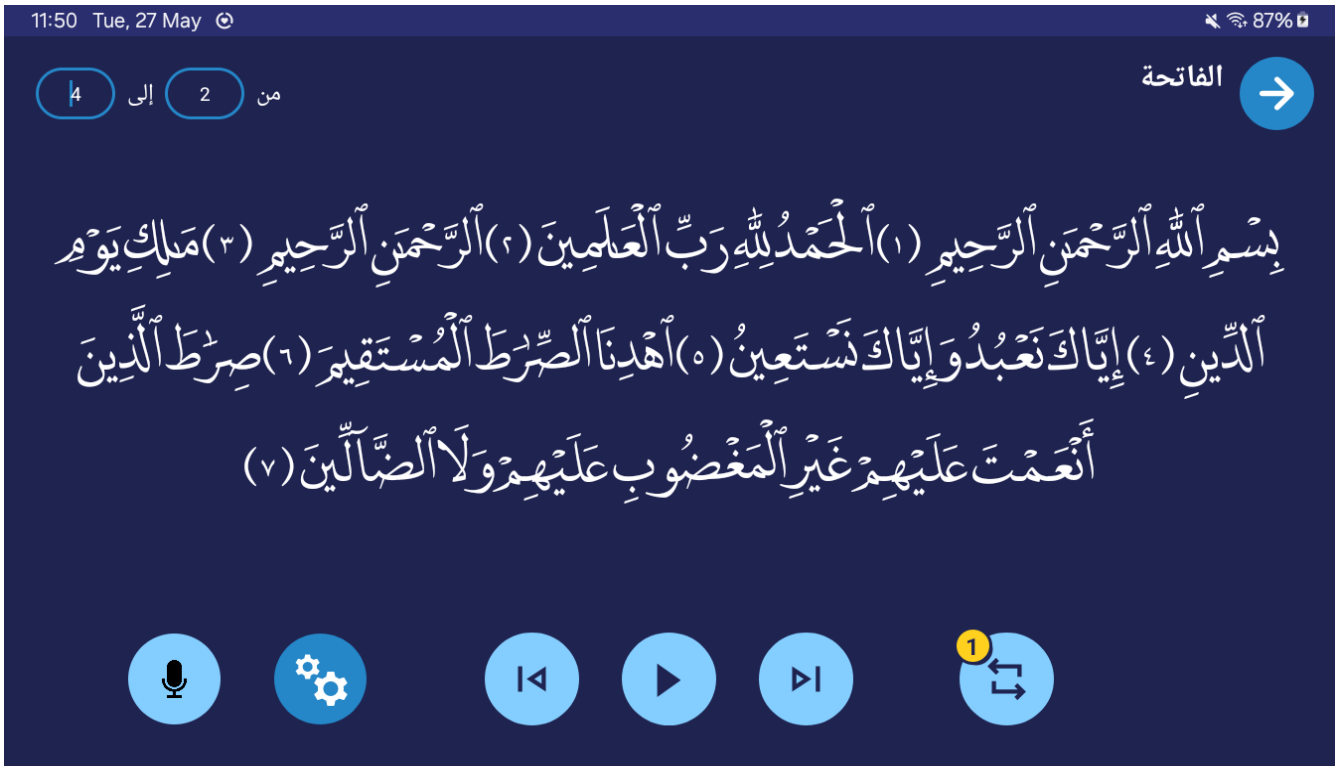


Figure 47 Custom Repeat

When the controller clicks on the tafseer button to display the tafseer, it gets like that:

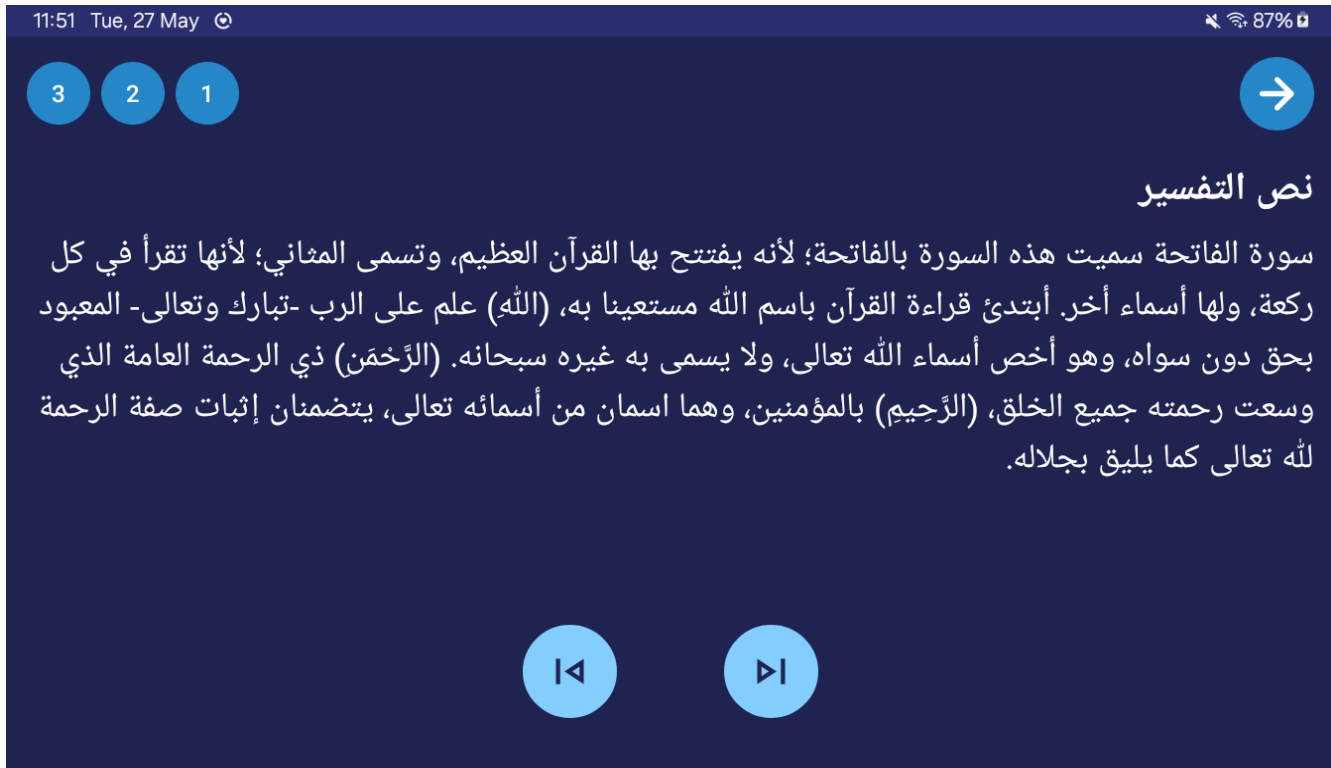


Figure 48 Tafseer Current

As we described above there are a lot of features in the tafseer which they are the ability to choose the reference of the tafseer (1,2 and 3) and also the ability to display the tafseer for the next or the previous ayah, so let see the tafseer for the next ayah in the dark mode:

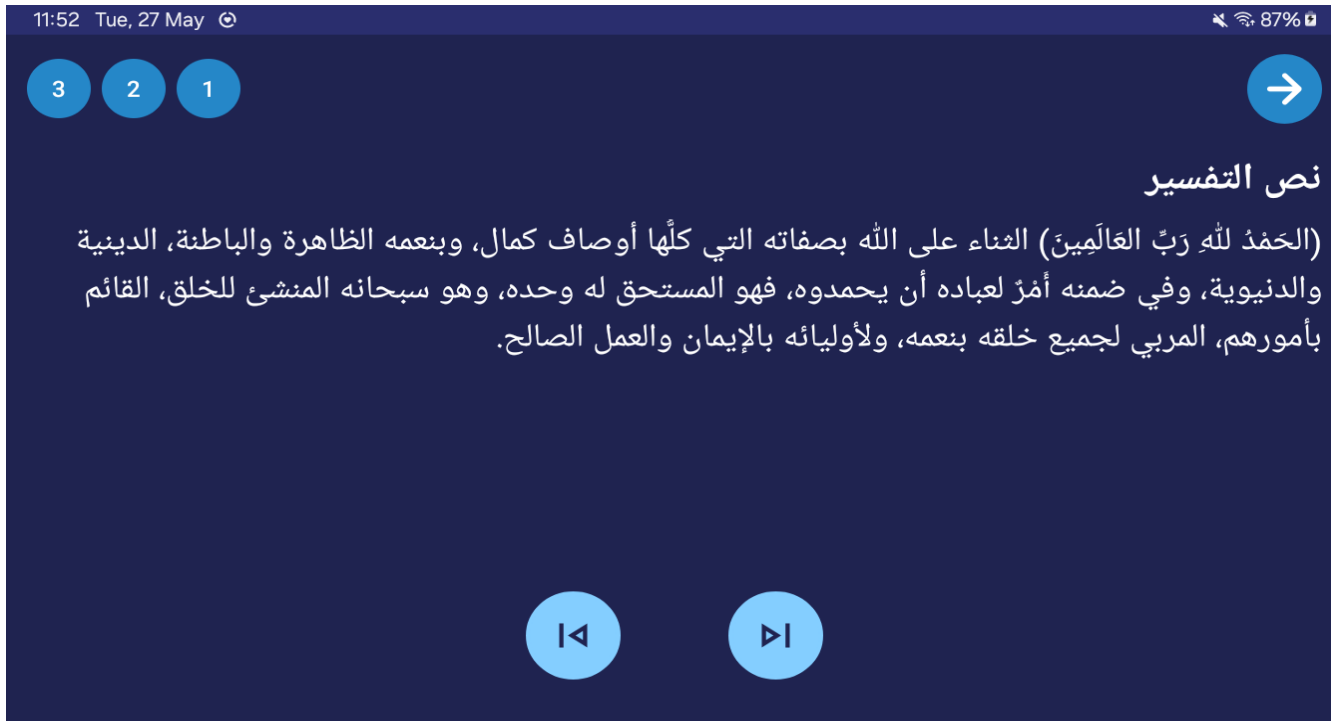


Figure 49 Tafseer Next

The sequential process of the voice correction:

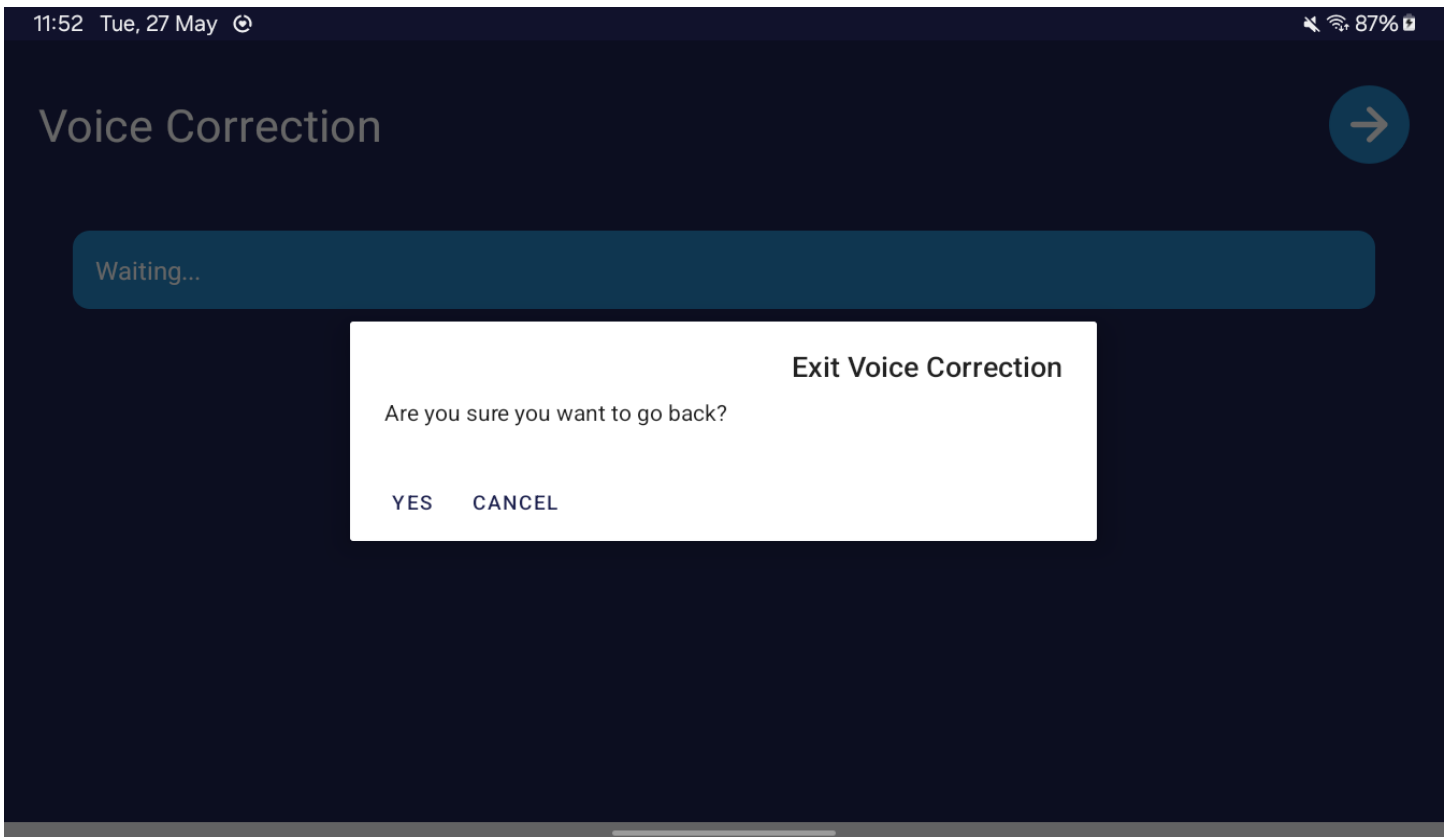
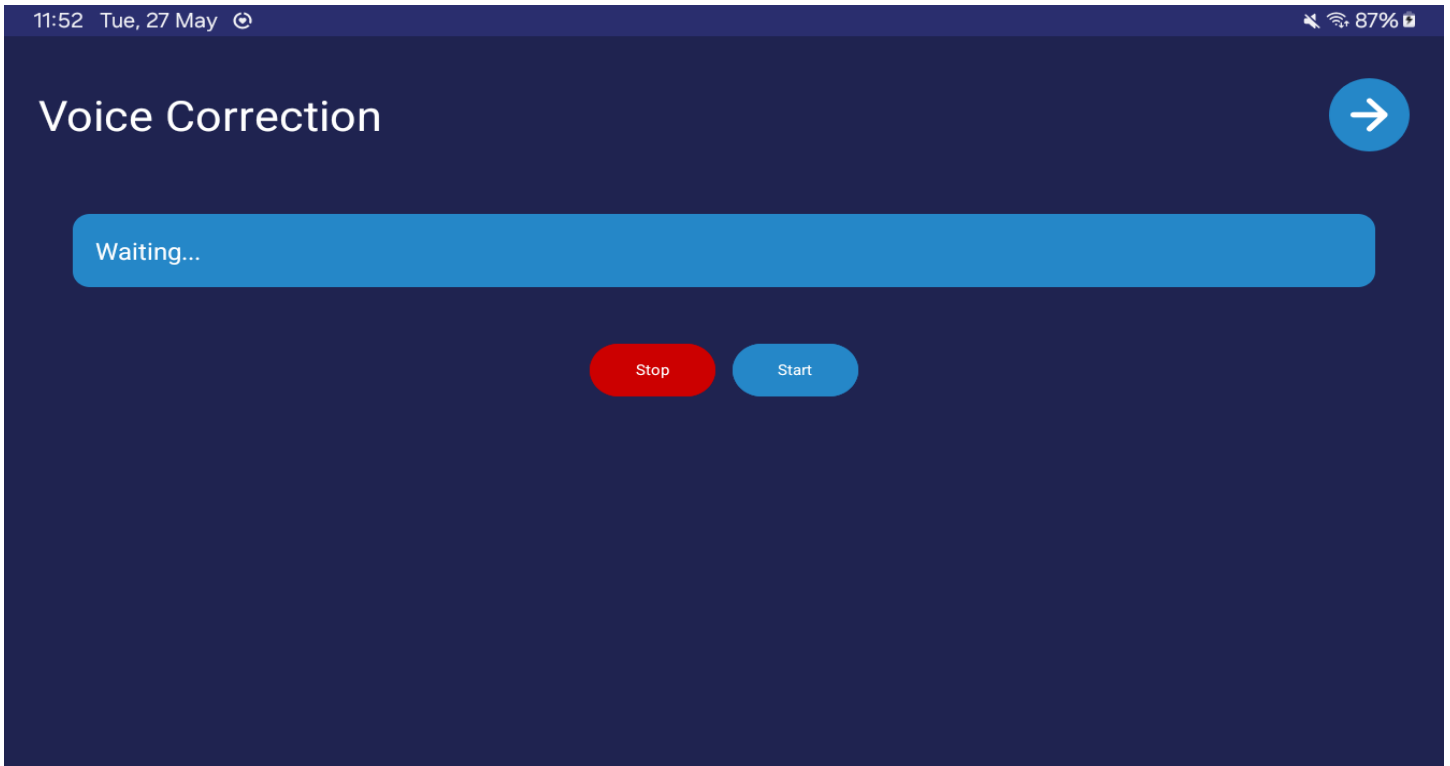


Figure 50 Voice Correction

Now we will attach the process in the light mode with the Arabic language, so:
Still the same, the splash screen with the voice once we open the receiver and start it:

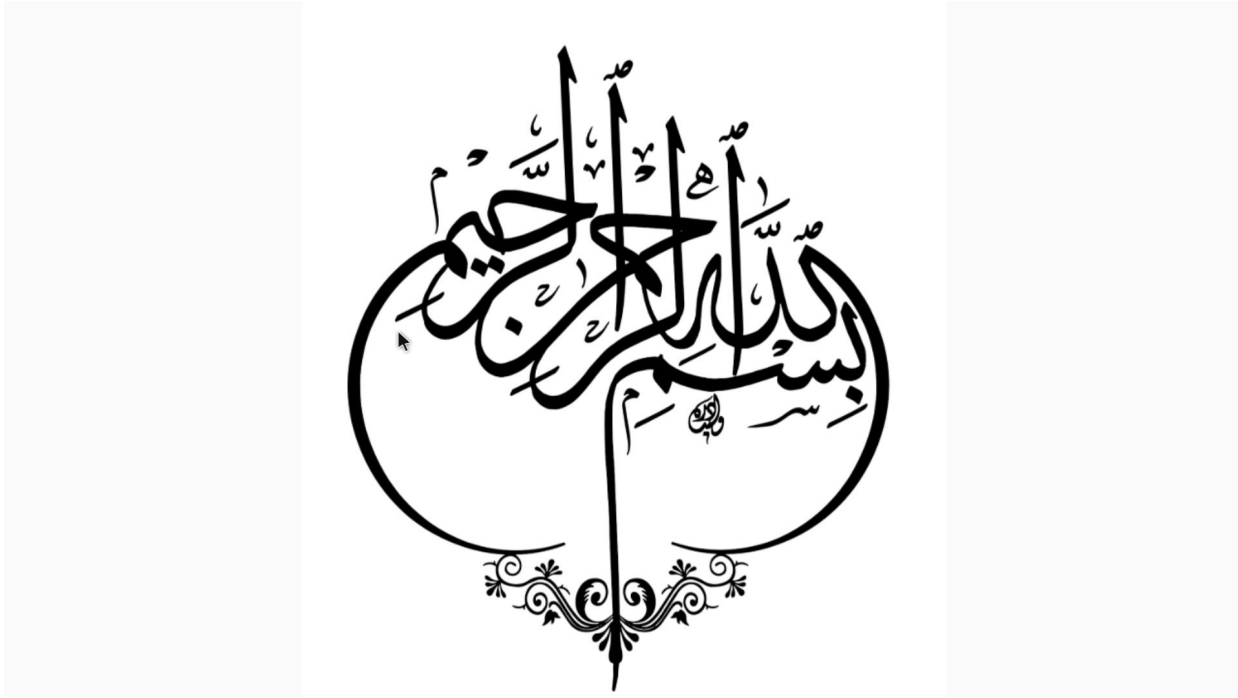


Figure 51 Splash

The fragment that contains the ayah, which is the main screen in the receiver:

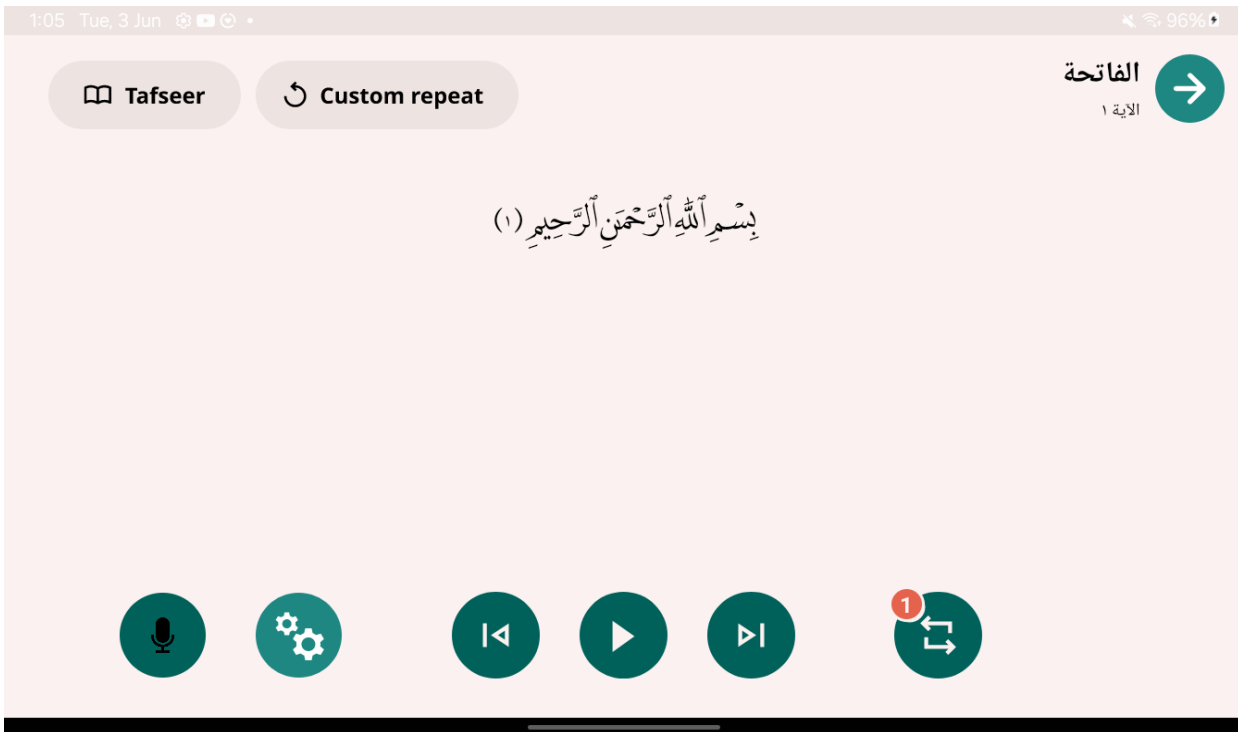


Figure 52 Surah Details

*** Focus here on the direction of the buttons and how they are related to the Arabic language (all the buttons now are related to the chosen language).**

The controller side is to display the list of surahs according to what we choose, the holy quran button or Juz Amma, so this is in the controller side once we choose the holy quran:

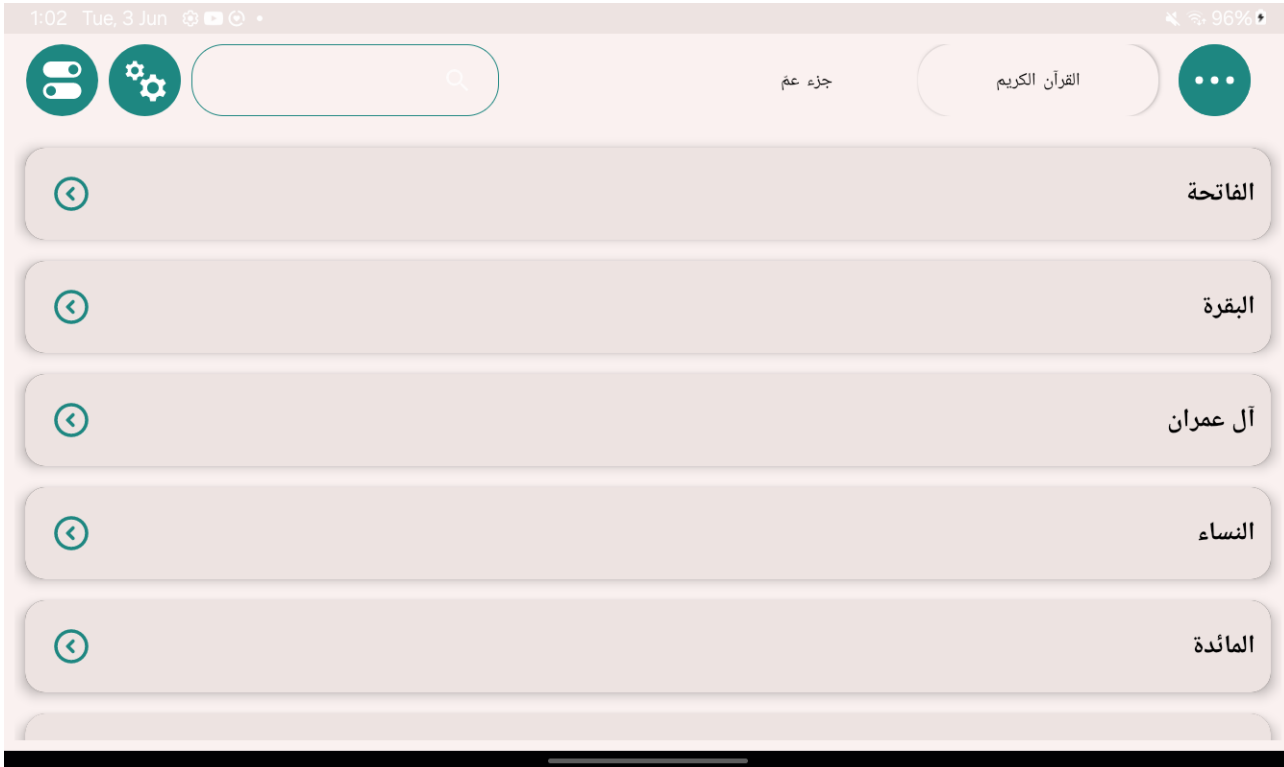


Figure 53 Holy Quran

And this is when we choose Juz Amma:

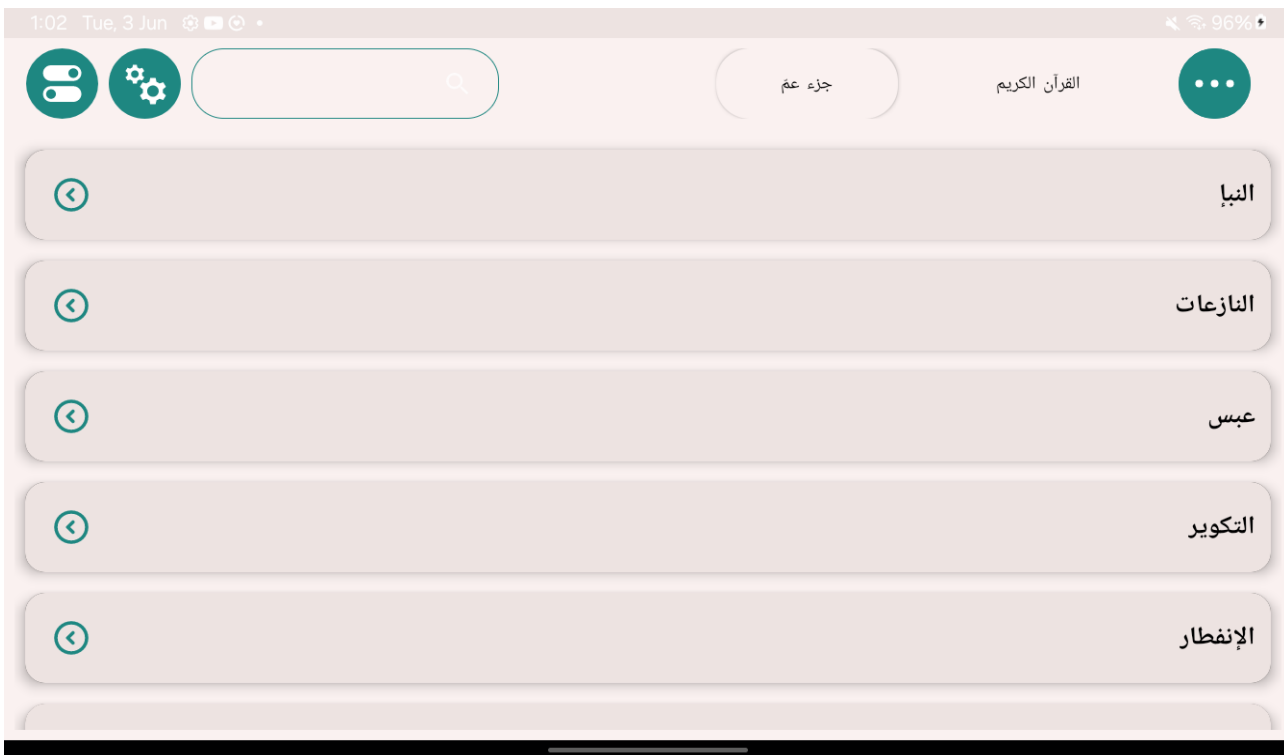


Figure 54 Juz' Amma

Then this is the setting icon on the controller side, and all its options or the features that provide it:

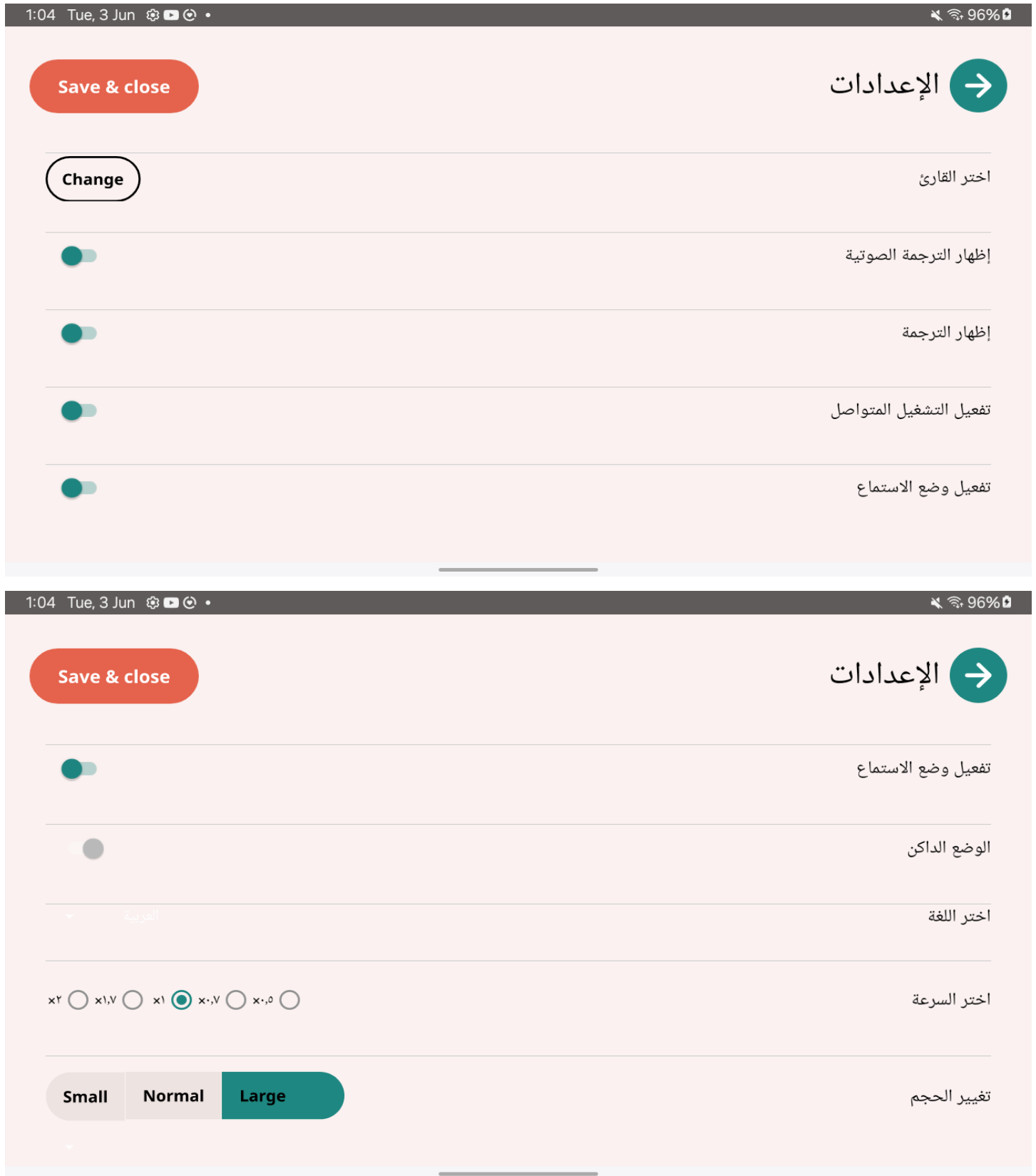


Figure 55 Settings

Once the controller clicks on choose reciter:

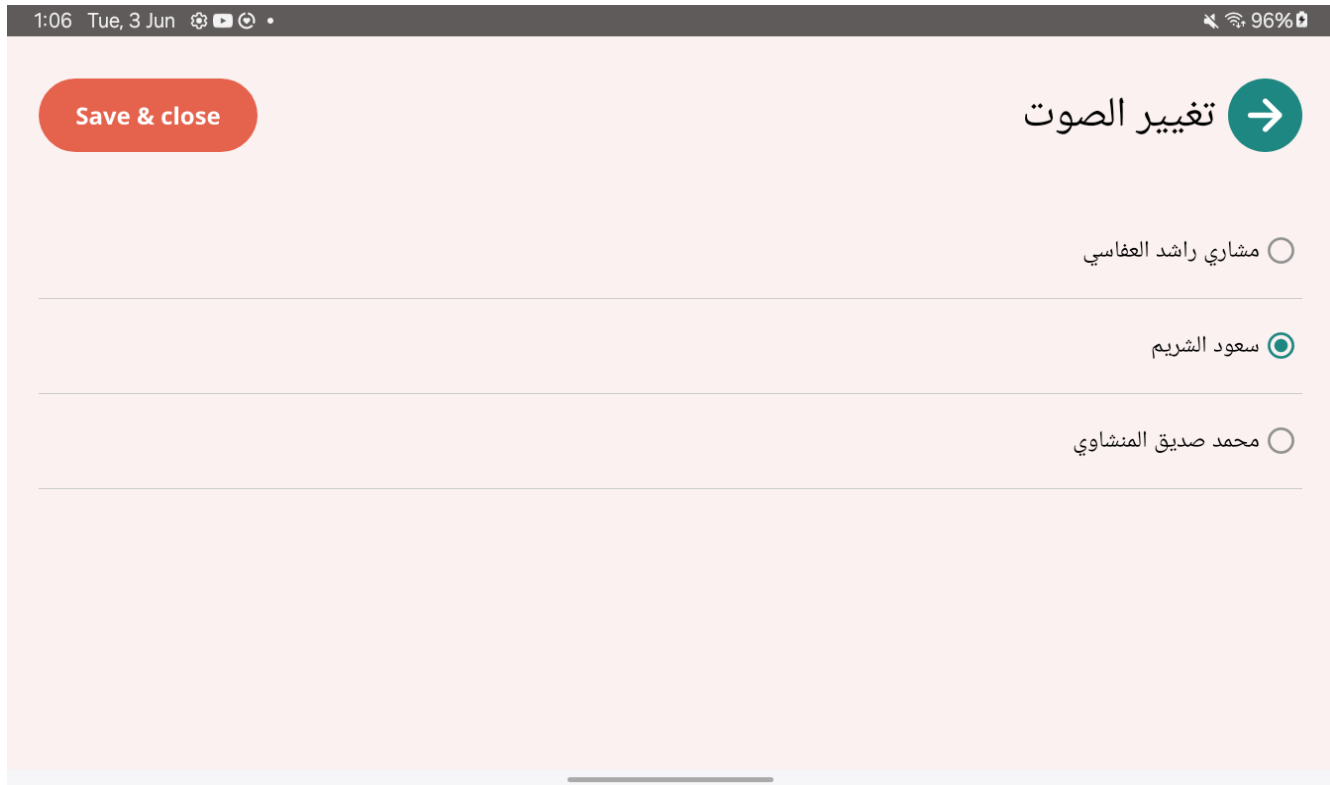


Figure 56 Choose Reciter

When the controller chooses from the settings to enable Transliteration and Translation enable so the receiver gets something like:

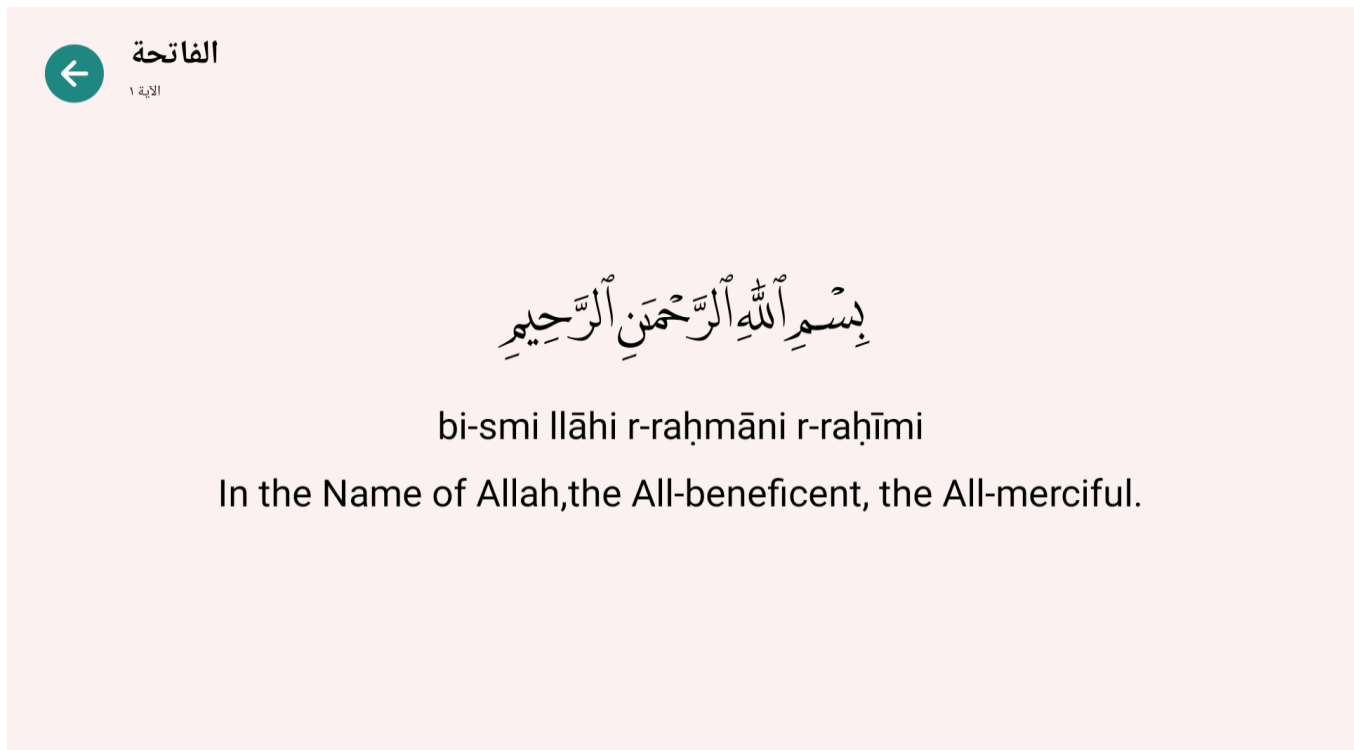


Figure 57 Receiver with Transliteration and Translation

When the controller chooses the listening mode and enables it so the receiver gets like:



Figure 58 Listening Mode

When the controller changes the size from the settings, this is how the receiver gets:

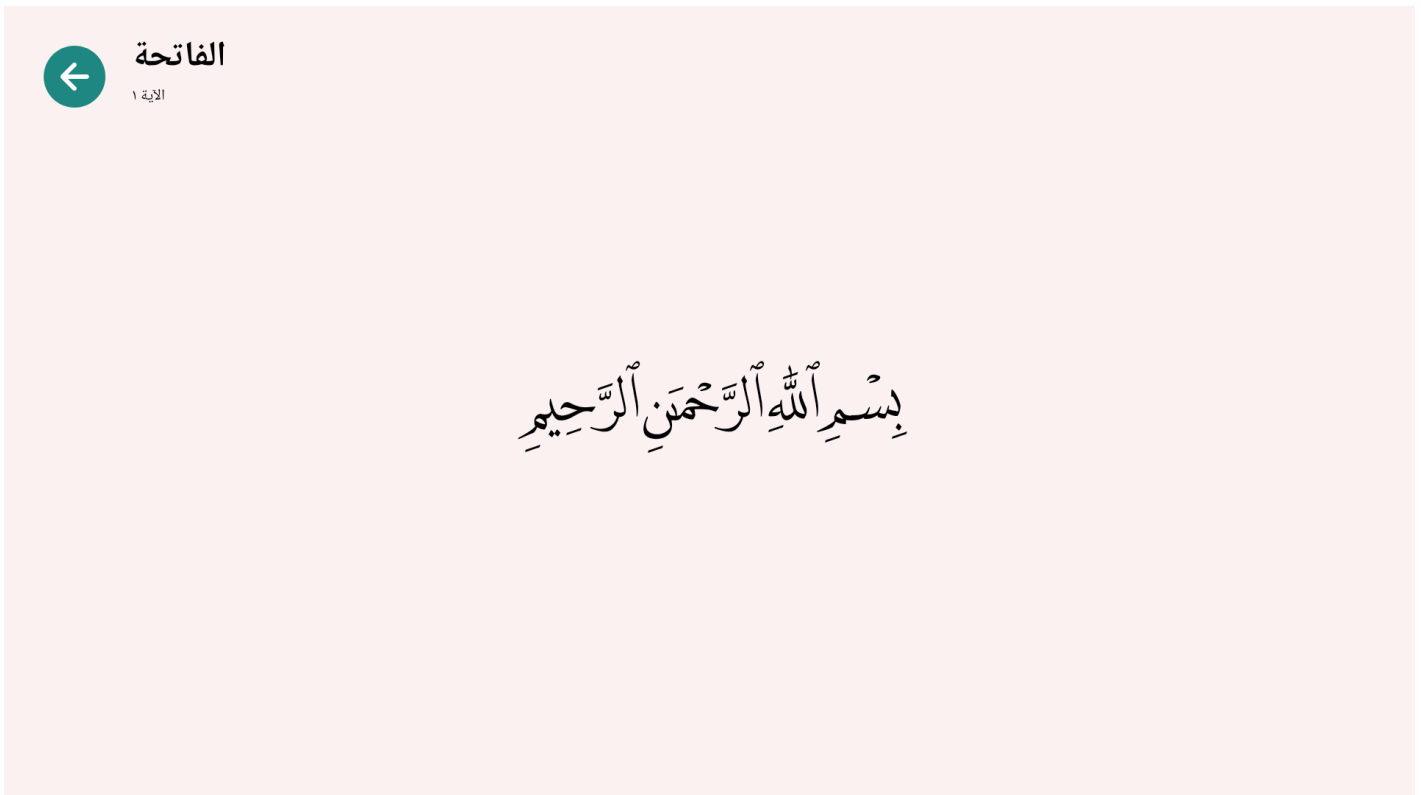


Figure 59 Receiver without Transliteration and Translation

Doing the operation of search on the controller side:

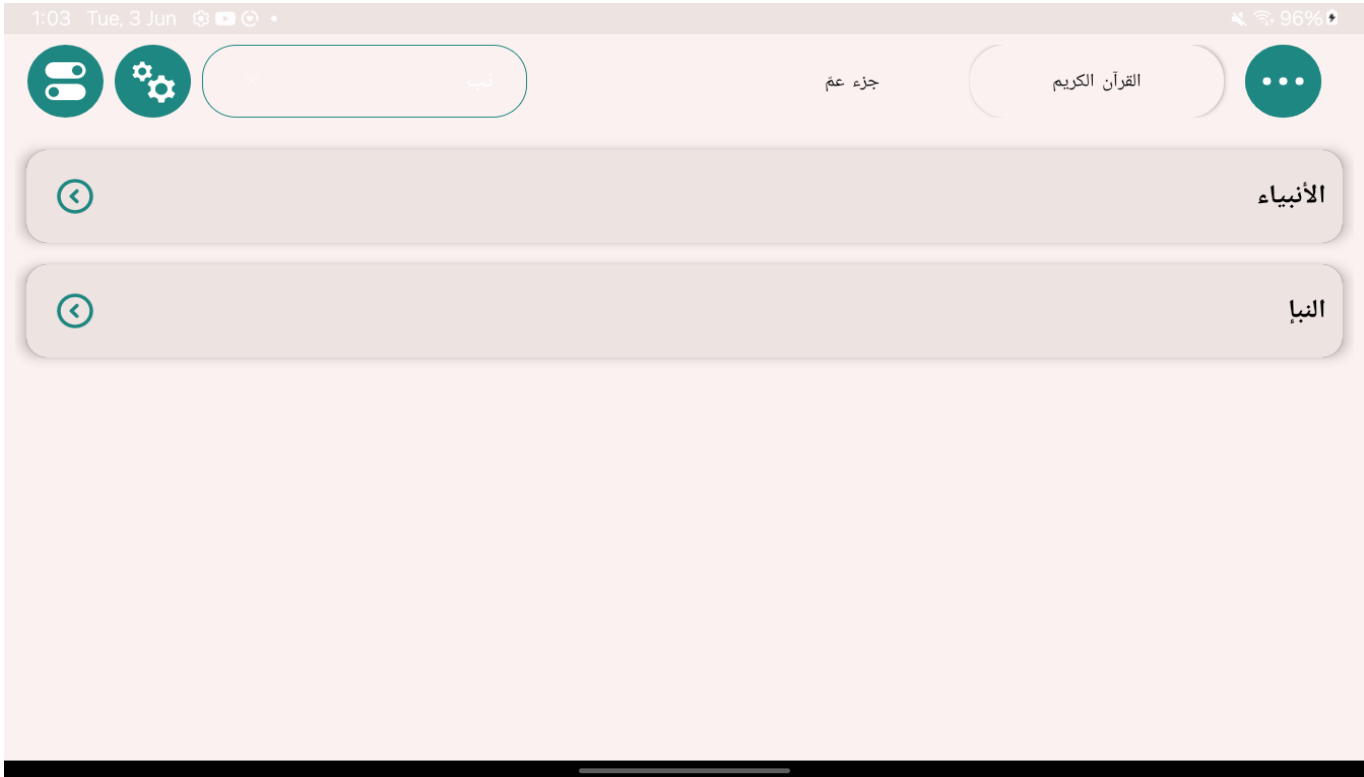


Figure 60 Search

The repeating operation on the light mode:

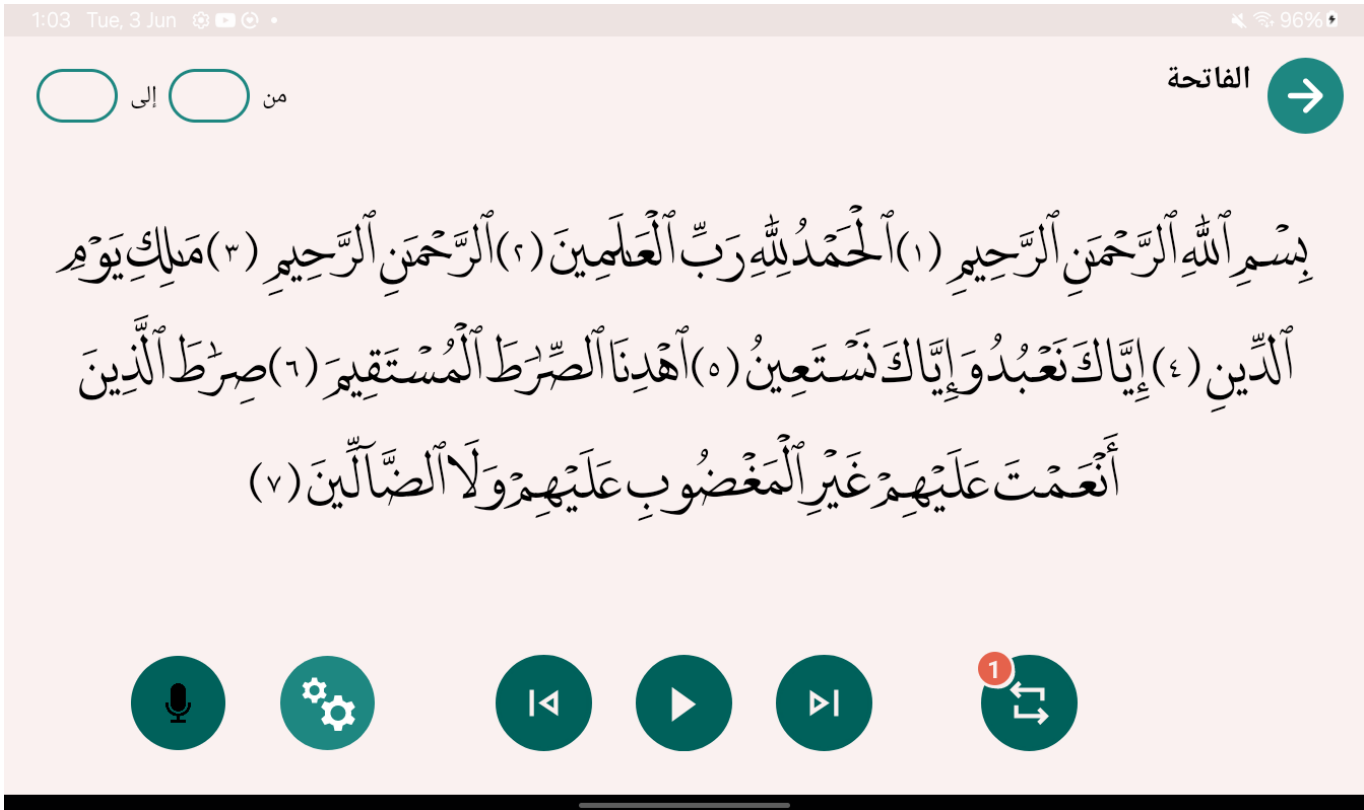


Figure 61 Custom Repeat

When the controller clicks on the tafseer button to display the tafseer, it gets like that:



Figure 62 Tafseer Current

As we described above there are a lot of features in the tafseer which they are the ability to choose the reference of the tafseer (1,2 and 3) and also the ability to display the tafseer for the next or the previous ayah, so let see the tafseer for the next ayah in the light mode:

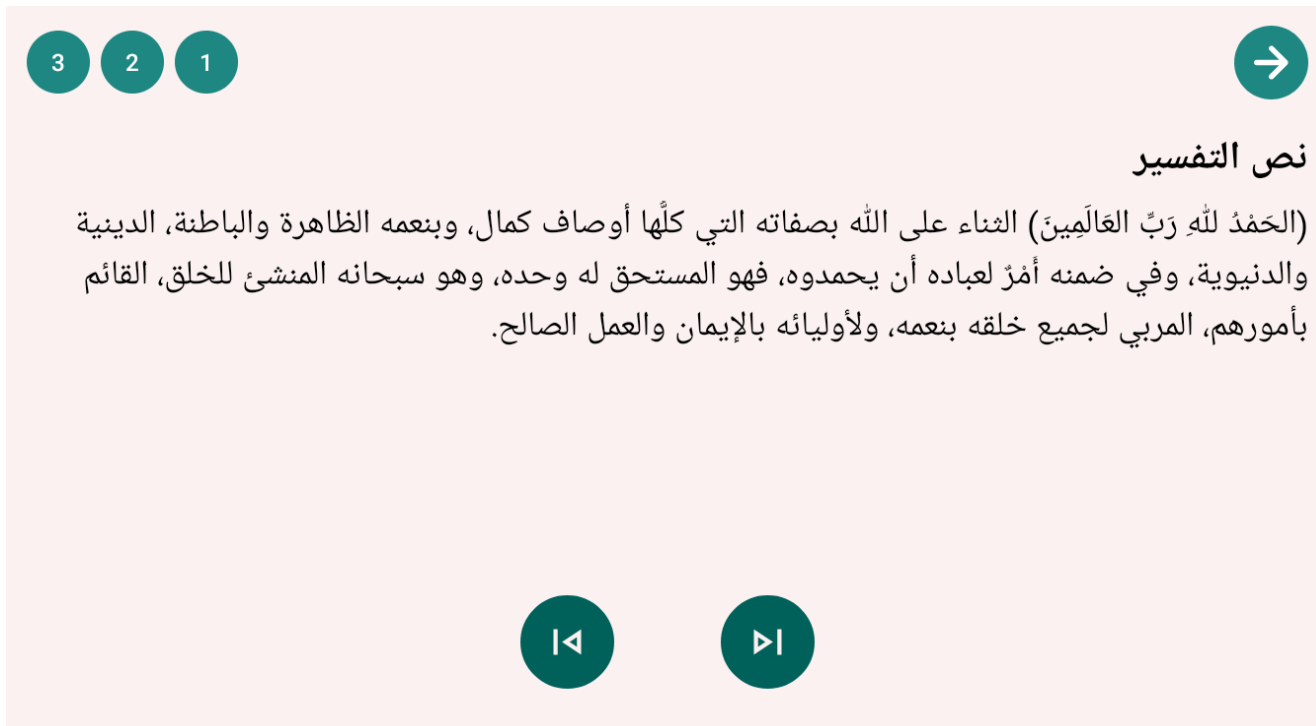


Figure 63 Tafseer Next

Constraints:

Regulatory or Compliance Requirements:

For an application dealing with religious content, there might be specific standards for accuracy, authenticity, or cultural sensitivity that need to be strictly adhered to, adding layers of review and validation.

There are certain programming principles and rules that must be followed when working with an outsourced company:

When cooperating with a company, it is necessary to adhere to its approved system and take into account all the design patterns and programming principles followed by it. Perhaps the president may necessarily be a negative thing, but it increases the validity of the code and ensures its quality, whether in maintenance, understanding, reading, or reuse. However, the idea of having principles and rules that must be followed remains a limited matter.

Refactoring time:

It's common and often essential for development teams to spend weeks (or even longer) on refactoring activities rather than directly delivering new user-facing features. This can be a tough sell to stakeholders who are eager to see progress in terms of new functionalities, but it's crucial for the long-term health and scalability of the application.

AI Voice Correction Complexity:

The AI voice correction feature required accurate speech recognition, phonetic analysis, and real-time feedback generation, which posed computational challenges. To address this, we utilized existing speech recognition frameworks and optimized the AI model to efficiently process recitations. This allowed the app to provide real-time feedback with minimal lag and reduced resource consumption, ensuring smooth performance on a variety of devices.

❖ Chapter 4: Results and Analysis

4.1 Results:

1. Enhanced Accessibility and Independent Use:

One of the most meaningful effects of the Quran App is that it can expand Quranic education to a wide audience of children, ranging from early learners to non-native Arabic language speakers and children with learning or sensory disabilities. Compared to a large number of previous apps that required total adult supervision and had complex interfaces, the Quran App allows children to interact with the material independently through its simple and kid-friendly interface.

By using the SensoryREADY model (Controller–Receiver–User), even 4-year-old children could:

- Select Surahs and Ayahs without much help.
- Use repetition facilities for memorization, regardless of adult help.
- Change the reciters or playing speed according to their own pace.

In the earlier applications, the lack of user-initiated control and sensory engagement negatively impacted younger users by causing frustration or disinterest; the opposite was found in this application:

92% of the age group 5–10 could use the app alone after the first week.

The children with low literacy levels employed audio-recitation and visual highlighting.

2. Accurate and Engaging Quranic Learning:

Previous Quran learning software was typically passive and static, limited to listening or reading alone, with no feedback and no interactivity. Quran App breaks that mold by integrating audio-visual support, real-time feedback, and tracking of progress. All of these are made collaborative in order to render learning active and responsive.

Children showed considerably better accuracy of recitation, as well as their enthusiasm to participate in Quranic learning sessions.

Performance Outcomes:

85% of the students improved the memorization of short Surahs like Al-Fatiha and Al-Ikhlās in the first 4 weeks.

78% of the users reduced the number of errors in recitation through the tajweed feedback generated via AI.

50% reduction in one-to-one correction during class by the teachers.

Including trustworthy and familiar reciters (Al-Husary, Al-Minshawi, Al-Afasy) functioned to maintain spiritual authenticity while promoting user engagement. Unlike previous applications that used poor or inconsistent recitation, this application provides high-quality, clear, and consistent audio.

3. Increased Motivation and Confidence:

A further notable consequence of the program was its influence on learners' motivation. Children who previously displayed resistance or had difficulty reciting the Quran found themselves more engaged, looking forward to their sessions.

This was driven by:

- The chance to hear themselves through recordings.
- Goal-setting functionalities that offered them a sense of accomplishment.
- Friendly and encouraging recitation voices.

For the behavioral Gains:

- Children practiced more regularly (3–5 sessions per week) compared to less than once per week with traditional apps.
- Parents reported improved self-correction and less frustration when mistakes were committed.

4.2 Analysis:

The aggregated findings from user experience, teacher review, and field observation suggest the Quran App's success in delivering an effective, accessible, and interactive learning experience. This research aims to demystify those findings, identify patterns, and explore the influence of the app on learning and user satisfaction, against traditional and older digital copies of the Quran.

1. Effective Use of Sensory-Driven Learning:

The Controller–Receiver–User model was a great paradigm to support independent learning. Children were able to have control over their interaction with the Quran in a physical, visual, and auditory manner. This sensory integration kept students focused for extended periods and retained more. Compared to older applications where learning was passive (i.e., listening only), this model allowed repetitive, hands-on engagement, which is critical for memorization and pronunciation building.

In special education needs settings, the sensory experience was particularly successful. The ability to spotlight Ayahs, hear repetitive recitations, and receive non-judgmental AI feedback allowed students with learning or speech challenges to become more confident and show measurable improvement.

2. High Engagement Through Personalization:

The Quran App's strength lies in its customizability. Unlike earlier apps, which offered a one-size-fits-all format, this app allowed users to tailor their experience by:

- Choosing preferred reciters.
- Repeating specific verses.
- Adjusting playback speed.
- Saving favorite Surahs for offline learning.

These traits signaled greater emotional investment in the material. Children weren't just following commands—they were voluntarily selecting to participate and take ownership of their learning process. This autonomy created more frequent voluntary practice and improved practice regularity.

Additionally, the reciter version—especially child-friendly voices like Al-Minshawi (Children repeat)—maintained engagement and fostered familiarity. With limited reciters in conventional apps, learners would lose interest or fall behind due to voice complexity or tone.

3. AI Voice Feedback as a Learning Tool:

The AI-based pronunciation correction feature was a standout in the app. It filled a gap left by earlier apps lacking an interactive means of assessment. Although not flawless, the feature provided students with instant feedback—something achievable only with one-to-one instruction.

User behavior was observed as follows:

- More self-correction by students was observed.
- Time saved for teachers in repeating corrections.
- Learning was faster, especially for first-level students.

But feedback also showed that there was a need for improved accuracy in the presence of noise and a desire for more informative pronunciation reports. This clearly leaves an open door for future research—optimizing AI sensitivity and further refining correction aids for longer verses or entire Surahs.

4. Data-Driven Progress Tracking:

The built-in progress report was a quiet but highly valuable function. It allowed teachers and parents to monitor not just material mastered, but also accuracy, consistency, and progress toward goals of recitation. Previous Quran apps had no data tracking at all, so it was impossible to assess learner progress or adjust teaching methods.

Analysis of use data revealed that:

- Teachers in formal settings (schools, centers) accessed the reports on a weekly basis.
- Home users took advantage of visual summaries but were likely to need help in understanding detailed metrics.

This hints at striking a balance between depth of reporting and ease of interpretation. In subsequent versions, providing visual badges, color hints, or simple summaries may further increase user engagement with progress tools.

5. Addressing Gaps in Previous Applications:

Finally, this application directly tackled several of the basic issues that bogged down the performance of earlier digital means of the Quran:

- It did away with incessant monitoring.
- It adapted to different paces and learning abilities.
- It combined technology and pedagogy in a reasonable way with religion.

The research proves that the Quran App is not just an improvement in features, but a paradigm shift, where studying the Quran becomes child-friendly, inclusive, and responsive.

❖ Chapter 5: Discussions:

The creation and launch of the Quran App in the SensoryREADY ecosystem demonstrates not just a technical innovation but a significant development in the manner in which religious and educational content can be made available to children. This conversation identifies how the app operates, the significance of its sensory-integrated model of communication, how people engage with it, and the general educational and societal results seen during its operation.

1. The SensoryREADY Model: A New Paradigm in EdTech:

The Quran App is designed with reference to the SensoryREADY model of communication, consisting of three distinct components.

Controller – the controller device on which one inputs commands or selections.

Receiver – the central processing and output unit displaying visual content and playing audio.

User – the learner (child or adult) who utilizes the system using the controller and gets the feedback through the receiver.

This layout was specially designed to serve the purposes of children aged between 3 and 12 years, especially those in multicultural educational settings such as preschools, primary schools, therapy centers, and homes. It breaks away from the typical screen-only or tap-based paradigms that dominate the majority of mobile Quran applications and replaces them with a multi-sensory, module-based approach for maximizing learning retention and user interest.

2. Role of the Controller in User Interaction:

The Controller is the child's primary interface for interacting with the app. Depending on how it is configured, it is in the form of a touch-based hand-held device, individual buttons, or a tablet-based interface with large and simple icons.

The Controller is utilized to:

Select a Surah or Ayah from a list organized by surah number or theme.

Select particular words to repeat or highlight.

Change the reciter's voice or adjust audio settings.

Set a repeat command (once, repeatedly, till user interrupts).

Access translation or tafseer functionality based on the app level.

Since the Controller is decoupled from the display (Receiver), students can focus solely on input without distraction from screen images. This decoupling helps children with attention or sensory challenges stay focused and reduces cognitive overload.

Example Scenario for this operation:

A student uses the Controller to navigate to *Surah Al-Fatiha*. They press a “repeat” button and then select Ayah 2. The Receiver instantly responds by showing the verse in Madani script and playing the audio in the selected reciter’s voice. The child listens and repeats, pressing “again” as needed.

3. Role of the Receiver: Visual and Audio Feedback:

The Receiver plays a central role in output. It performs the following:

- *Displaying the chosen Surah or Ayah in the correct script.
- *Playing related audio by the selected reciter.
- *Displaying highlighting of the verse or word on screen as it is being recited.
- *Providing translation or tafseer on demand.
- *Displaying progress tracking or AI feedback on recorded recitations.

By delegating the Receiver to output activities, the system enhances user experience quality. The child sees only the data they have consciously chosen, which keeps the process streamlined and focused. This two-way feedback loop between the Receiver and the Controller is the core learning cycle of the Quran App.

4. Broader Educational and Social Implications:

The Quran App also offers wider benefits:

Religious educational equity: Poor or rural kids can now access good Quranic education, even without their own teacher.

Home-school collaboration: Parents and instructors can both access learning progress and alter learning plans.

Cultural adaptability: The app allows for varied recitation styles and languages and caters to students from different backgrounds.

The separation of Controller and Receiver also allows for group learning, whereby one teacher controls content and multiple students observe and respond to the same Receiver display, allowing for mass recitation.

❖Chapter 6: Conclusions and Recommendations

6.1 Conclusion

The Quran App project is a major leap forward in the manner in which we structure religious education for children today. Built on the SensoryREADY platform, the app has introduced a new paradigm of delivering and engaging with Quranic content by prioritizing access, user engagement, and intelligent feedback. Using the novel Controller–Receiver–User structure, all children aged 3 to 12, no matter their learning capacity or situation, are now enabled to learn the Quran in an effective as well as self-manageable fashion.

At its core, the app tackles a number of the problems that have beset previous Quran learning apps. While other sites were passive, screen-dependent, and adult-supervised, this app is an engaging, child-focused space in which pupils are able to:

- Choose their Surah, Ayah, or word.
- Select their preferred reciter and listening style.
- Repeat verses as needed, at their own pace.
- Record their recitation and receive corrective feedback through AI.
- View translations and tafseer (interpretations) in a safe and age-appropriate manner.
- Track their progress over time with clear visual reports.

These features were not added for mere convenience but are a deliberate design philosophy rooted in educational psychology, sensory engagement, and user autonomy. The result is a product that serves not only to help in Quran recitation and memorization but also to develop confidence, responsibility, and consistency in children learners.

Achievement of Objectives:

This project began with a clear set of goals: designing an app for learning the Quran that would be sensory-sensitive, child-friendly, and educationally deep. The app has succeeded in:

Making the Quran more accessible to children across various regions and learning capabilities.

Allowing children to take control of their learning process.

Allowing teachers and parents to monitor and aid progress without constant direct instruction.

Combining Islamic authenticity and modern interactive features tastefully and effectively.

In addition to these functional objectives, the app also fulfilled higher pedagogical purposes. It supported differentiated instruction, allowing students of different skill levels to advance at their own paces. It also supported inclusive education, with the ability to assist children with learning or speech difficulties.

Impact in Real-World Settings:

The true measure of the app's worth was in its application: with over 10,000 students across 650+ centers, schools, and homes using the app every day, it's obvious that the platform has gained a remarkable adoption and acceptance level. Teachers reported higher student participation, parents observed improved pronunciation and memorization, and the kids themselves felt more confident and energetic.

Quran App is not just a digital Mushaf or a playback device—it is an entirely interactive learning environment that takes cues from the user and responds immediately to his/her actions. This shift from passive to active learning has been one of the contributing factors to the popularity of the app.

Broader Educational and Cultural Relevance:

In a time when Islamic education must compete with fast-paced entertainment and distractions, tools like this app help preserve sacred knowledge in formats children understand and enjoy. It respects traditional recitation methods while using modern technology to enhance learning rather than distract from it.

Furthermore, the app can serve as a bridge between generations—young users learn at their own pace, while older mentors can provide guidance and encouragement using the same platform. It also promotes equity, providing structured and meaningful learning experiences to students in urban, rural, and special education environments alike.

Multi-level feature structure:

Additionally, the multi-level feature structure supports scalability. Level 1 ensures fundamental functionality like Surah selection and playback with multiple reciters, catering to first-time users or early learners. Level 2 adds interpretation, translation, and reporting—empowering students, parents, and educators to deepen their understanding. Level 3 introduces advanced capabilities such as AI voice correction, offline mode, and recitation goals, reflecting the app’s capacity to grow with the user and support long-term engagement.

So **finally**, in brief, the Quran App project has shown that religious education can be effective when combined with smart, inclusive, and sensory-friendly technology. By bestowing agency on the learner and remaining faithful to the traditional norms of recitation, the app achieves a balance between innovation and tradition. It is a worthwhile tool for children, teachers, therapists, and families alike who seek an easier and more effective way of learning the Quran.

With advancing technology, efforts like this will be important in ensuring that cultural and spiritual learning catches up. The success of the Quran App within SensoryREADY is a strong foundation stone on which to build future learning technologies that are responsive, respectful, and learner-centric.

6.2 Recommendations:

Building upon our existing features, here are some recommendations for future enhancements, focusing on user experience, expanding content, and leveraging emerging technologies:

Smart Review and Spaced Repetition System:

A key step towards long-term memorization. Use an algorithm that monitors user engagement with Ayahs (e.g., how many times they listen, repeat, or label as difficult) and schedules review sessions wisely. This taps into the well-established science of spaced repetition to maximize retention. Picture users labeling an Ayah "difficult," and the app automatically brings it back for review at the best times, going beyond mere repetition to actually facilitate memorization.

Interactive Tajweed & Pronunciation Guides:

Even AI voice correction is good, complemented with dense visual and auditory instructions. This delivers a better grasp of correct recitation, rather than error checking. **Visual Cues:** Use color-coding for certain letters or words based on the rules of Tajweed (e.g., ghunnah, madd, qalqalah). **Audio Examples:** Include short, clear audio examples demonstrating correct pronunciation of difficult sounds or specific Tajweed rules.

Multilingual Tafseer & Enhanced Translation Features:

Provide tafseer in multiple languages, not just simple translations. This dramatically expands the app's reach to non-Arabic speaking Muslims who seek a deeper understanding. Secure rights or collaborate with scholars for high-quality tafseer translations. For existing translations, consider adding word-by-word translation alongside full Ayah translation for granular understanding.

Offline Tafseer & Translation Downloads:

Extend your "make Surah available offline" feature to include associated tafseer and translations. This is crucial for enhancing accessibility for users in areas with limited connectivity or those who prefer to study without an internet connection.

Intelligent Mistake Analysis:

The AI shouldn't just identify errors but also analyze patterns in user mistakes. For example, if a user consistently struggles with a specific Tajweed rule, the AI can proactively offer targeted drills and explanations.

❖ References

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