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Face Tracker Audio for Saronen Music Using Augmented Reality on Social Media

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ABSTRACT Saronen music is a traditional Madurese music commonly played at cultural and traditional events. Saronen music typically combines traditional instruments such as gamelan, trumpet, kenong, korca, large drums, and small drums, producing a unique sound characteristic of Madura. This research aims to preserve Saronen music through the development of an interactive filter on Instagram and Facebook using augmented reality. The face tracker feature allows users to interact with each instrument using head movements or facial expressions. The development method, MDLC, encompasses concept, design, material collection, design, testing, and distribution. Functional research results indicate the filter can run well on Android and iOS operating systems. Testing on 31 social media users yielded positive feedback from the majority, stating that the filter has clear instructions, a low error rate, is easy to use, satisfying, and attractive. More specifically, the user testing results from the questionnaire showed very positive figures across all five aspects: Instruction Clarity (87.1% stated 'very clear' or 'clear'), Error Rate (83.9% stated 'very good' or 'good'), Ease of Use (87.1% stated 'very easy' or 'easy'), Satisfaction (90.4% stated 'very satisfied' or 'satisfied'), and Attractiveness (96.7% stated 'very attractive' or 'attractive'). This innovation is expected to be a means of preserving Saronen music for the younger generation through social media. This innovation is expected to be a means of preserving Saronen music for the younger generation through social media.

KEYWORDS: Augmented Reality; Face Tracker Audio; Saronen; Social Media Fiters

I.INTRODUCTION

Traditional music is important as local wisdom and space for artistic expression. In addition to composition, idiom, and instrumentation, traditional music contains historical, philosophical, and social values that characterize community life. One of traditional music that represents the richness of regional culture is Saronen music from Sumenep Regency. Sumenep is the easternmost Regency in Madura Island, East Java Province. Saronen music has uniqueness that combines nine traditional instruments, such as the saronen, large gong, kempul, kenong, korca, and gendang which can produce a distinctive dynamic rhythm. [1]

The challenges of digital technology development gives serious impact to traditional arts. Modern music dominates and it is widely distributed for various digital platforms in various forms such as videos, reels, stories on Instagram and Facebook. They are the reason why the younger generation is less interested in traditional music. [2] So, this has impact on Saronen music which can eliminate an important part of the nation's cultural heritage. In this situation, the strategic tool for preserving Saronen music is social media with creative and participatory approaches that adapts to the digital habits of the millennial and Gen-Z generations. [3]

Innovative and adaptive approaches in the development of digital technology are needed to implement Saronen music. They can be done by developing Augmented Reality (AR) for interactive filters based on face tracker on social media platforms, especially Instagram and Facebook. [4] The features designed in that filter can respond to user interactions using a smartphone camera, such as head or face movements that can result in playing, stopping, or selecting instruments in Saronen's musical compositions. [5] Users can also record their own video interactions with Saronen music with creative and interesting. Then the video results can be shared to other users, so that a participatory space in preserving culture using social media can be created [6]. By using this approach, it is hoped that we can reintroduce familiar digital media to the younger generation.

The use of Augmented Reality (AR) through filter features on social media platforms like Instagram and Facebook is an effective strategy in various domains, from commercial promotion to cultural heritage preservation. Previous research by [2] focused on developing AR filters for museums and cartographic heritage exhibitions, where interaction is dominated by the visual modality and uses Target Tracker or Plane Tracker approaches to display virtual objects on physical markers or flat surfaces. Similarly, research by [5] applies AR to the context of branding and consumer experience, by designing filters that specifically rely on Image Tracking mechanisms on product packaging as markers. Both studies demonstrate that AR research applied to social media tends to be oriented towards tracking external objects and static visual outputs for promotional or informational purposes.

This research gap lies in the lack of exploration of dynamic interactions based on user facial input that generate real-time audio output. Saronen music is in dire need of this audio facial tracking feature because its musical characteristics rely heavily on the instrument's performance and sound. Without responsive audio interaction, digital preservation of traditional musical instruments would be merely a passive visual representation that would be less appealing to younger generations. With a facial tracker, users can actively "play" the instrument, providing an immersive experience and a deeper understanding of the structure of Saronen music in a personal way.

The main contribution of this research is the shift in focus from tracking external markers to facial interaction as audio control input. By utilizing a Face Tracker, this study innovatively transforms user expressions or gestures into interactive instructions for operating a Saronen instrument. This approach offers an adaptive method for sound-based cultural preservation and introduces a participatory AR filter design that has not been explicitly addressed in previous studies that have focused more on visual aspects and static objects.

II.METHOD

This research uses the Multimedia Development Life Cycle (MDLC) method, which has six steps, namely concept, design, material collecting, assembly, testing, and distribution [7]. The use of MDLC in the development of this AR filter provides advantages in terms of flexibility in integrating audio and visual assets compared to other traditional software development methods. The stages of the MDLC framework applied in this study are illustrated in detail in Figure 1.

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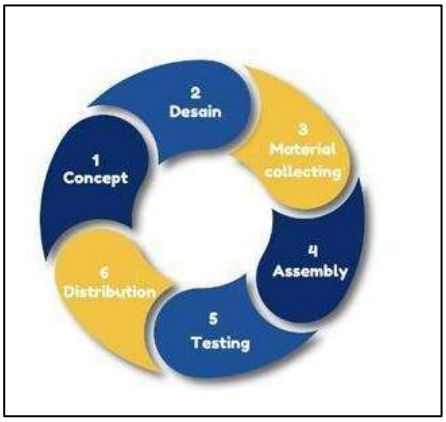


FIGURE 1. MDLC Method

The application of that method in this research has some steps:

A. Concept

Social media such as Instagram and Facebook give opportunities for preserving traditional arts, including Saronen music from Madura. Saronen music is a cultural heritage played with nine different instruments: the saronen, large gong, kempul, large kenong, medium kenung, small kenong, korca, large drum, and small drum. The existence of this music has high historical and social value for the Madurese people [3].

B. Design

The design stage focuses on designing head movement interactions as control instructions for playing the Saronen instrument. In contrast to previous studies by [2] and [5], which focused more on tracking external objects (Target Tracker), this study innovatively uses a Face Tracker as the main input to produce dynamic audio output.

The face tracker filter design uses some head movement interactions as instructions to play or select saronen instruments.[8] The head movement instruction design is as follows:

- Head facing left: turning on all the saronen instruments
- Head facing right: turning on the korca
- Head tilted to the left: turning on the kenong
- Head titled to the right: turning on the trumpet
- Smiling: turning on the drum
- Head facing up: turning on the gong

This is a flowchart of how to use the Saronen music audio face tracker filter:

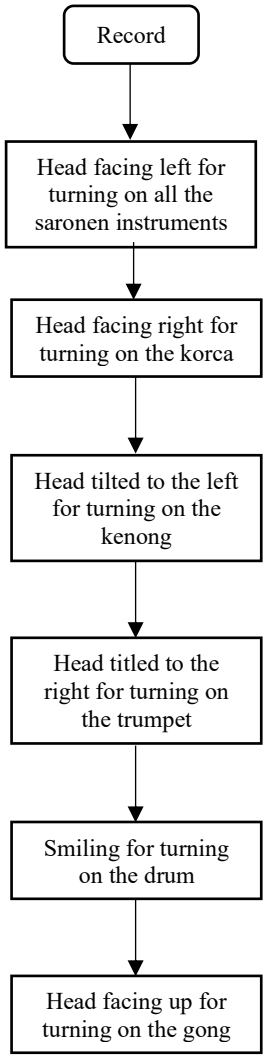


FIGURE 2. Flowchart of How to Use the Saronen Music Filter

C. Material Collecting

The collection of materials consists live recordings of Saronen music from original performances. The recording process uses audio mixer that capable to record multitrack, so that each saronen instrument can be recorded recorded separately and detail. [9]

D. Assembly

The filter was created using Spark AR v180. These features include a face tracker using a patch face finder, face select, and a face tracker that are linked to the feature of head rotation interaction.

E. Testing

System testing uses real camera simulation to ensure that the filter results can be used as planned.

F. Distribution

In the distribution process, we publish the filter on social media platforms like Instagram and Facebook. We submitted our application on Meta Spark Hub to be used on Instagram and Facebook.

III.RESULT AND DISCUSSION

A. Material Collecting

In this step, the saronen instruments are recorded using multitrack to capture audio data for each instrument. This separation purposed to develop filters to synchronize audio with user movements. The parts of the saronen musical instruments that will be recorded include the trumpet, drum, kenong, and gong.

FIGURE 3. The Process of Recording Saronen Music

A visualization of the audio data collection process in the field is shown in Figure 3, which illustrates the device settings for optimal sound quality. Furthermore, a list of Saronen instruments successfully recorded and processed into filter assets is summarized in Table 1.

TABLE 1. Saronen Instruments

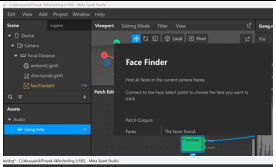
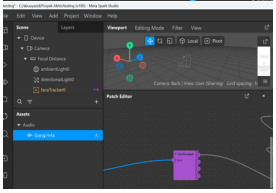
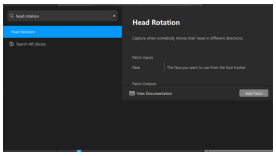
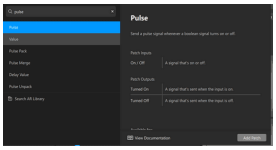
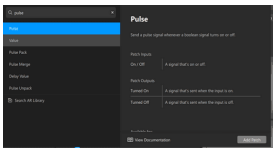
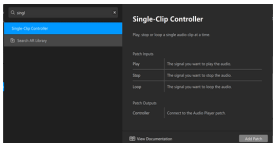
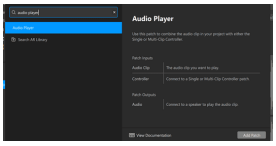
No	Saronen Instrument	
1		Trumpet
2		Drum
3		Kenong
4		Drum

The recording process was conducted live using a multitrack system to separate the audio from each instrument, as illustrated in Figure 3. This separation was intended to develop a filter that could precisely align the audio with the user's movements. The list of instruments successfully documented and integrated into this filter system is summarized in Table 1.

B. Assembly

To create a face tracker filter of Saronen music on Spark AR V180, we use patch face finder, face select, and face tracker features that are linked to the feature of head rotation interaction [10].

TABLE 2. Tools Used

Tools	Feature Image	Function
Face Finder		Select a face object
Face Tracker		Face tracker
Head Rotation		Head movement
Smiling		Smile interaction
Pulse		Patch to turn on/off
Single-clip controller		Controller patch
Audio Player		Audio player

The functions of each main patch used are: Face Finder to detect the presence of faces, Face Select to select the face to be processed, and Face Tracker to dynamically track the user's facial movements in real time. By integrating the features listed in Table 2, the system is able to transform head movements into precise audio control instructions for playing the Saronen instrument.

To insert audio into Spark AR, the audio format must be m4a. To start the instrument based on head and facial movements, we use a pulse patch (to send an on/off signal), a single-clip controller (to set the on/off signal), and an audio player (to link the audio) to connect the patch as in figure 4:

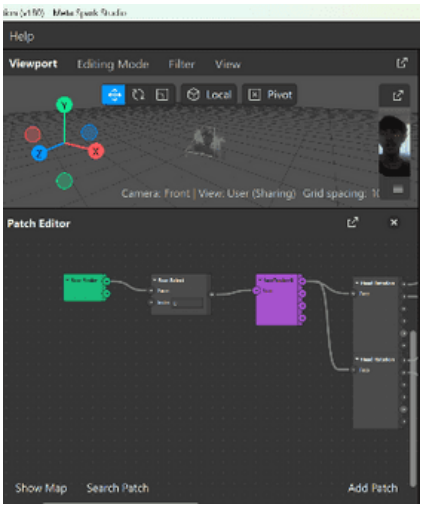


FIGURE 4. The Process of Linking the Face Tracker to the Head Rotation Interaction

The main technical components and features used in this development process, including the function of each patch, are detailed in Table 2. The technical implementation begins by connecting the Face Tracker to the head interaction, as shown in Figure 4.

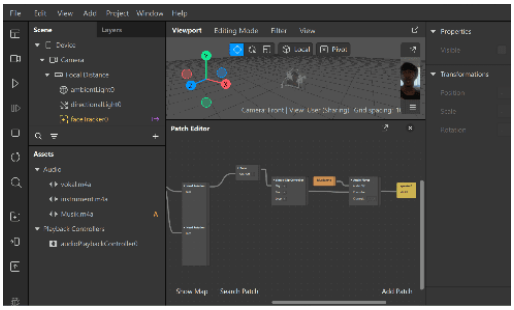


FIGURE 5. Turning On Audio

To control the sound dynamics, a specific signal control mechanism was developed. The logic for activating audio (turning on) when motion is detected is shown in Figure 5.

In the audio mute feature, we use left head rotation to turn on the music. And then we use right head rotation to automatically turn off the music as in figure 6 [7].

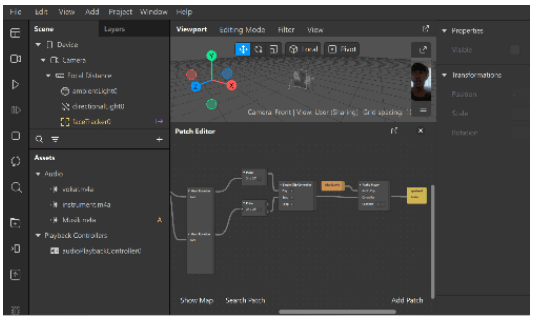


FIGURE 6. Turning Off Audio

To add an image, the image format is JPEG, JPG, PNG, or WebP. The image is imported into the assets in Spark AR. To ensure the image follows the movement of the face, we use the face tracker and plane features. Then we add a material on the plane and change the material of the shader type to flat shape. On the texture, we add the image that will be used. [11]

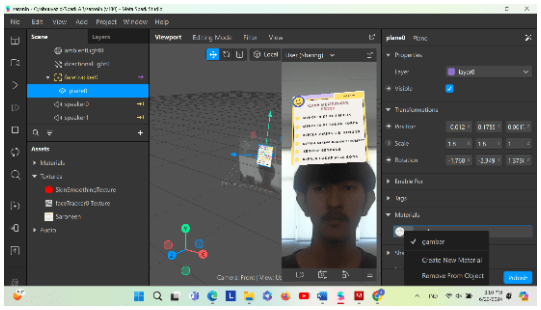


FIGURE 7. The Process of Making an Image Follow the Face

This face tracker filter has some criteria, as shown in Figure 8. This is done so that the filter can run well, it can be uploaded to promotional media, and it passes the review process by Instagram when submitting a filter [12][13].

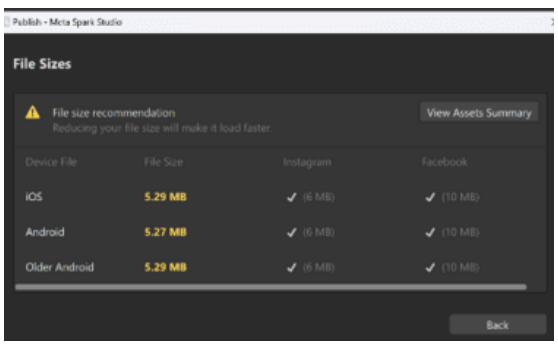


FIGURE 8. Filter Submission Criteria

If the filter criteria that will be created have been selected, then the filter is created using the Spark AR application .

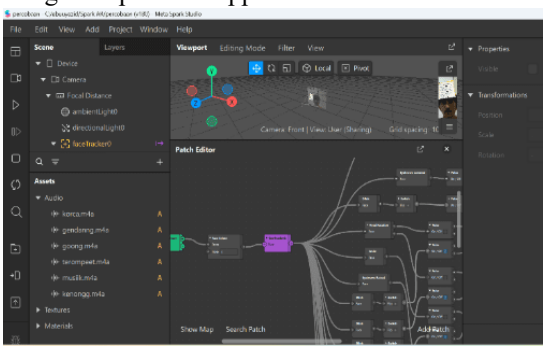


FIGURE 9. The Process of Creating a Filter in Spark AR

The audio material that we use in the Saronen music filter must be converted to the m4a format to match the specifications of Spark AR. The material specifications for Spark AR are as follows:

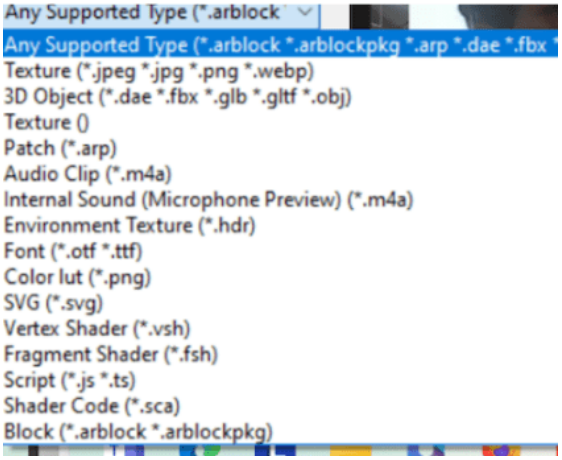


FIGURE 10. Some of the Format Specifications that Exist in Spark AR

When compared with research by [5], which uses Image Tracking for statistical objects, the use of Face Tracker here provides a more personal and dynamic interaction dimension because the user plays a direct role as the controller of the music rhythm through their own expressions.

C. Testing

1. Functional Testing

The filter will be tested live using the real-time camera simulation in the Spark AR application. This is done to know whether that filter is working properly under various operating conditions. This filter testing is done in 6 movements such as:

- Head facing left: turning on all the saronen instruments
- Head facing right: turning on the korca

- Head tilted to the left: turning on the kenong
- Head titled to the right: turning on the trumpet
- Smiling: turning on the drum
- Head facing up: turning on the gong

These are the results of a system test using real-time simulation Spark AR [14][15].

TABLE 3. Movement Test

No	Movement	Movement Example	Results
1	Head facing left		Succeed
2	Head facing right		Succeed
3	Head tilted to the left		Succeed
4	Head titled to the right		Succeed
5	Smiling		Succeed
6	Head facing up		Succeed

Functional testing of various types of movement tests used as audio control instructions in the AR Saronen filter. In the table, validation was carried out on six specific types of movements, namely looking left (Saronen), looking right (Korca), tilting left (Kenong), tilting right (Terumbuk), smiling (Kendang), and looking up (Gong), to ensure that each movement can trigger sound output accurately and responsively. In contrast to previous research by [2], which often faced obstacles in latency between movement and sound, the results in Table 3 show that the system is able to detect facial input in real-time with a high success rate.

After we have done the real-time simulation test successfully, next we do testing with different operating devices using Android and iOS operating devices.

FIGURE 11. Experiments on the Android Operating System

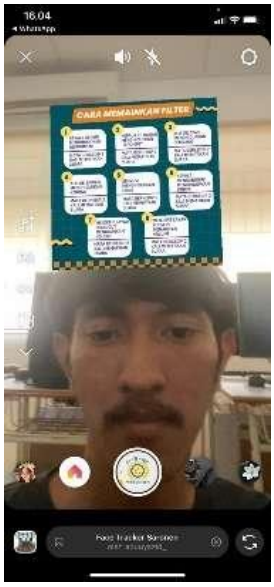


FIGURE 12. Experiments on the iOS Operating System

The test results on a device with the Android operating system are shown in Figure 11, while the filter performance when running on the iOS operating system is shown in Figure 12. Based on the visualization in both figures, it can be seen that the visual elements and audio responsiveness of the face tracker can run stably and consistently across both major mobile ecosystems. The success of stability proves that Saronen's audio asset optimization provides a uniform user experience for both Android and iOS users.

2. Public Testing

We tested the filter by distributing research questionbaires to respondents. There were 31 random respondents. All of them from Instagram and Facebook social media users who were given a questionnaire and they tried the Saronen music face tracker filter.

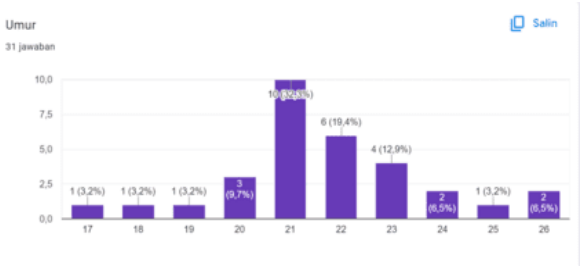


FIGURE 13. Respondent Age Data

From the respondent data, it was concluded that 3,2% were aged 17, 18, 19, and 25. And then 9,7% were aged 20 and 32,3% were aged 21. Also 19,4% were aged 22 and 12,9% were aged 23 and 6,5% were aged 24 and 26. It can be concluded that most of the respondents are mature.

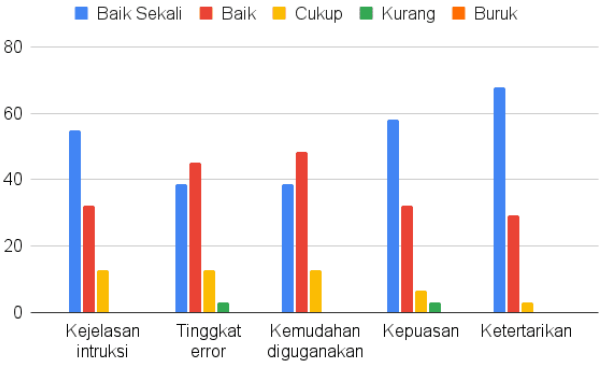


FIGURE 14. Questionnaire Results

Based on the questionnaire data, five aspects were asked: clarity of instructions, error rate, ease of use, satisfaction, and interest. The questionnaire results are as follows: for the clarity of instructions aspect, 54,8% of respondents answered “very clear”, 32,3% of respondents answered “clear”, and 12,9% of respondents answered “enough”. For error rate aspect, 38,7% of respondents answered “very good”, 45,2% of respondents answered “good’, 12,9% of respondents answered “enough”, and 3,1% of respondents answered “less”. For ease of use aspect, 38,7% of respondents answered “very easy”, 48,4% of respondents answered “easy”, and 12,9% of respondents answered “enough”. For satisfaction aspect, 58,1% of respondents answered “very satisfied”, 32,3% of respondents answered “satisfied”, 6,5% of respondents answered “enough”, and 3,1% of respondents answered “less”. For interest aspect, 67,7% of respondents answered “very interesting”, 29% of respondents answered “interesting”, and 3,1% of respondents answered “enough”.

Based on the questionnaire results, it can be concluded that Saronen music face tracker filter received a positive assessment from the majority of respondents. The clarity of instructions was considered very clear by the majority of users, while the error rate aspect was still relatively low. From the aspect of ease of use, it was considered easy and comfortable to use by the majority of users. And then from the satisfaction aspect was rated highly by the majority of users. Similarly, the interest in Saronen music demonstrated excellent appeal.

D. Distribution

Distribution to the Instagram and Facebook platforms via Meta Spark Hub aims to fill in the information required for uploads by Instagram and Facebook.

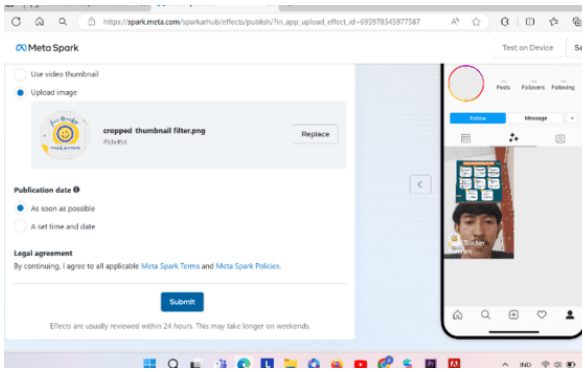


FIGURE 15. Filling in Filter Information

After completing the required information, the application will be reviewed by Meta Spark Hub based on technical criteria with Spark AR Studio policies and Instagram community guidelines. The review will take five days.

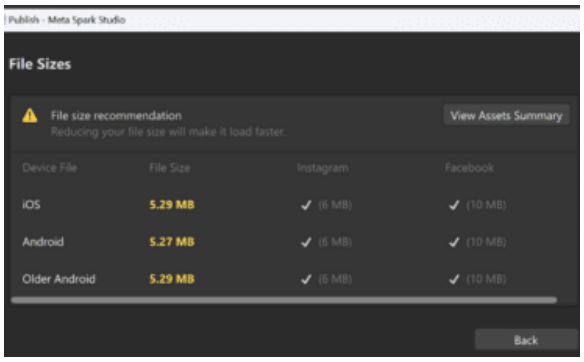


FIGURE 16. Testing Criteria

Filters that can be tested and submitted will be processed until the submission process is successful.

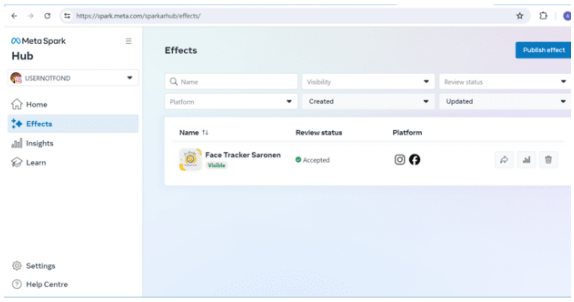


FIGURE 17. Submission Successful

Figure 17 displays the "Submission Successful" status, indicating that the filter has met the technical eligibility criteria and community policies after a five-day review period. Once this status is achieved, the filter is officially published and accessible to users through the filter gallery on the @abuuyazid_ Instagram account or Abu Yazid's Facebook account, as shown in Figure 18.

FIGURE 18. Filter Gallery

To access the Saronen music face tracker filter, the first step is open the Instagram account @abuuyazid_ or the Facebook account Abu Yazid. And then we select the filter gallery section as shown in Figure 18:

IV. CONCLUSION

This research successfully achieved its goal of developing a facial tracking-based Augmented Reality (AR) filter as an innovative medium for preserving traditional Saronen music on social media platforms like Instagram and Facebook. Through the application of the Multimedia Development Life Cycle (MDLC) method, this filter is able to integrate dynamic audio interactions that respond to users' head movements and facial expressions in real-time. Technical testing results demonstrated stable performance on Android and iOS operating

systems, while public testing results confirmed a very high satisfaction rate (90.4%) and significant appeal (96.7%) among users. It can be concluded that the use of facial tracking features in AR technology is not merely a means of entertainment, but an effective educational and cultural preservation instrument in bridging traditional music with the digital habits of the younger generation in an interactive and participatory manner. As a further development step, this research suggests expanding the instrument interaction by combining multiple facial or head movements simultaneously so that users can play Saronen musical compositions more fully and complexly. Furthermore, a comparative study to measure the effectiveness of long-term preservation compared to conventional digital media is recommended, as well as the integration of this filter into various other social media platforms to reach a wider audience.

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