Ar Color Grab – A Coloring Experience for Autistic Children

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Abstract: ***Augmented Reality (AR) brings together a hub of technologies together, thus allowing us to visualize computer generated data over reality. AR enhances the view by adding digital components to the view. Computer added elements are placed over a real environment indirectly by the use of AR, which increases the impact on the viewer. Various forms of elements like audio, video, animation or data may be added on the scene. The gap between the real environment and digital enhancements is bridged by Augmented Reality by creating an exciting situation. Therefore, a colouring book app, which leverages the use of Augmented Reality is presented, the app allows children to colour the characters of the colouring book, which can then be verified by a mobile device. The detection and tracking of the drawing are done using the application, and a 3-D view of the character is animated via a video stream. This video stream is developed according to the colouring done by a child. The visible and omitted regions of the 3D character are projected from the 2-D view using a process which is then presented in reality. A new outlier rejection algorithm is implemented to track a deformable surface for coloured drawings. Real time tracking and surface deformation recovery are provided. A pipeline that creates 2-D and 3- D content is effectively presented. The principal idea behind this project is to come up with an enhanced colouring experience for autistic children using AR, and also enable them to learn something out of it via a video option given by the application.***

Keywords**:** ***Augmented Reality, Autistic children, Real time tracking.***

I. INTRODUCTION

Electronic information is combined in real time with the user's atmosphere using Augmented Reality. Augmented Reality is a combination of electronic information with the user's atmosphere in real time. Augmented reality (AR) is associate degree distributive expertise of a real-world atmosphere wherever the objects that exist within the physical world square measure increased by computer-generated intuitive information, generally across multiple sensory techniques, as well as visual, auditory, haptic, sense modality and sense modality. AR will be outlined as a system that satisfies 3 basic features: a mixture of real and virtual worlds, period of time interaction, and correct 3D registration of virtual and real objects [3]. The coated sensory data will be constructive or damaging. This expertise is smoothly interlinked with the important world such it's taken as a facet of the important atmosphere. During this manner, increased reality changes one's the continued insight into a real-world atmosphere, whereas VR fully replaces the user's real-world atmosphere with an imitated one. Increased reality is said to 2 mostly meaty terms: MR and pc mediate reality.

1. IKEA Mobile App Apart from the article of furniture with funny names that you simply need to collect yourself and low-cost Swedish meatballs, IKEA is additionally notable within the school world together of the primary organizations to use increased reality well. The dealer began experimenting with increased reality back in 2012, once shoppers may use the app to envision however tables and shelves would look in numerous places around your house. IKEA is taking it a step additional with its IKEA place app, that currently permits you to pick something from the store's catalogue and see however it'll look to suit anyplace in your house. This can be an Associate in Nursing exceptionally useful tool for those who AR speculative if a precise piece of article of furniture can slot in an offered house, or if the colour of their doubtless purchase can match the figure of the area.

2. Nintendo's Pokémon Go App You really can't have an increased reality speech while not mentioning Nintendo's Pokémon Go app. The blockbuster of 2016, Pokémon Go created users to catch their favourite Pokémon by exploring through their phones at the $64000 world – however with superimposed pictures. The sport was an enormous success, with up to sixty-five million users at the height of its quality. It had been conjointly the rationale you detected, numerous teens and young adults wandering around your neighbourhood observing their phones all the time.

Different Fields Of Augmented Reality

Today, augmented reality works in different fields. We need a complete analysis of the following fields, such as augmented reality in

- Healthcare
- Education
- Games and Entertainment

II. EXISTING SYSTEM

Augmented reality helps in combining digital information with the real environment by projecting animated objects into the real world. So, based on the children's mentality, an application called COLORING BOOK APP is developed, in which children can color the

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characters that exist in the coloring book. And then, children can get excited by tracking the colored character. By tracking, a 3-Dimensional object of the tracked character appears in the real environment. Therefore, a 3-dimensional character gets projected from the 2-dimensional view.[1] The app provides a video stream based on the character that the children color.

A. Issues In The System

1. They provide a finite number of pictures to color. Therefore, the children need a coloring book that they provide.
2. The children can only color the characters but not sketch the new ones.
3. The video stream available is just made for fun and excitement but no knowledge is gained.

4.The children need to get a printout of the picture whenever they desire to color.

5.They have no option to change its shape and size.

III. PROPOSED SYSTEM

A. Objective

This project is purposefully designed for the autistic children to sketch and color the characters or objects. The characters get projected using mobile devices based on augmented reality. And information about the characters will be shown on the screen of the mobile device.

B. Explanation

Our project is the improvisation of the existing app namely 'COLORING BOOK APP'. As autistic children have good intensity over colors, we made an application to learn them through drawing. On the other hand, it is an exciting task to sketch and color the characters. The application is designed using unity and Vuforia software. The Vuforia software has a license key to access. This application is provided with 4 modules. The application is started by selecting a category from different categories. Each category consists of some characters. Firstly, a character is to be selected among various characters. To get a 3-dimensional view of a character, an ID is to be scanned. Each and every character has it's own ID. The ID is formed with the name of the character, status, and type. By scanning the ID of the character, a 3-dimensional view of that character is projected. This can be seen through a mobile camera or holo lens. This module has an option to change its angle. This feature helps autistic children to see a character from different angles. The children can rotate the character to their desired angle. After setting the angle, the character can be tracked using the outline. The children can sketch and color the character using the reference provided as a 3-dimensional object. The last module is more beneficial as the information about the characters is provided. The children using this application gets not only the excitement but also the knowledge about what are they doing. This application drags the interest to sketch the characters by providing exciting situation. Consequently, the future enhancement for this application is to provide video streams related to the character that the children drew. And also a story may be provided to drag the children's interest and to be more interactive.

C. Block Diagram

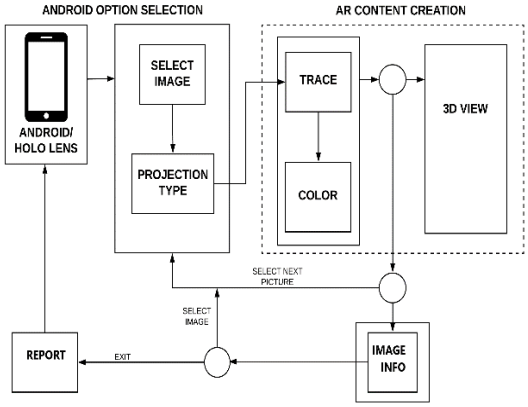

Fig.1 Block Diagram

IV. COMPONENTS USED

A. Hardware Components

Cell Phone – A Cell phone is a mobile device that is used to receive and make calls, to use the internet and browse things.

The following features must be there in a cell phone to use this application:

RAM – 8 GB

OPERATING SYSTEM – ANDROID

B. Software Components

Unity – Unity is a software mainly designed to develop games either in 2-dimensional and 3- dimensional. Therefore, unity is called as a game engine. It is also used for non-gaming visualisations.

Vuforia – Vuforia is a software development kit (SDK) that is used to develop applications based on augmented reality. Computer vision technology is used to track the images either in 2D or 3D in a real environment. A license key is needed to access the software. It needs permission for the external camera, advanced camera, watermark and model targets.

V. IMPLEMENTATION

There are totally five modules in this application. These will help the children to get educated through drawing.

A. Module 1 - Category Selection

There are four categories provided in the list like animals, birds, vegetables, and fruits.

Fig.2 Category Selection

B. Module 2 - Taeget Object Selection

After selecting the category, the target object that the children desire to draw is to be selected from the given list. The selection of the object is based on the ID. The ID is nothing but the name of the object in capital letters. The children must take printout of the ID to make the object to be projected onto the paper.

Fig.3 Target Object

C. Module 3 – Object Projection

The object that the child desired to draw will be projected onto the paper by scanning the ID of that particular object. The 3D view of that object will get projected.

There are four categories:

1. Animals
2. Birds
3. Vegetables
4. Fruits

Fig.4 Pumpkin

D. Module 4 – Tracing The Object

The children will trace the object on paper. The children can trace the object at any angle they desire. The Joystick has been used to rotate at any angle. This makes the children enjoy the objects from different angles.

E. Module 5 – Information About The Object

After completing the sketch and color of the object, they can get the information about the object. The information will appear on the screen if they click the button "DETAILS". Therefore they can get educated on the other hand, they can enjoy the 3d objects.

Fig.5 Object with its information

VI. RESULT

Thus, this application results in projecting 3 dimensional figures in real environment. These figures are useful for children to use the 3D figure as reference to sketch and color the characters. The application has provided an another option to rotate them in desired angle. It also provides the information of the image so it is very helpful for the child's education.

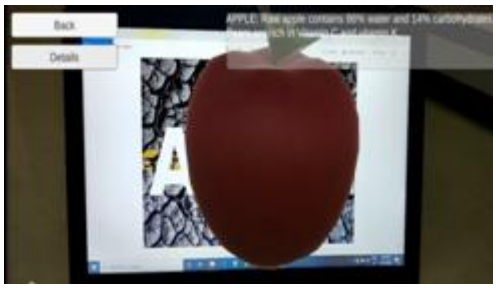

Fig.6 Result of the output

VII. CONCLUSION

Therefore, this application 'AR COLOR GRAB – A COLORING EXPERIENCE FOR AUTISTIC CHILDREN' will give a beneficial experience of coloring. On the other hand, it provides information about the various characters. This application shows a 3- dimensional object in a real environment with the help of augmented reality. This helps in bringing the passion hidden in the children. This application also makes the children get excited about drawing.

FUTURE ENHANCEMENT

The following future enhancements can be done:
The future enhancement of 'AR COLOR GRAB – A COLORING EXPERIENCE FOR AUTISTIC CHILDREN' is to add a module that can be named as 'VIDEO If you wish, you may write in the first PROJECTION'. This will have a video or story of a particular object that is drawn by a child. This will be based on the child's desire to watch a video or story. Therefore, this will give a clear idea about that object.

There can be a module through which children can voice input and some hyperlinks can be added to display video about the object.

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