



CodAR: AN AUGMENTED REALITY GAME TO TEACH PROGRAMMING

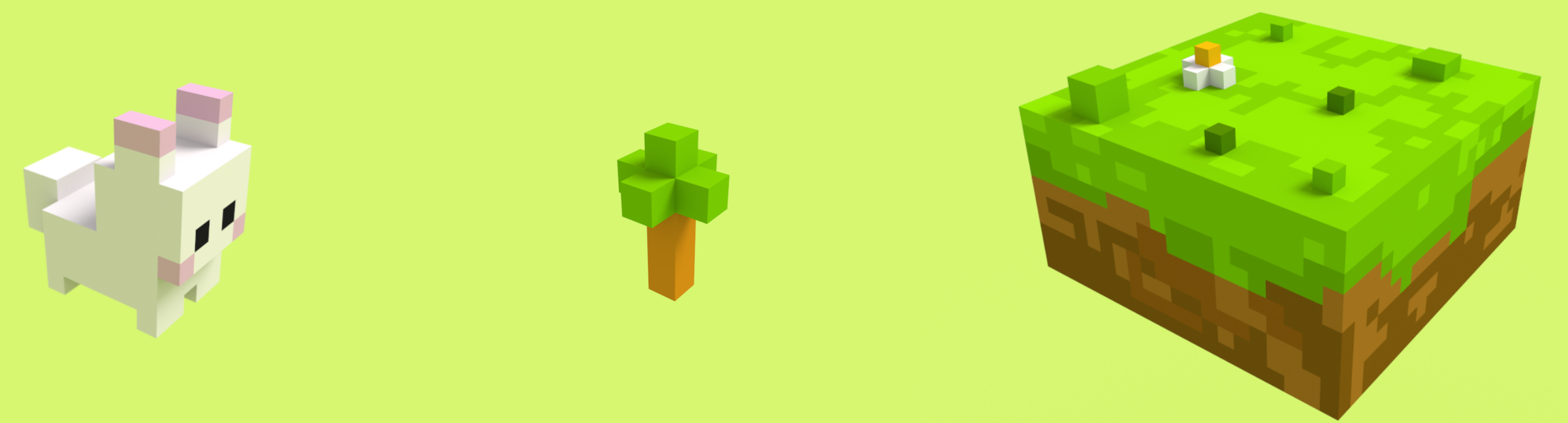
VANDIT SHARMA, JEEVANKUR TALUKDAR & KAUSHAL KUMAR BHAGAT

INTRODUCTION

In recent years, technology has revolutionized all spheres of life. Since programming is the heart of software technology, it is thus imperative that the demand for programmers is also increasing day by day. With advancements in the field of augmented reality (AR) and Computer Vision (CV), we can now develop applications for unique experiences in the field of education. This study aims to develop a game for elementary school students to learn programming skills. Students are provided with cards which act as markers for our Game. Each marker acts a distinct programming block in AR which causes our game character to perform a certain action. The student needs to place these blocks in the right manner to accomplish a given task. It thus enables students to learn some basic programming skills in a way appealing to them.

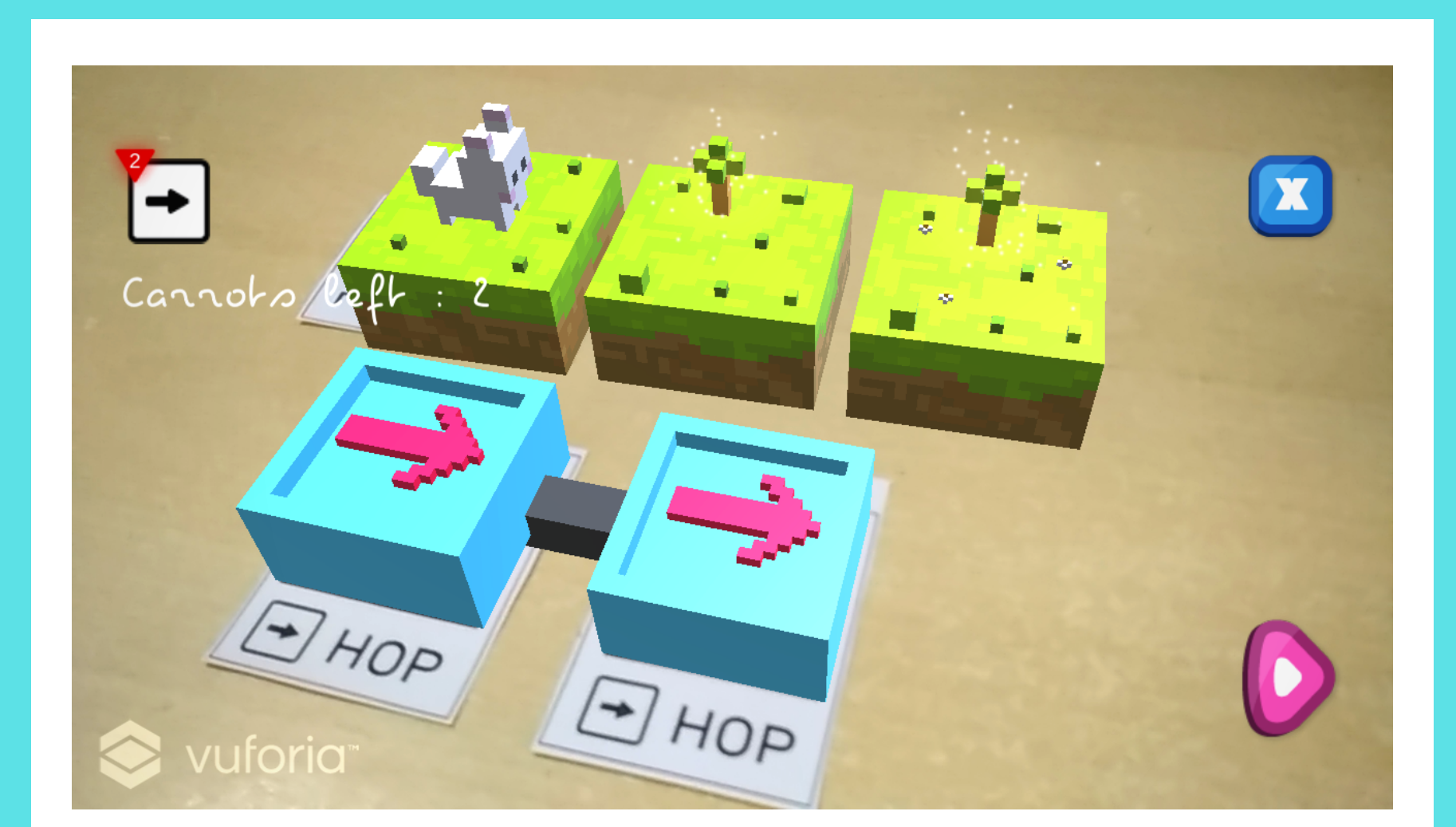
OBJECTIVES

- To develop an immersive platform to teach programming
- To gamify the learning process by including game elements



PROPOSED SYSTEM

- We use a smartphone and a set of markers as cards to generate an AR Game. There are five types of markers used in this game.
- The detailed purpose of each card is described below :
 - Level - Generates a virtual game area comprising of our game character and the puzzle.
 - Direction/Hop - Moves the game character one block forward in the direction it is facing
 - Rotation - Rotates the game character by 90° in the clockwise/anti-clockwise direction
 - For Loop - Repeats the marker placed immediately before a given number of times, which is generated automatically by the level
 - While Loop - Repeats the set of markers placed before it infinitely or till level completion
- A virtual block corresponding to the recognized marker is displayed on the screen.
- The virtual blocks are brought in the scene one by one and placed next to each other to generate a sequence of commands.
- After a sequence is created the play button is activated. Once it is pressed, the bunny performs actions corresponding to the set of instructions received, if feasible.
- If all the carrots are collected by the bunny, the level is completed and the user can proceed to the next level.



TRY IT!

Open the game , select the second level and scan this section to experience it yourself !



CONCLUSION

- Conventional techniques to teach programming generally require a good understanding of various mathematical concepts and are difficult to visualize. Therefore, various visual programming techniques are being developed.
- CodAR takes this idea to the next level in terms of user understanding and engagement by practical implementation and visualization.
- Our approach is unique mainly because there is a simple relationship between abstract mathematical concepts of programming and the Virtual Blocks.
- The game is developed using AR, which makes it quite engaging and interactive.
- Our work certainly has its limitations. Currently, we have not conducted an empirical evaluation of our developed game. We are currently working on it. Some future improvements may include the addition of more types of markers corresponding to Conditionals, Boolean, Switches, Data Structures, Debugging etc. along with more challenging levels.