웹 기반 메타버스 구축 플랫폼

캡스톤 디자인 최종 발표

최진아, 이혜진, 유선아

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01

프로젝트의 필요성

01. 프로젝트의 필요성

메타버스의 개념

META	+	VERSE
Meta(μετά)		Universe
이후, 그 너머, 초월		우주, -세계

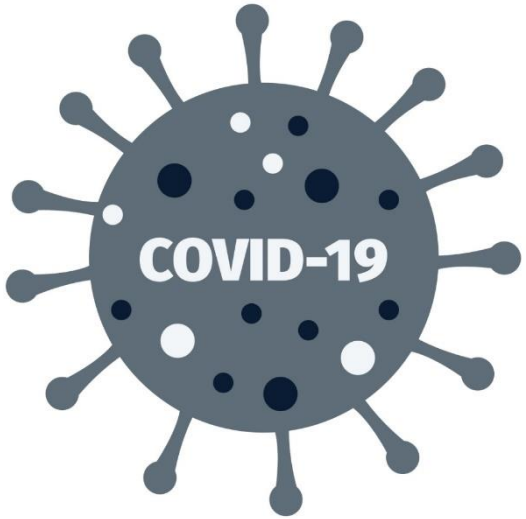
현실세계의 객체와 가상공간, 가상의 물체를 아우르는 가상의 데이터가 기술을 통해서 상호작용할 수 있는 가상세계

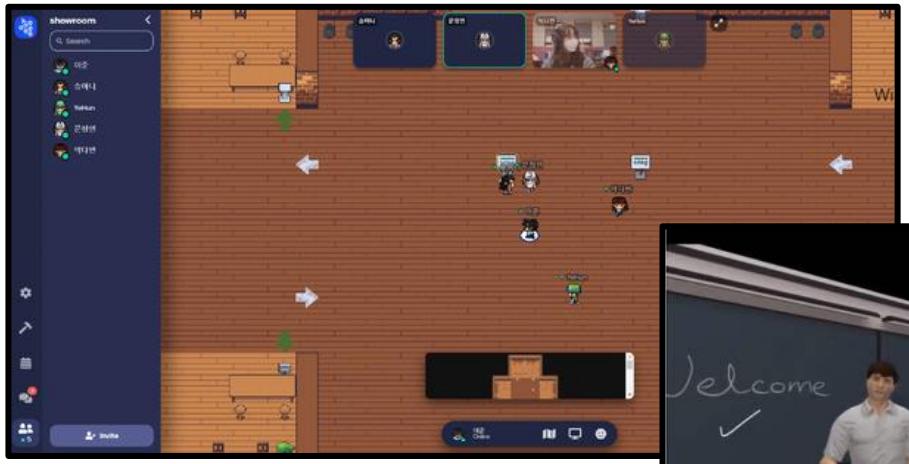
현실공간 — 가상공간

01. 프로젝트의 필요성

현재 상황

*** 코로나 펜데믹**





◀ 메타버스 졸업작품 전시관

가상현실 수업 ▶

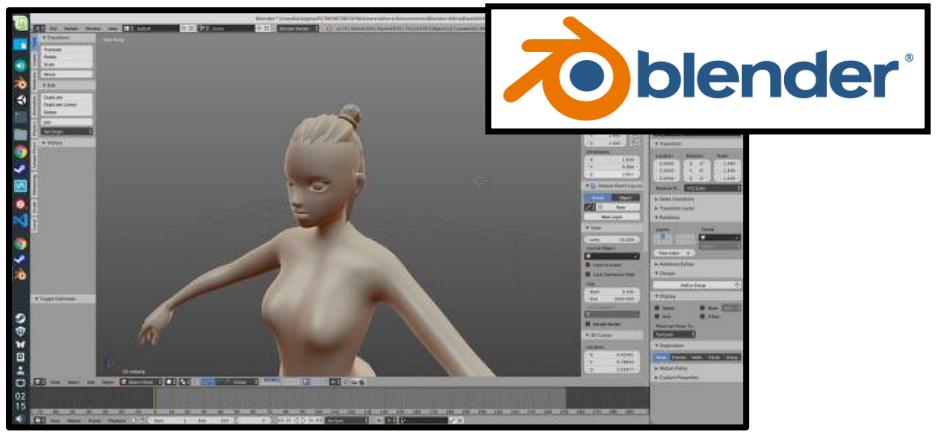
코로나 펜데믹 영향으로 비대면으로 전환되면서, '**메타버스**'가 새로운 산업으로 떠오르게 됨

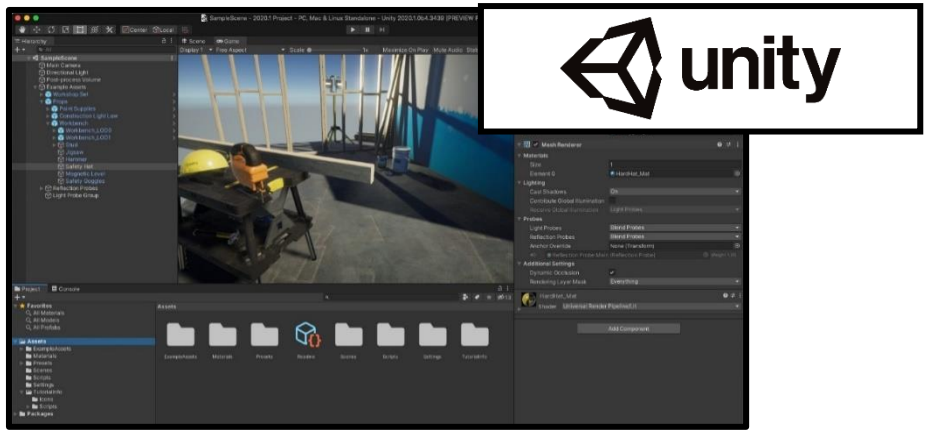
01. 프로젝트의 필요성

대중화되지 못한 이유 (한계)

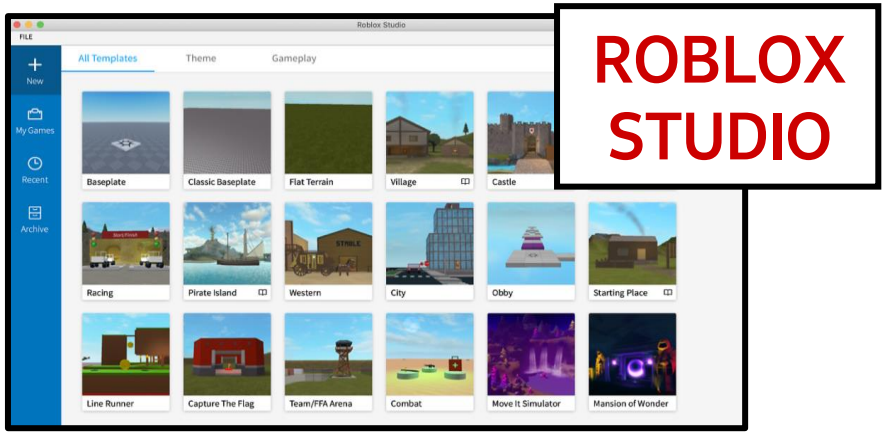
* 기존 방식

1) 전문가용 소프트웨어로 직접 개발





2) 기업에서 배포 중인 개발 소프트웨어 툴을 따로 설치

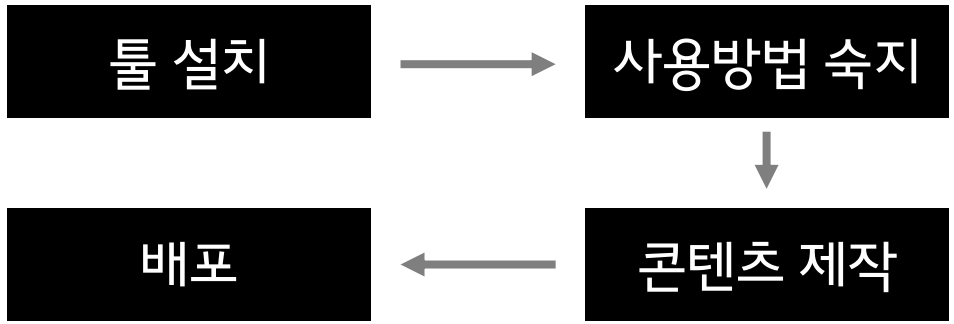


01. 프로젝트의 필요성

대중화되지 못한 이유 (한계)

* 문제점

1) 어렵거나 번거로운 콘텐츠 제작 과정

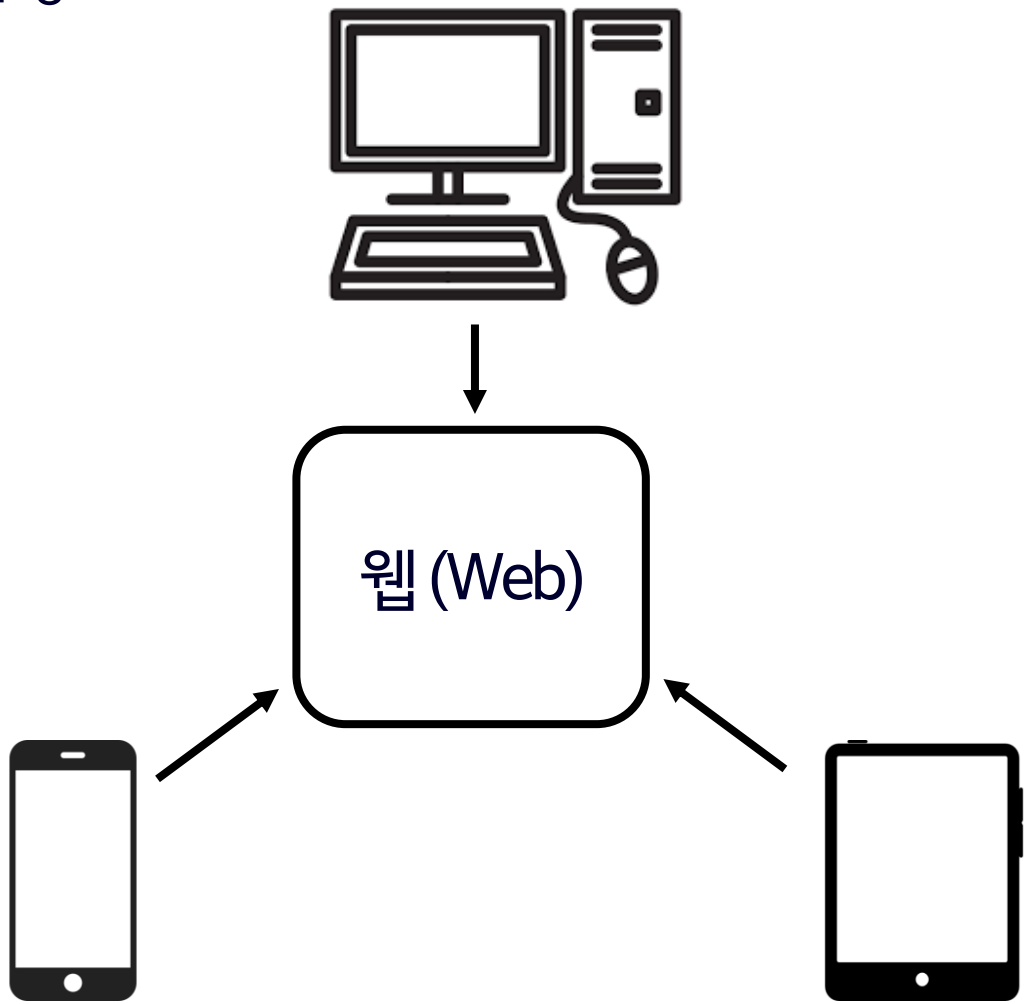


2) 가볍게 콘텐츠를 즐기기에는 비싼 기기

접근성이 떨어짐 → 대중화되지 못함

01. 프로젝트의 필요성

구상



웹을 통해 다양한 환경에서 서비스 이용

웹 기반 메타버스

01. 프로젝트의 필요성

목표

1) 웹 기반 환경에서 콘텐츠 제작 & 소비

2) 새로운 사용자들이 유입되도록 진입장벽 낮추기

02

요구사항 분석

02. 요구사항 분석

Prototype 사용자 피드백

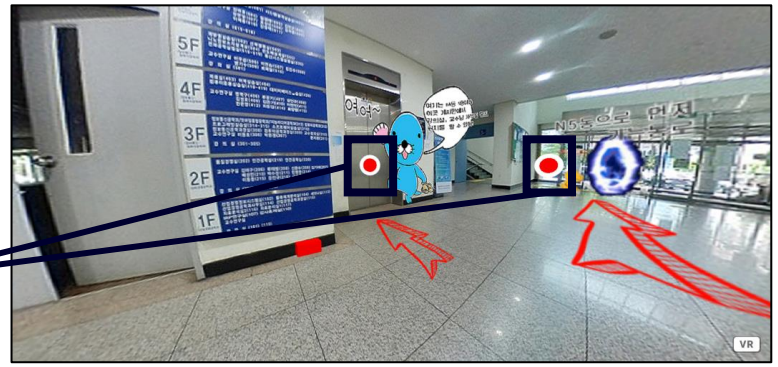
▲ 한밭대학교 공학설계입문 수업

▲360도 이미지와 link만을 이용한 콘텐츠 제작 (학생 작품)

02. 요구사항 분석

Prototype 사용자 피드백

Link



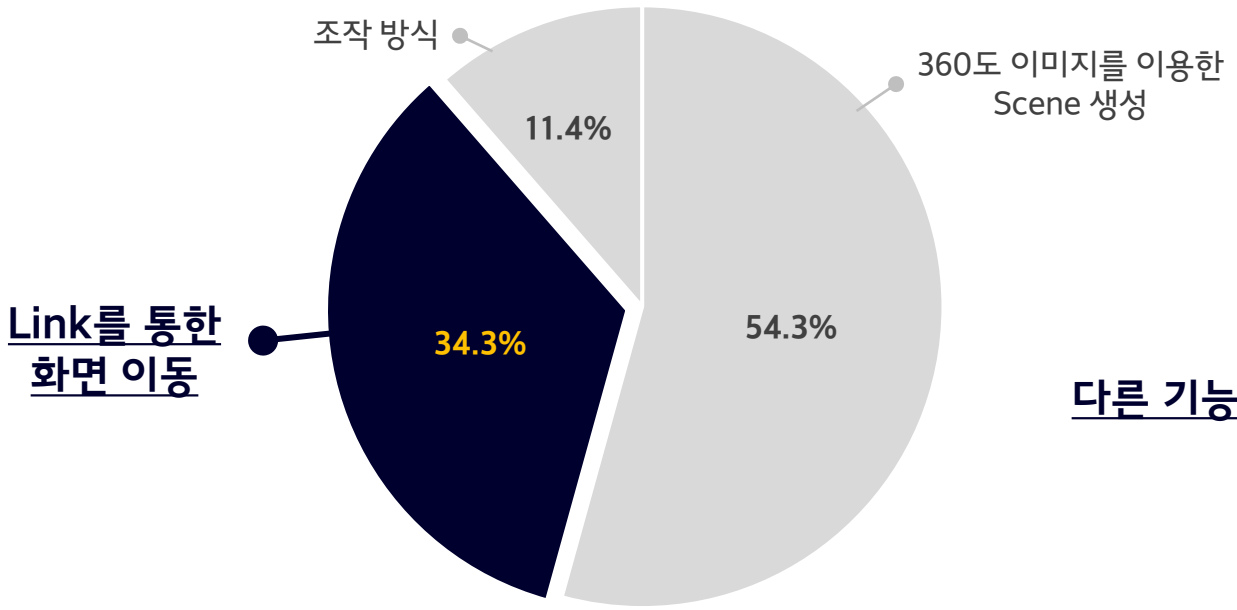
Link를 통해 scene과 scene를 연결하여, 스토리텔링을 통한 콘텐츠 제작이 가능함
* Link : 다른 화면으로 이동할 수 있는 object

Link를 중심으로 웹 기반 메타버스 구축

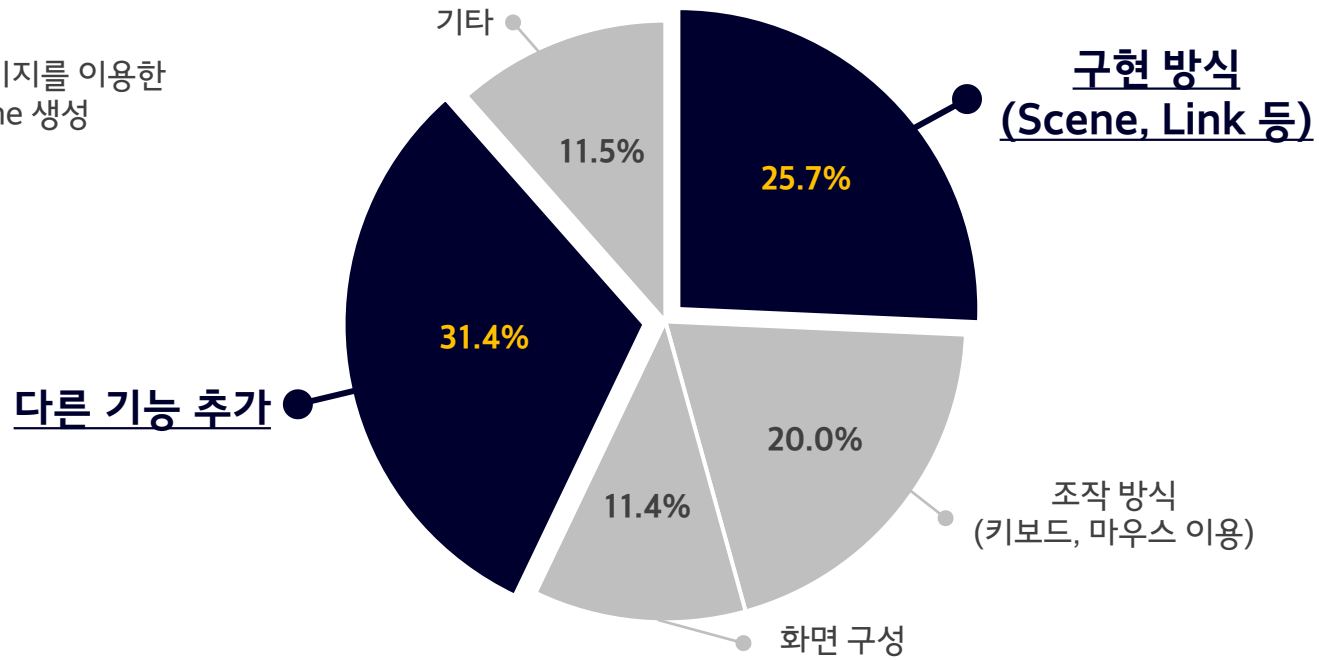
02. 요구사항 분석

Prototype 사용자 피드백

플랫폼에서 가장 마음에 드는 부분



플랫폼에서 개선해야 할 점



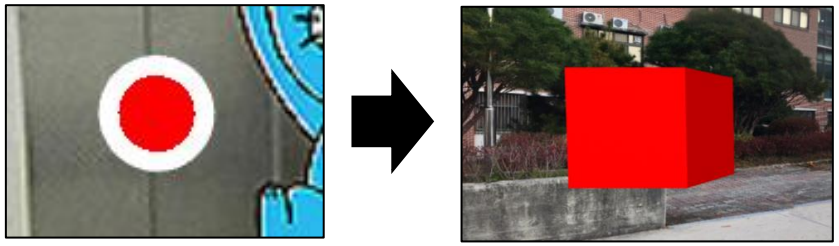
Link에 대한 **만족도**는 높은 편이나,
360도 이미지만으로 만든 **Link 구현 방식(link 위치, 개수)** 과
scene에 추가로 다른 오브젝트들을 넣을 수 있는 기능에 대해 **개선**해야 한다는 의견이 있었음

02. 요구사항 분석

요구사항 분석

1) Link의 추가 및 변경

- Scene 내부에서 간단히 추가
- Link의 형태 변경

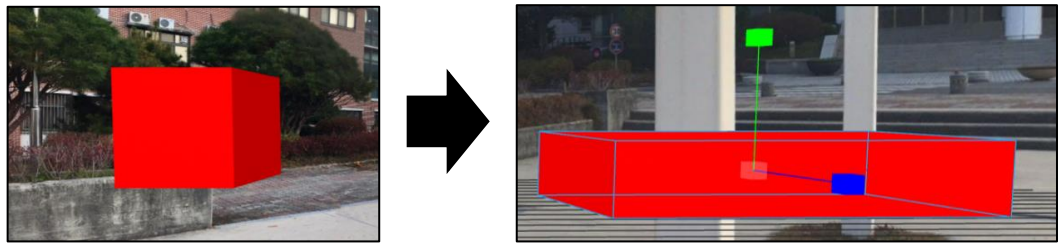


2D Link

3D Link
(3D object)

2) 3D object 기능을 중점으로 플랫폼 발전

- 3D object 생성, 편집
- 3D object 저장, 불러오기

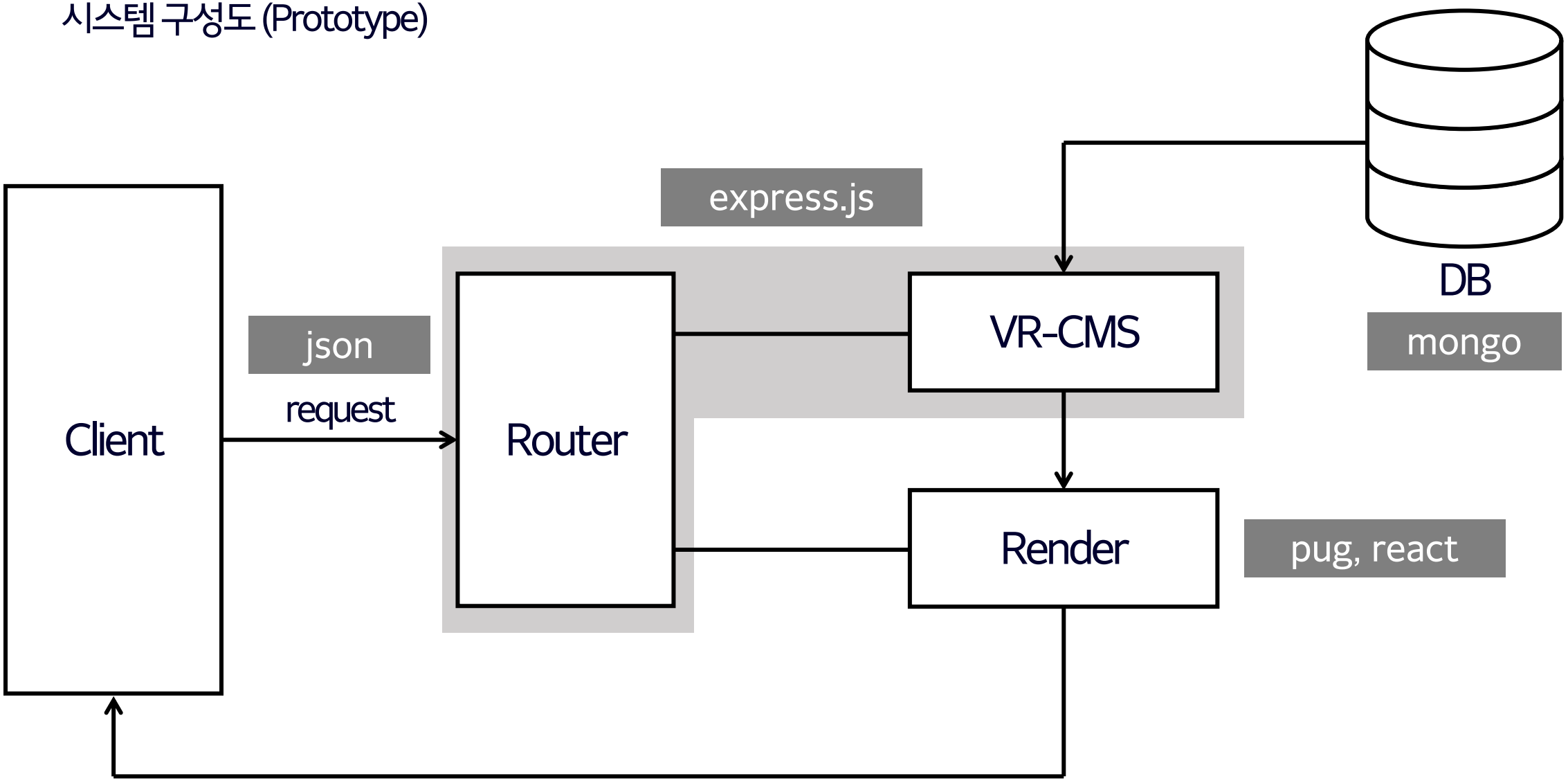


03

플랫폼 구현

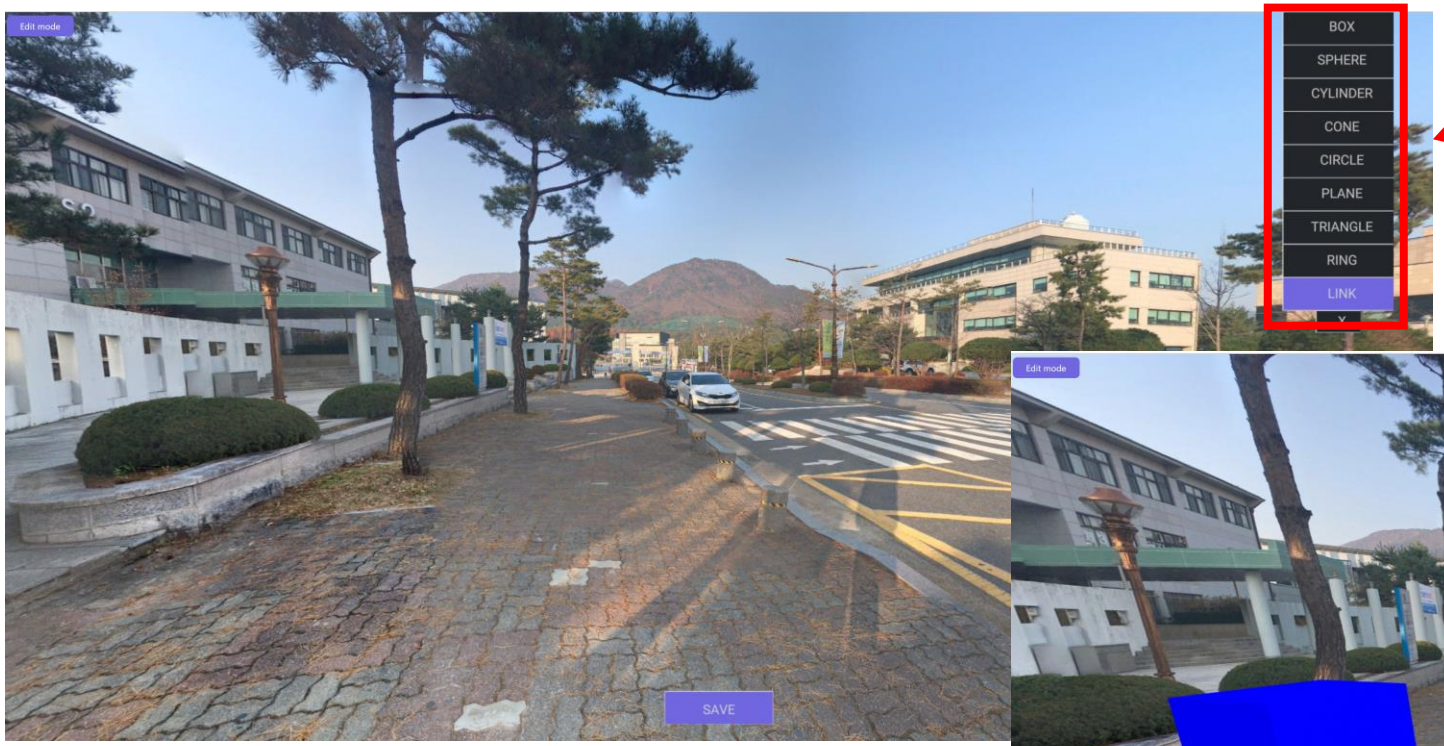
03. 플랫폼 구현

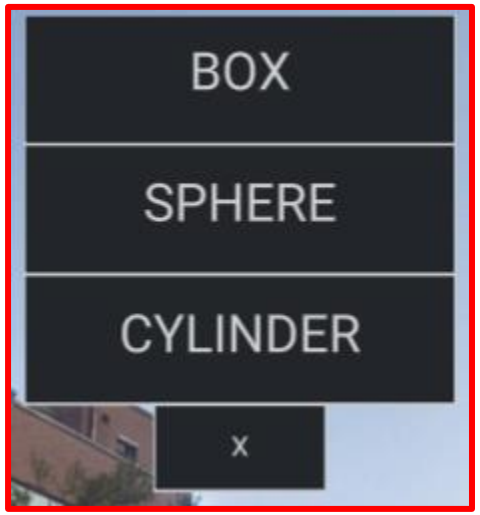
시스템 구성도 (Prototype)

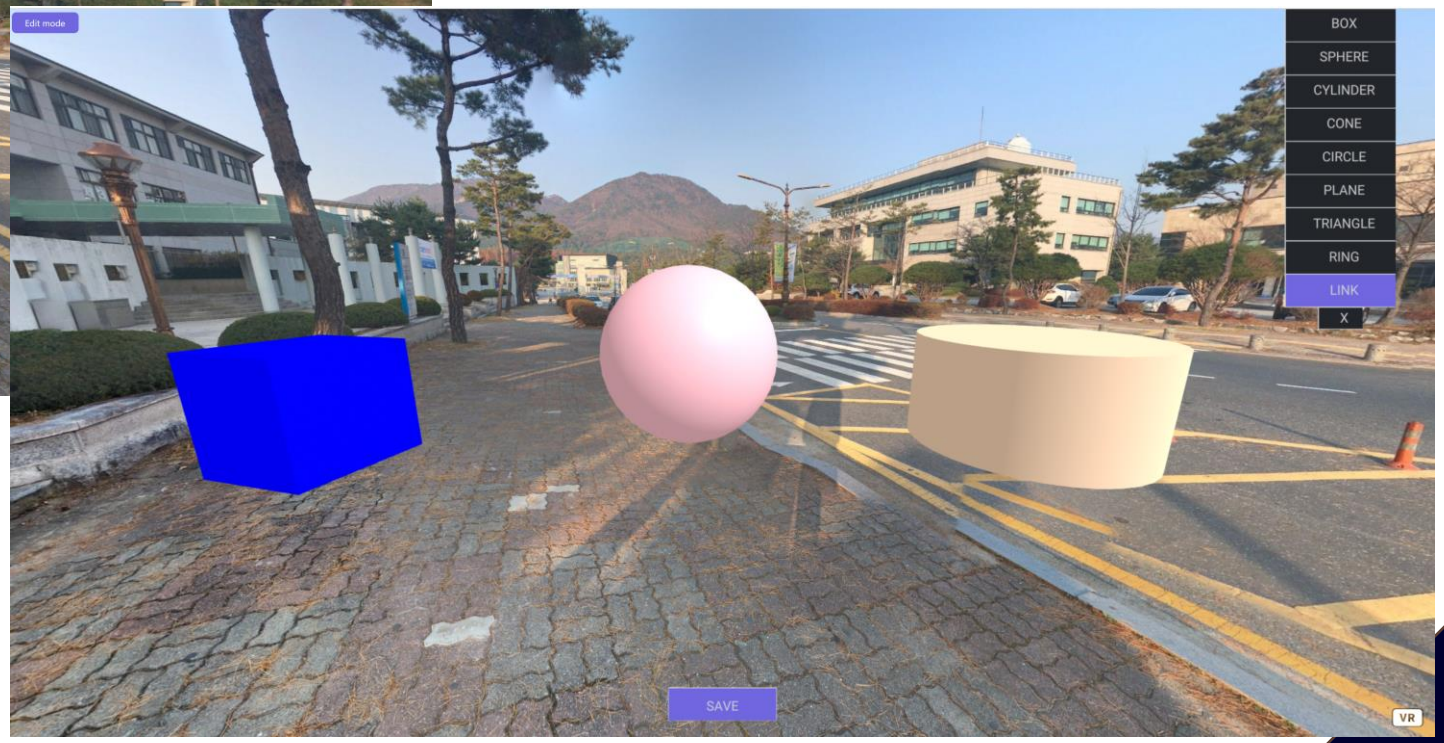


03. 플랫폼 구현

3D object 생성

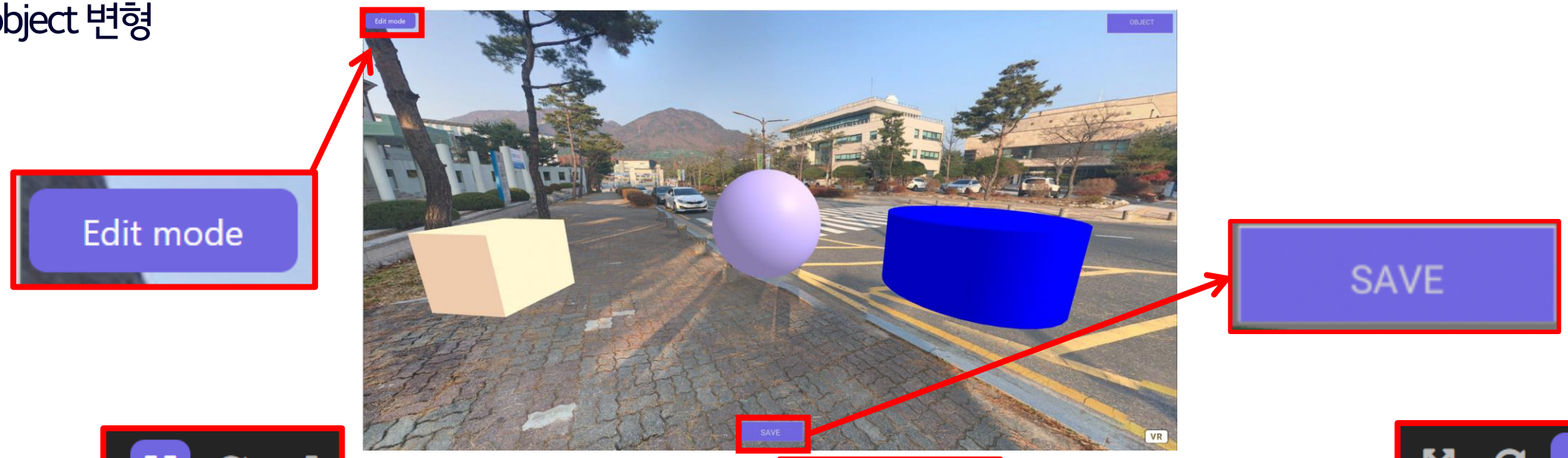


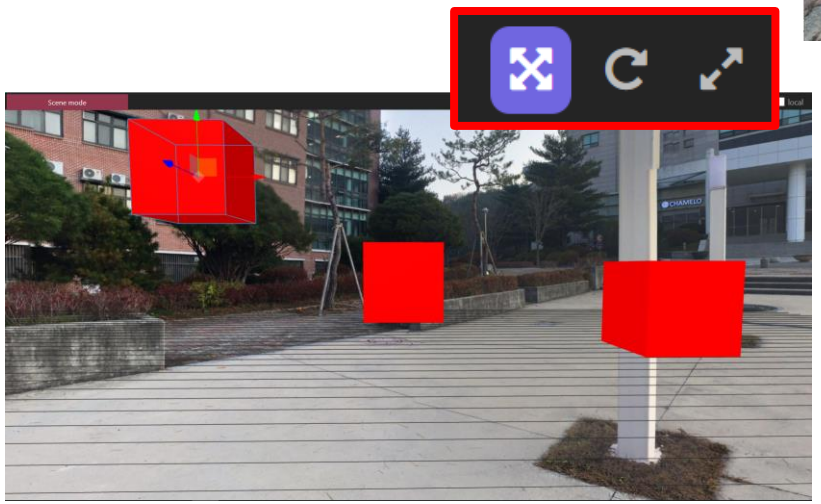




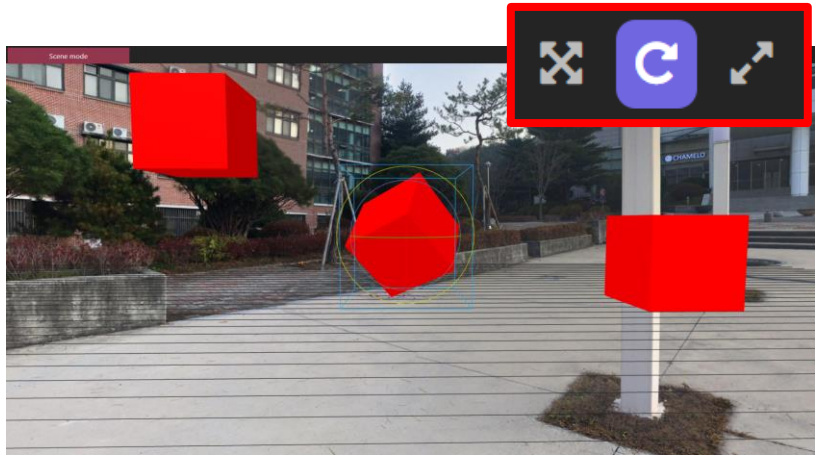
03. 플랫폼 구현

3D object 변형





이동 (Translation)



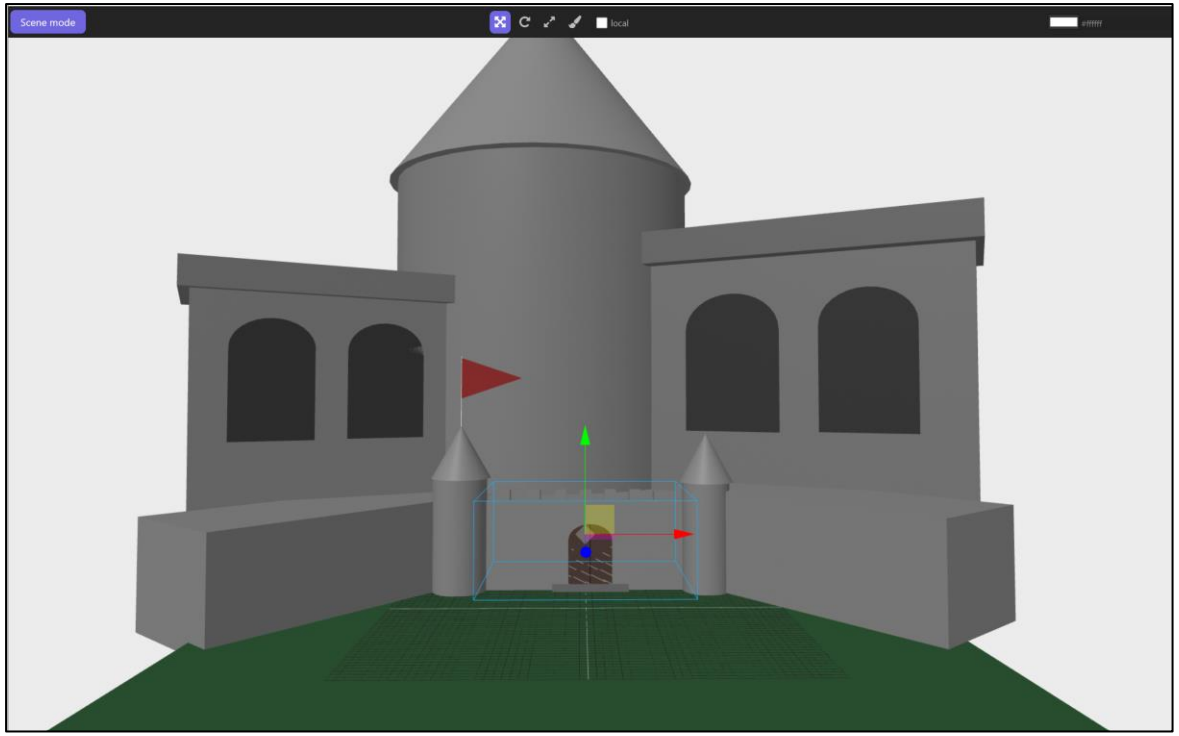
회전 (Rotation)

신축 (Scale)

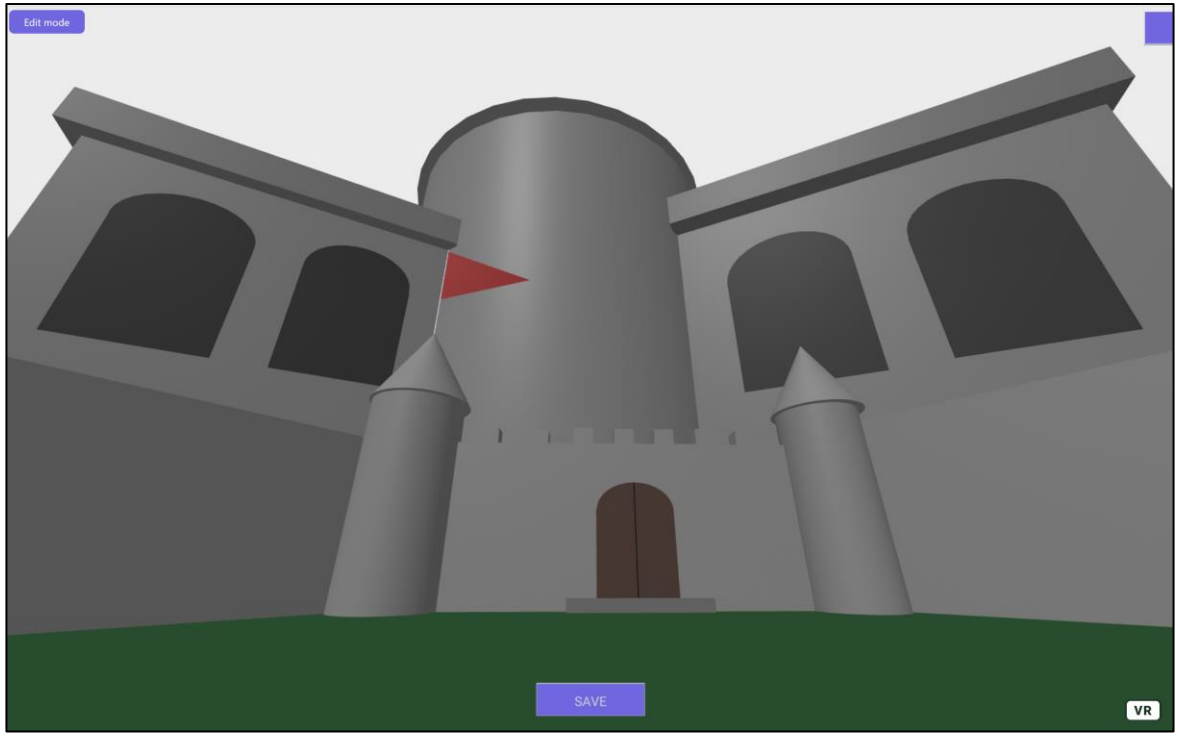
03. 플랫폼 구현

3D object를 이용해 만든 성

Edit mode

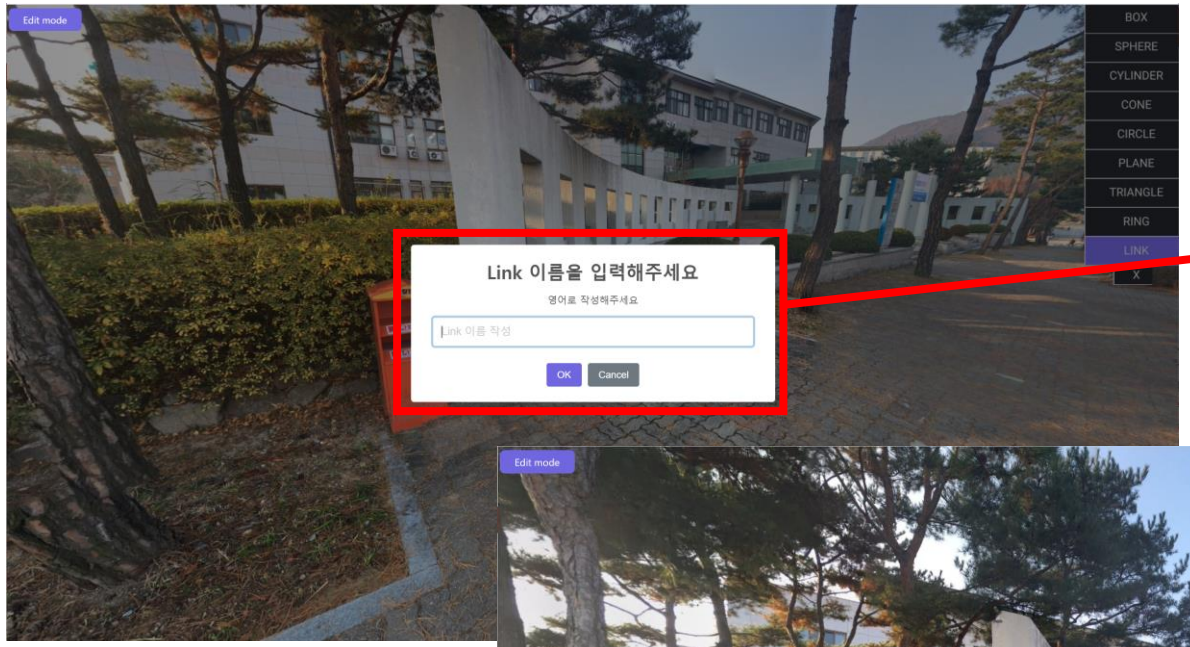


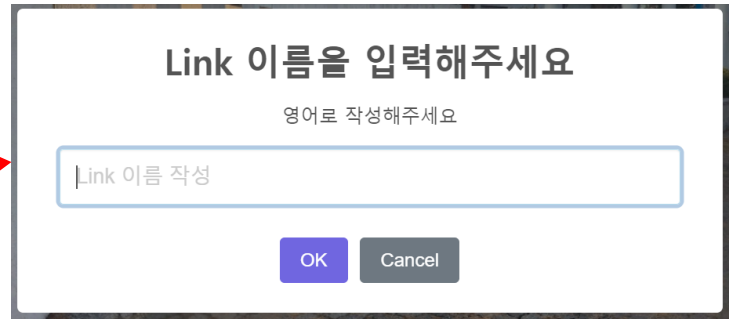
Scene mode

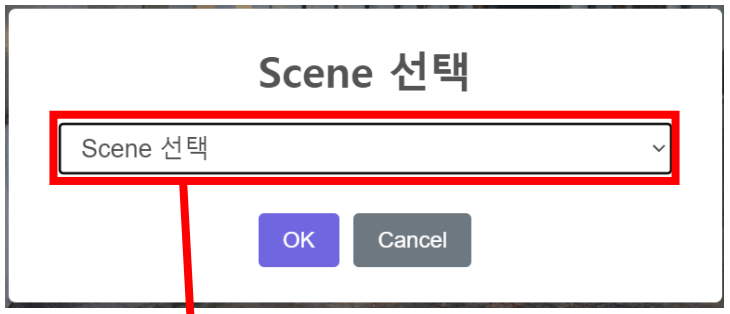


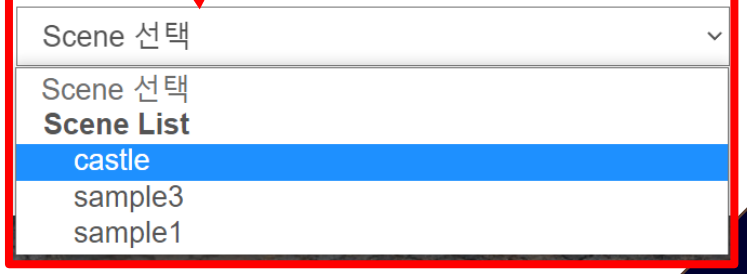
03. 플랫폼 구현

Link object 구현



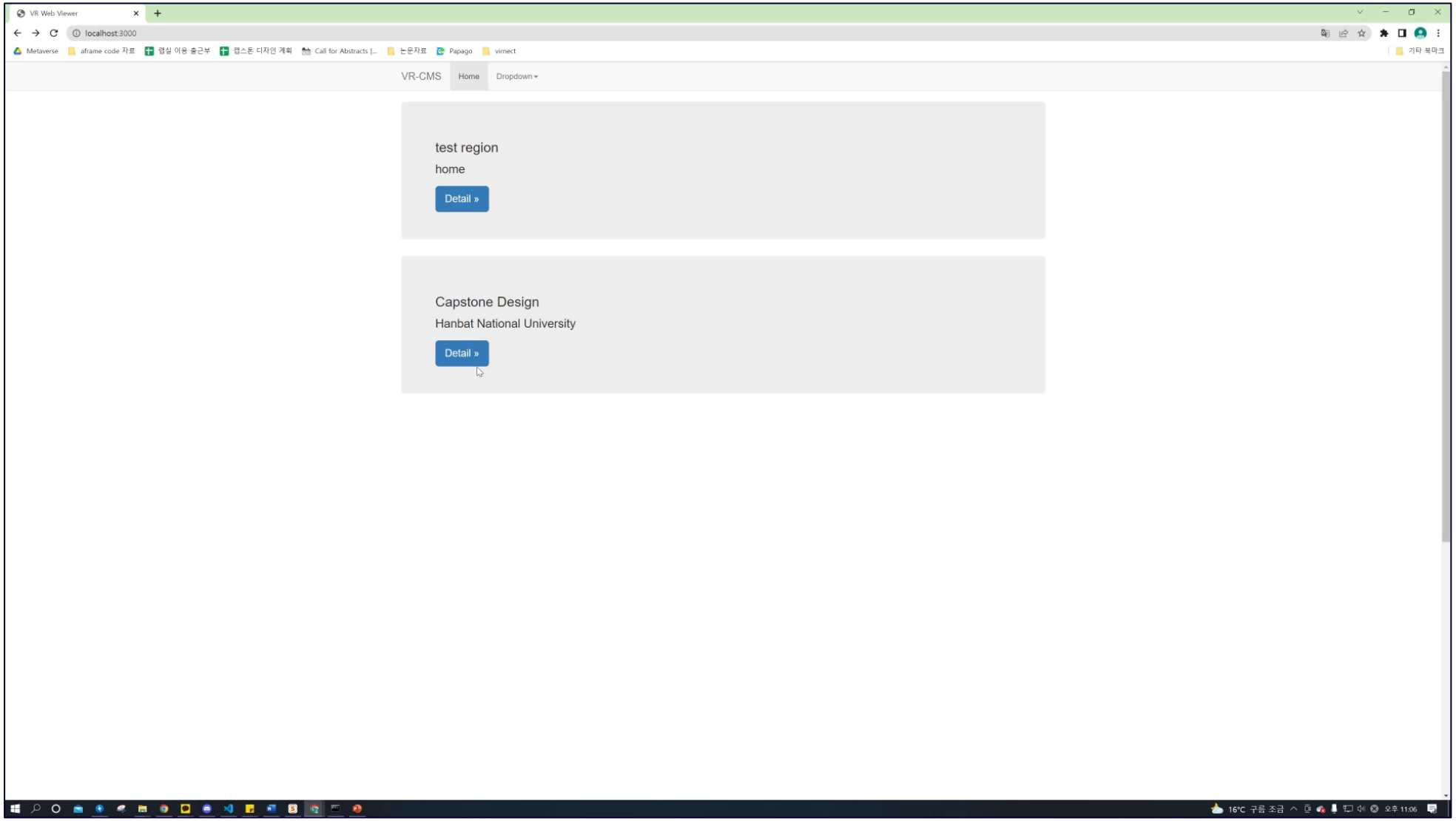






03. 플랫폼 구현

전체 데모



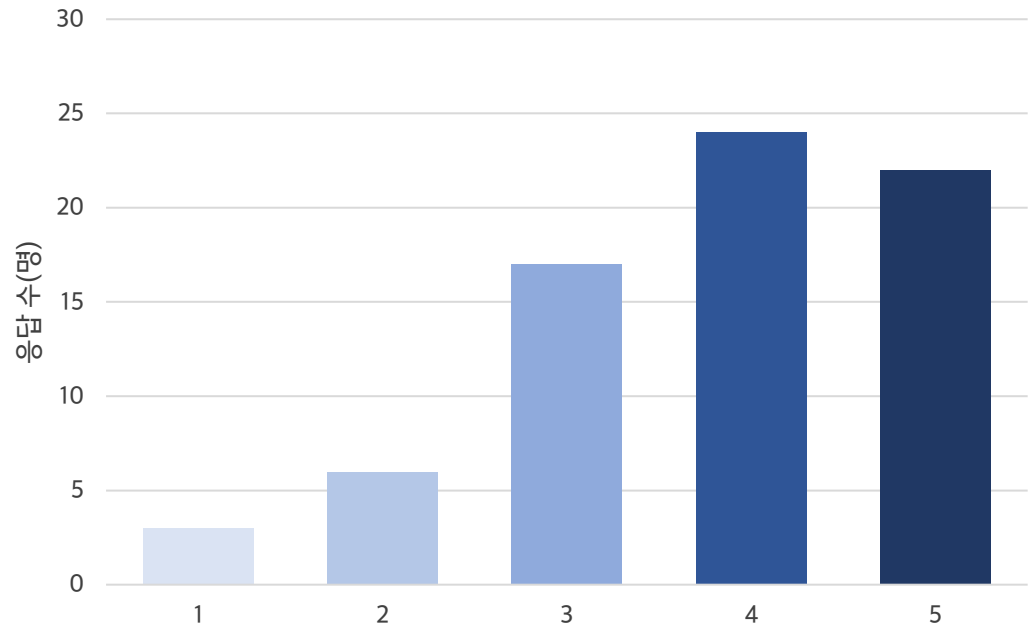
04

프로젝트의 효과

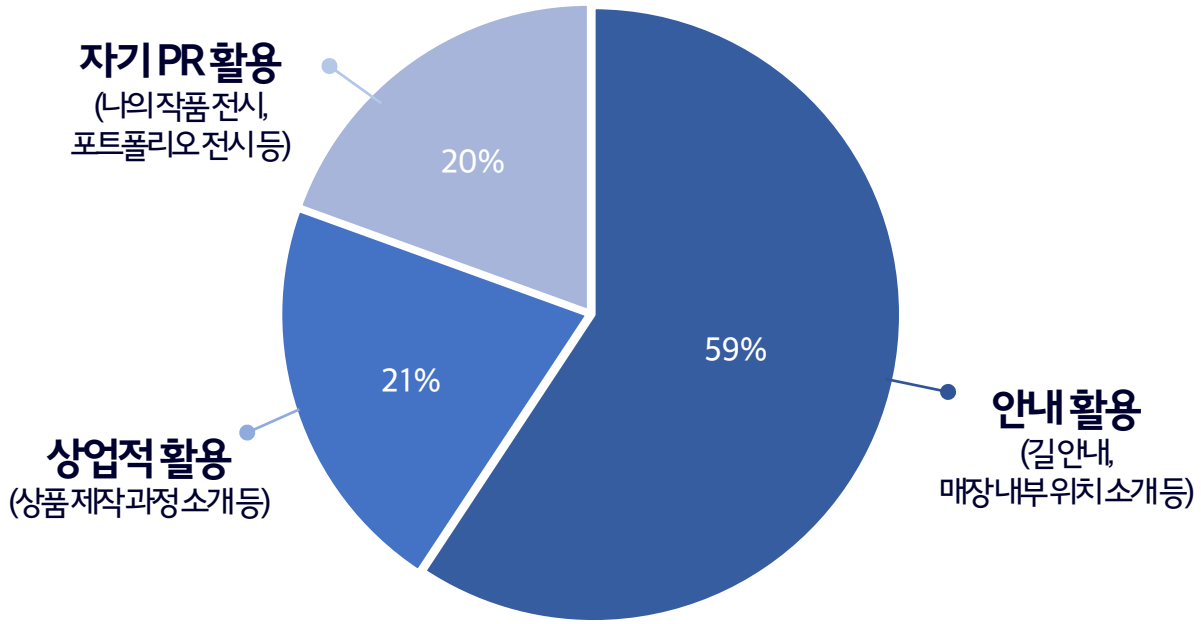
04. 프로젝트의 효과

시장성

플랫폼 추천 의향



플랫폼 활용 방안



기존의 메타버스와 달리 **웹 기반**으로 운영되어 접근성이 쉽고,
콘텐츠를 소비하면서 생산함으로서 **상호작용적**으로 이용

04. 프로젝트의 효과

교육성

논문 제목 : Non-face-to-face Career Exploration Program utilizing Web-based Metaverse Hands-on Contents
논문 요약 : 비대면 상황에서 웹 기반 메타버스를 사용하여 공학 관련 진로 흥미도와 관심도를 증가시킨다.
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ASEE American Society for Engineering Education
Educational Research and Methods Division ERM

Non-face-to-face Career Exploration Program utilizing Web-based Metaverse Hands-on Contents

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***Abstract*—Career exploration programs for high school and middle school students are a useful strategy for keeping students in high school and preparing them for further study or training. Among various career exploration programs, a "Tech-Prep" program, a course aimed at smoothing the transition from high school to college, has become increasingly popular in recent years. The Tech-Prep program may provide various educational contents to develop systematic links between secondary and post-secondary institutions to help students prepare for high-tech careers. In general, the programs' contents contain hands-on activities or applying theoretical and academic skills to real-world problems. Unfortunately, due to the COVID-19 pandemic, face-to-face learning activities had to be changed to non-face-to-face classes, such as video lectures or remote sessions. As a result, an educator may not easily adopt hands-on activities to the Tech-Prep program since every participant participates in the program on a remote site. The Tech-Prep program designer should consider the issues to overcome the limitations. This research introduces a non-face-to-face Tech-Prep program and its case study in the pandemic circumstance. To provide hands-on activities in the non-face-to-face Tech Prep program, we suggested the PLIMP structure to help participants so that they may plan, design, and implement their metaverse. To show the effectiveness of the non-face-to-face Tech-Prep program, we provided a pilot program to the high school in the Republic of Korea.**

Keywords—Online learning, Education environment, Career Exploration Program, Tech-Prep Program

I. INTRODUCTION

Career exploration programs for K-12 students are one of the critical courses. High school and middle school students should decide to keep students in high school and prepare them for further study or training. Recently, many career exploration programs are not teaching theory lessons but encouraging student participation in the classroom. For example, the Digital Safari Academy(DSA) curriculum at Mt. Diablo High School in Concord, California, emphasized project-based learning and experience to tackle real-world problems, including making an annual plan about virtual companies and creating new technology products [1]. Through a career exploration program, students can develop problem-solving and reasoning skills. Also, students observe whether the job aptitude is suitable for students or not.

Among various career exploration programs, a "Tech-Prep" program is a course that encourages students to participate actively. The goal of the Tech-Prep program is to smooth the transition from high school to college [2]. In addition, the Tech-Prep program may provide various educational contents to develop systematic links between secondary and post-secondary institutions to help students prepare for high-tech careers. The educational contents of the Tech-Prep take time to think about their future, including doing hands-on activities, applying theoretical and academic skills to real-world problems, using work styles that emulate employment settings, and so on.

The Tech-Prep program consists of hands-on activities that students can experience in person. Since student participation is the main activity, it is natural that face-to-face classes take place. However, due to the COVID-19 pandemic, it has become difficult to turn Tech-Prep into non-face-to-face classes. Therefore, educators need new educational strategies to replace face-to-face classes. Non-face-to-face classes such as video lectures and remote sessions are suitable for educators and students. To smoothly operate non-face-to-face classes, digital tools that can adequately interact between educators and students become a fundamental element of learning [3].

This paper focuses on the roles of an educator, students, and staff in non-face-to-face classes and looks for related research on applying hands-on contents to non-face-to-face classes (Section 2). We suggest the considerations for proposing the "PLIMP" structure, an education model that uses hands-on contents for non-face-to-face classes (Section 3). Then, case studies using the PLIMP structure seek to explain the change in students' interests in engineering and the learning achievement by conducting online hands-on contents (Section 4). Finally, we evaluate the effect of the Tech-Prep program consisting of hands-on contents in non-face-to-face classes (Section 5).

II. RELATED WORK

Researchers have shown class methods depending on meeting between educators and students, such as face-to-face classes, mixed classes, and non-face-to-face classes. The study of non-face-to-face classes is also noteworthy because it increases students' interest and concentration in mixed classes [4]. When only non-face-to-face classes are conducted, it is necessary to organize easy classes that students can understand immediately rather than complex contents that take time to understand [5]. Educators must spend much time making the class more student-centered and preparing creative classes such as applying hands-on contents [6].

05

최종 결과 및 향후 계획

05. 최종 결과 및 향후 계획

계획 완료 여부

중요 마일스톤	완료 여부	캡스톤 디자인2 예정
초기 테스트 진행	✓	
사용자 요구사항 정리	✓	
3D Object Database 연결	✓	
3D Object 생성 처리	✓	
3D Object Position/Scale/Rotate 기능 구현	✓	
Next.js 플랫폼 리팩토링		✓
Link object 개선 및 추가 구현		✓
외부 3D Object 삽입		✓
최종 테스트 진행		✓

Thank you