Reception number	

SW Institute	**Academicity Capstone Design Result report**

Task type	■Technical solution type			□Problem excavation	
Task area	■AI	□Information protection	□VR/AR	□IOT	□Big Data
Task name	Dump truck accident prevention through object detection		Team name	God(Guardians of dump)	
Period of execution	2023/03/01/ - 2023/06/30				

Coaching staff	Affiliation	Department of Computer Engineering	Name	Ilyong Chung	
	Contact	010-8666-6470	E-mail	iyc@chosun.ac.kr	
Participating agency	Name	ByungGyu No	Participating agency Human resources man	Department / position	Chief Researcher
	Representative	Wontae Lee		Name	Korean Internet & Security Agency
Participating agency	Name	Heekyu Gwak	Participating agency Human resources man	Department / position	CTO
	Representative	Calvin Heo		Name	METARPAS,INC

Participating students	Major	Grade	Class Number	Name	Contact
	Computer engineering	4	01	Jun Yeop Bang	010-9958-4258
	Computer engineering	4	01	Soung Min Kang	010-9432-0627
	Computer engineering	4	01	Jeong woo Lee	010-2264-3812

Gitub Link 주소	https://github.com/P-C-Space/Chosun_Capstone_Design

Submit a result report according to the Design Support Plan of the University Campus Support Business Program, SWU-centric Business Support Project.

2023 year 4 month 4 day

Coaching Staff : Ilyong Chung (sign)

Representative Student : JUN Yeop Bang (sign)

Chosun University SW Master of Education

<별첨서식#2>

Composition of Capstone Design Projects for the industry-style capsulation projects

1. Task Professor and Professor of Engagement

Index	Name	Position	Subject	Contact	E-mail
1	IlYong Jeong	Professor	Computer Engineering	062-230-7712	iyc@chosun.ac.kr
2					

2. A list of Members

Index	Subject	Year	Class Number	Name	Contact	Role
1	Computer Engineering	4	01	Jun Yeop Bang	010-9958-4258	Team leader
2	Computer Engineering	4	01	Soung Min Kang	010-9432-0627	Deputy Team leader
3	Computer Engineering	4	01	Jeong woo Lee	010-2264-3812	Team member
4						
5						
6						
7						
8						
9						
10						

3. Other participants(Graduate student /Internal/External experts / practicpants)

Index	Name	Role	Affilation	Contact	E-mail
1					
2					

<별첨서식#3>

A Study on the Execution Plan of Capstone Design Studio

1. Outline of Task

Background and Purpose
- Due to the blind spot of the dump truck, accidents occur frequently because they don't recognize driving vehicle and pedestrian. Especially, There are case of death because they couldn't see a shot man and kids. Therefore we want to prevent accidents by objects detection in the dump truck blind spot, analyzing the recognized information, and notifying the driver.

expectation effectiveness
- There were three major dump truck blind spot accidents we investigated.
 1. When right turn, accident due to difficulty in viewing angle in the lower right area
 2. When wait for traffic light, accident due to person passes by jaywalking
 3. They couldn't see person in construction.
- If AI can recognize objects in blind spots, it can be expected to greatly reduce these problems.

2. The Necessity and Expected Effect of Task

2-1. The Present Condition of Existing Technologies, Problems and Improvement Measures

Currently, Volvo is a representative company developing artificial intelligence that reduces dump truck blind spot accidents. You can also see that most dump trucks in our country are made by Volve company. And the artificial intelligence system Volvo is developing is called the Volvo Autonomous Hauler Concept. The system uses a variety of sensors, including cameras, radars, and lidars, to detect the environment around the dump truck, Based on this, the distance and location between the dump truck and the surrounding environment are calculated. This detects blind spots, sends a warning message to the driver or automatically controls the vehicle to prevent accidents. Customers in Korea who purchased Volvo dump trucks can install additional AI systems according to their choice. However, in most cases, the system is expensive, so you buy the old one secondhand, or you don't add the option because it's too expensive. Therefore, we would like to solve the above problems by making blind spot object detection artificial intelligence products at a low price.

2-2. Expected effects due to task development or production

Accidents continue to occur every year because of the dump truck's blind spot. But Because it is expensive to add blind spot detection system option, They don't add options or buy old dump truck. so we will make low-cost products for increase accessibility.

3. Task goals and content

- Using object recognition algorithms and analyzing image data

- The camera recognizes the dump truck's blind spot in real time

- Camera recognizes objects such as people, motorcycles, bicycles, etc. and generates a warning sound

- Evaluate the performance of the developed system, supplement and improve

4. How to Perform a Task

4-1. Task performance

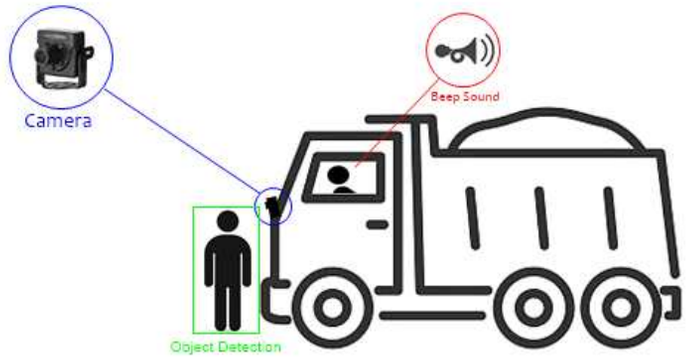
Task objective
By using a camera installed on the front of the truck, pedestrians and motorcycles in blind spots can be detected, and a warning sound can be generated to provide the driver with information that accident prevention is necessary.

Participating member	Performance role
Professor	- Feedback for project process - suggestion and advice for direction of process
	AI training / GUI design
	App coding / Raspberry PI development
	App coding / Interlink App with Raspberry PI

4-2. Propulsion system

- Hardware component

1. Waterproof miniature camera
2. Computer equipment



- Software component

1. Visual Studio Code development tool used
2. Object recognition algorithm utilized
3. When objects such as pedestrians and motorcycles are recognized, a warning sound is emitted.

5. Advance schedule

Details	Period of execution(Month) (Plan : ⇨)																	Etc
	03					04				05					06			
	1	2	3	4	5	1	2	3	4	1	2	3	4	5	1	2	3	4	
An idea conference																			
Hardware Configuration																			
Building Artificial Intelligence Models and Camera Interworking																			
Object Detection Test																			
Build a field test model																			
Field test																			
Commercialization																			

○ Task Detail Capstone Design

Week	Project propulsion plan	Enterprise Participation status	Participation Name of enterprise
1	Team building and topic discussion		
2	Topic selection		
3	Hardware Configuration		
4	Object recognition AI study		
5	Building Artificial Intelligence Models		
6	Model test		
7	Build a field test model		
8	Field test		
9	Fix Error and Add Function		
10	Field retest		
11	Commercialization		
12	Create the result report		

6. Expected effects and utilization measures

- By preventing accidents in dump truck blind spots, we can create a safer driving environment (improving safety)
- - Productivity can be improved by preventing large inventory movements caused by accidents caused by blind spots in dump trucks.
- - It can be attached to and used not only dump trucks but also heavy equipment vehicles with blind spots can be used.

7. Requirement expense statement

(Unit : Won)

Sortation	Cost		Ratio(%)
	Calculation details	Estimated amount	
Material cost	Purchase hardware components	300,000 Won	100 %
Total		300,000 Won	100 %

1.재료비는 1인 200,000만원 한도로 산출함
(ex.팀원 4명기준 신청가능 예산액은 80만원까지 가능함)
2.금번학기는 재료비에 대해서만 예산산정 가능함