

SYNOPSYS®

2023 Synopsys ARC AIoT Design Contest

Project Proposal

Application of GCP-assisted braking
system with medical mobility scooters

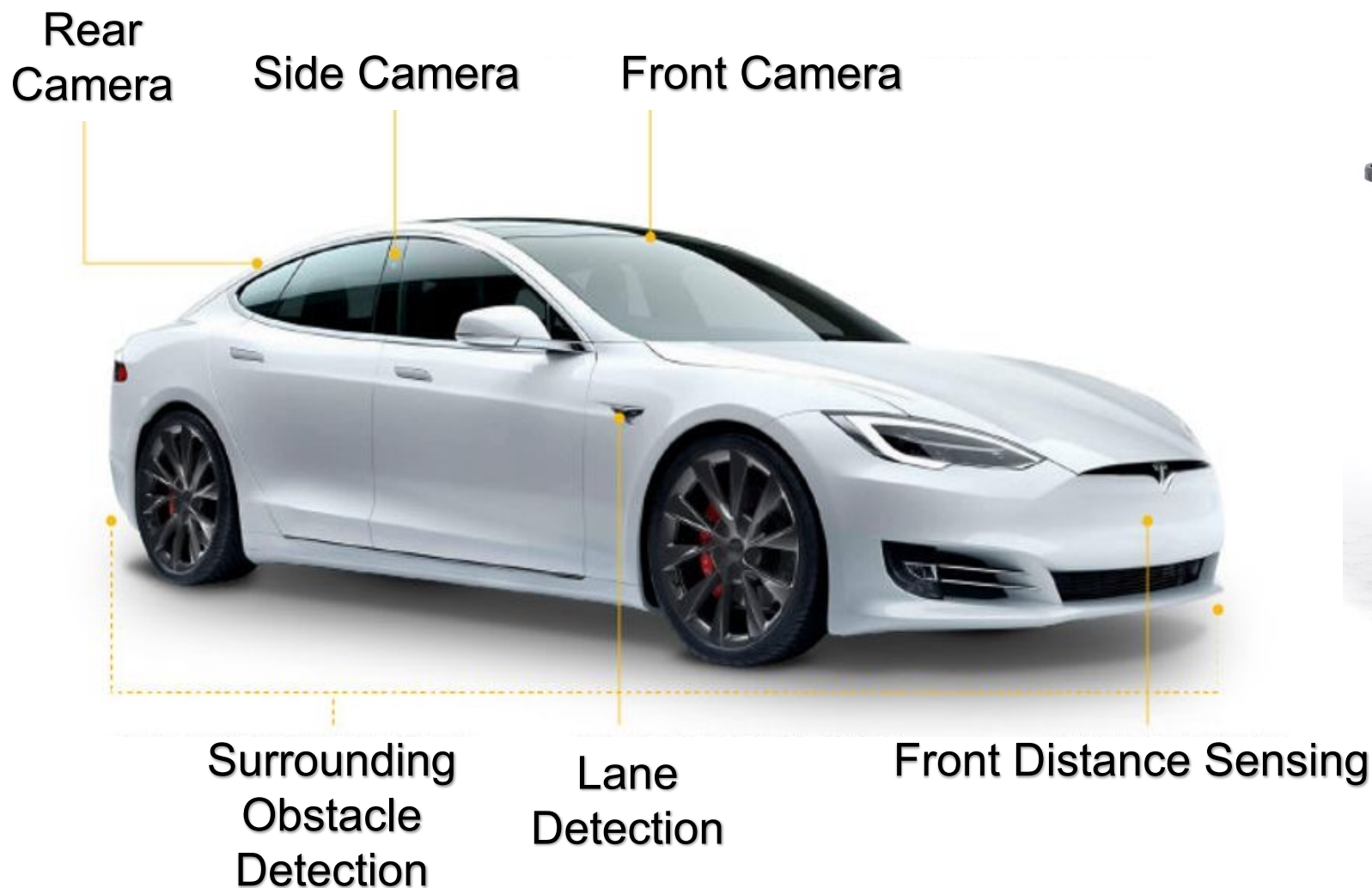
July 21, 2023

Presenter- 曾石瑋宸 陳彥儒

Agenda

- **Motivation and Abstracts**
- **Innovation and Challenge**
- **Design and Reliability**
- **Results and Demo**

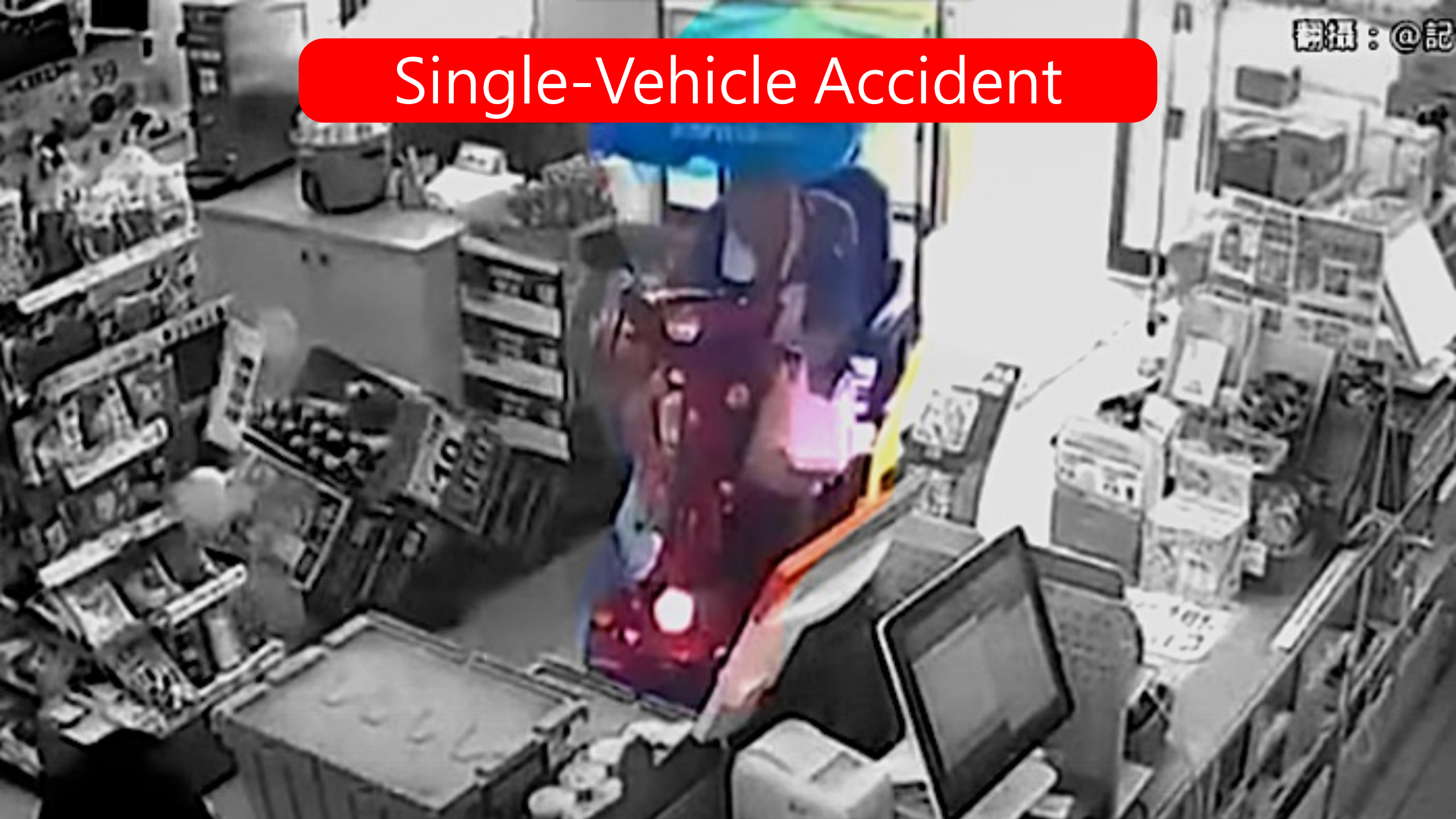
Motivation - High Risk with Mobility User



Surrounded with Danger



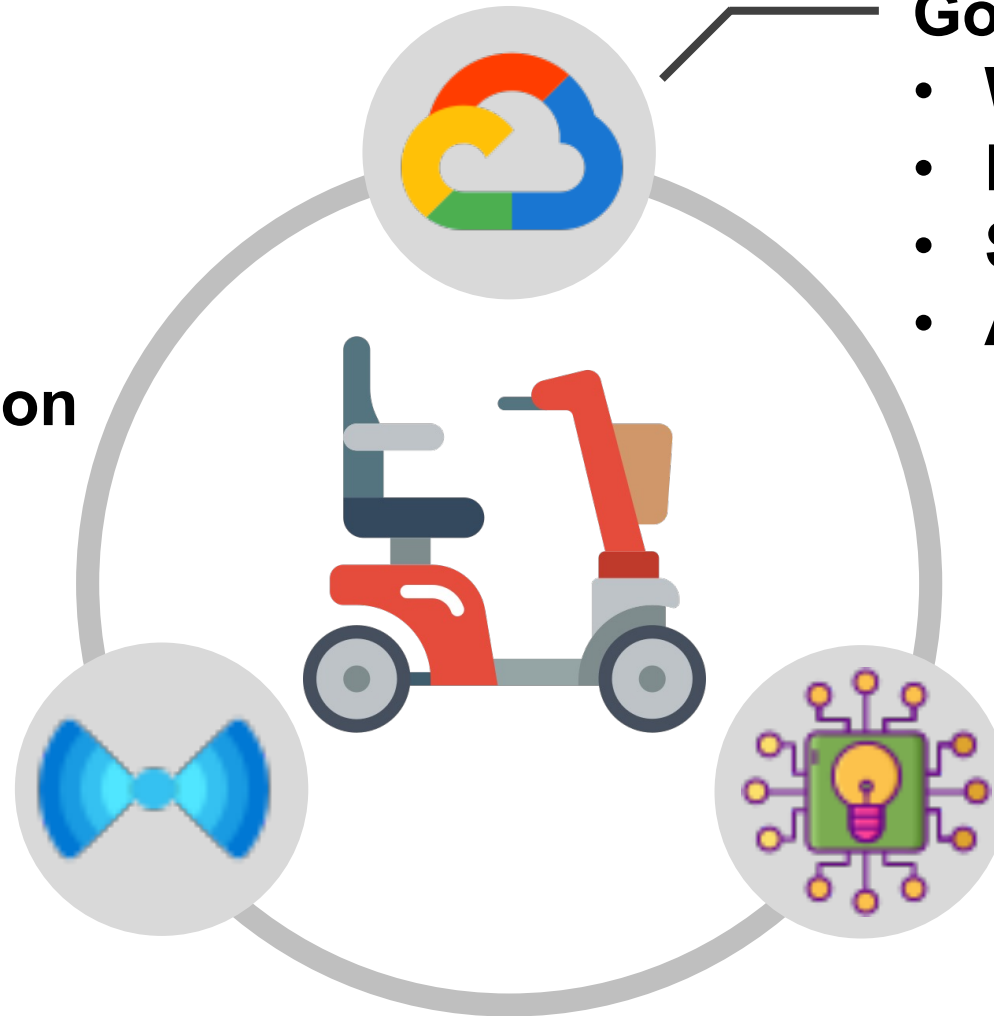
Single-Vehicle Accident



Abstracts - System Architecture

Multi-Sensor

- Control mobility scooter
- Perceive information around mobility scooter



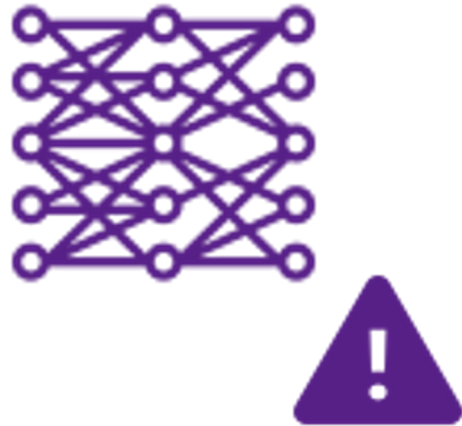
Google Cloud Platform

- Web-base Dashboard
- Realtime Database
- Safety Fence Service
- Authorize user account

ARC EM9D

- Braking Implementation with CNN model

Innovation



Braking Implementation
with CNN model

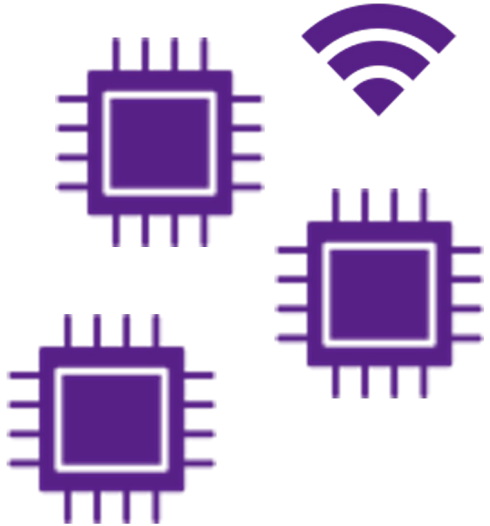
ARC EM9D



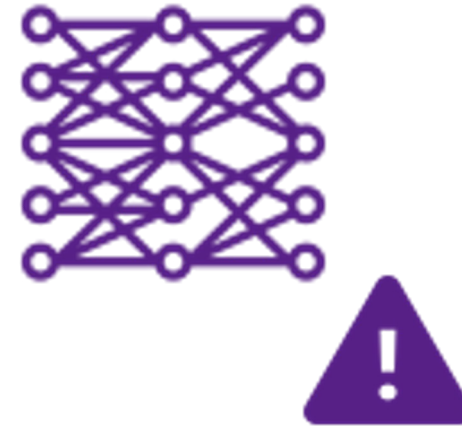
Safety fence for
mobility scooter

Google Cloud Platform

Challenge

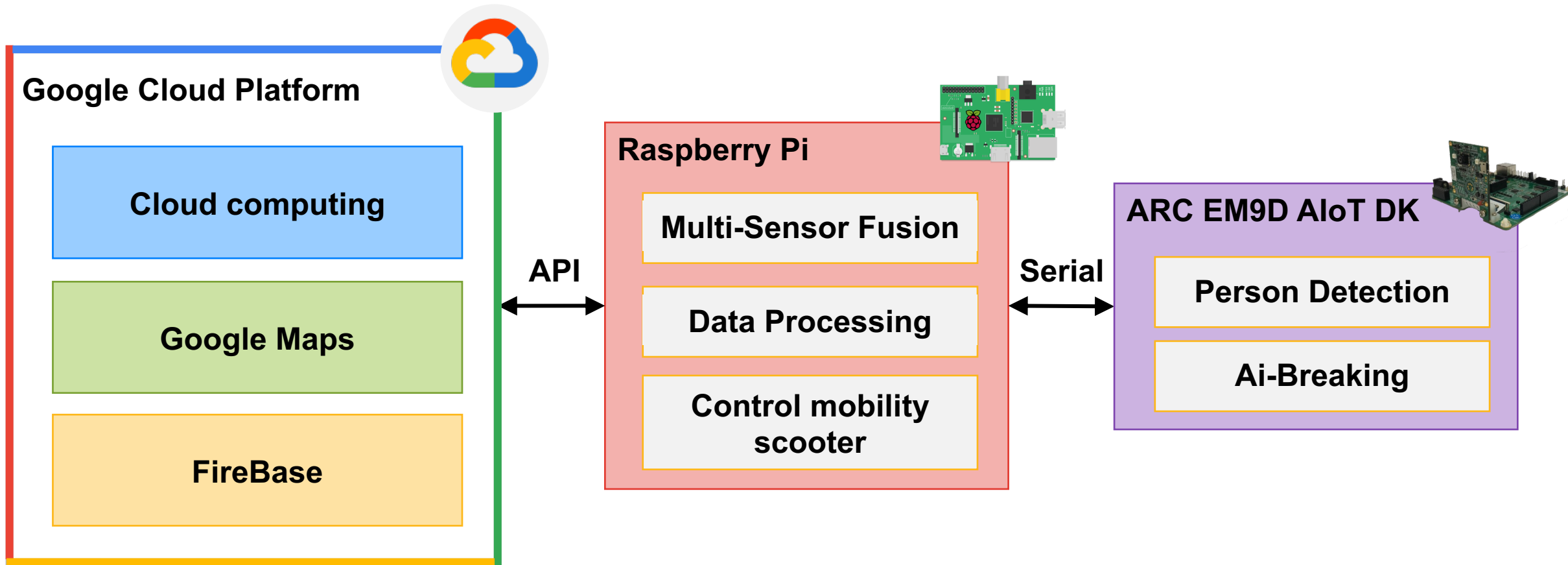


Wirelessly integrate
multi-sensor

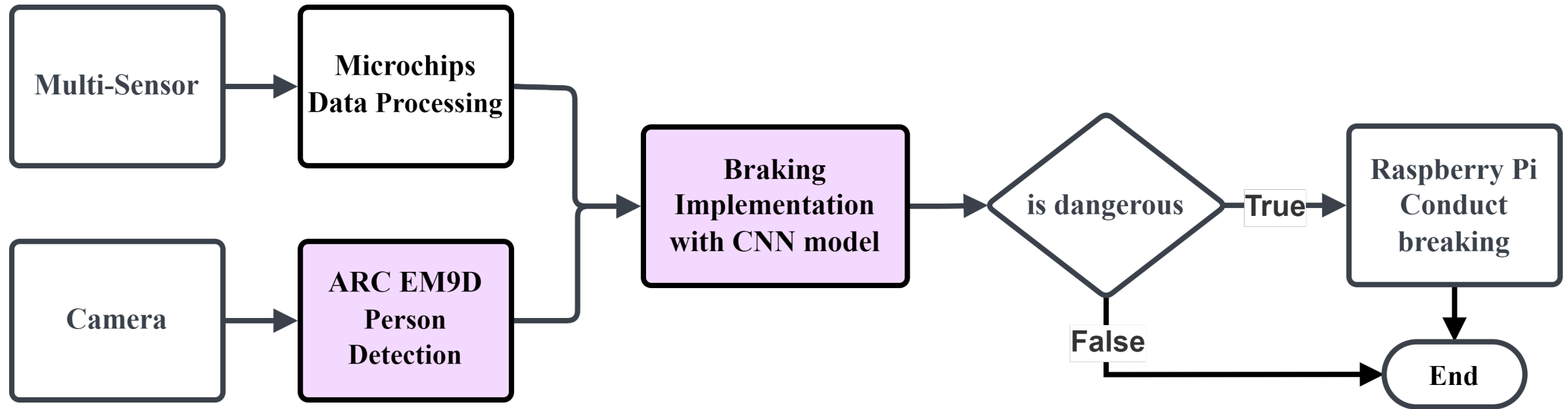


Braking Implementation
with CNN model

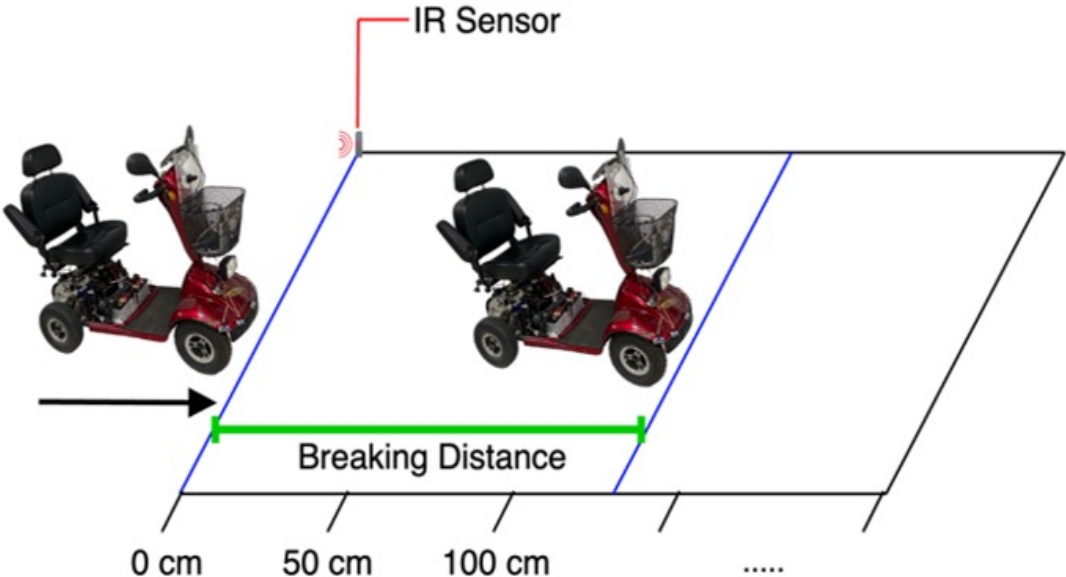
Design – Architecture



Reliability – AI-assisted Braking



Reliability – AI-assisted Braking



Schematic of the experiment

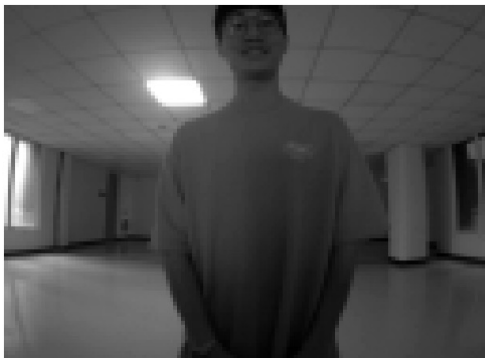
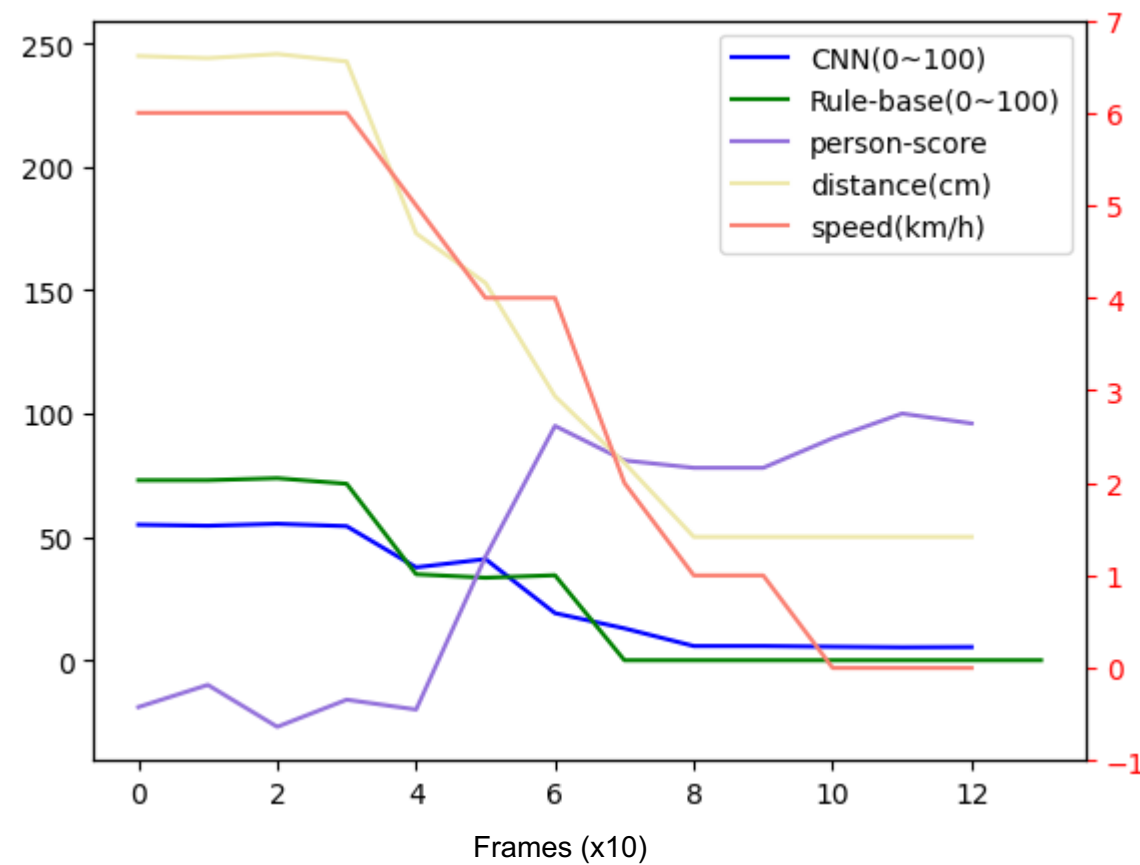
Vector table

Vehicle Speed	Danger Distance	Warning Distance
0 ~ 1 km/h	32 cm	132 cm
1 ~ 2 km/h	41 cm	141 cm
2 ~ 3 km/h	64 cm	164 cm
3 ~ 4 km/h	76 cm	176 cm
4 ~ 5 km/h	91 cm	191 cm
5 ~ 6 km/h	105 cm	205 cm
6 ~ 7 km/h	136 cm	236 cm
7 ~ 8 km/h	171 cm	271 cm
8 ~ 9 km/h	212 cm	312 cm
9 ~ 10 km/h	258 cm	358 cm

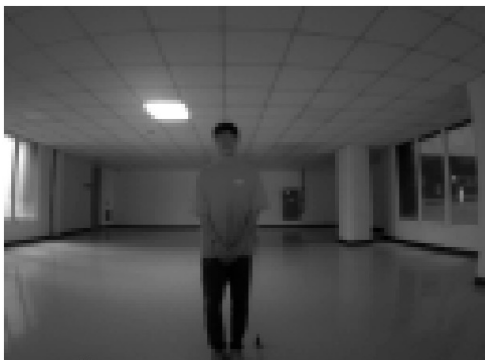
Reliability – AI-assisted Braking

Model Architecture	Input	Output	Average Mean Square Error
Convolution	<ul style="list-style-type: none">• Speed• ARC person score	Throttle	14.6881
Convolution	<ul style="list-style-type: none">• Speed• ARC person score• Front distance	Throttle	7.99561
MLP	<ul style="list-style-type: none">• Speed• ARC person score• Front distance	Throttle	12.9501

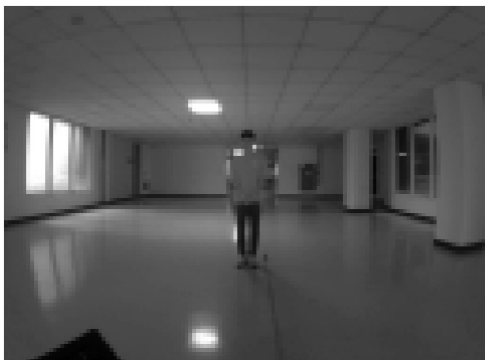
Reliability – AI-assisted Braking



50 CM
Score:114



150 CM
Score:90



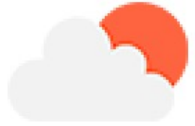
300 CM
Score:-110

DEMO

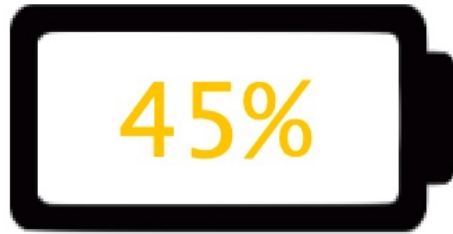


10:27

ARC Contest



25°C



關機

0

km/hr



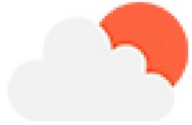
警報

解鎖

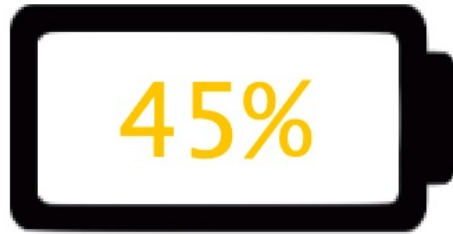


10:27

ARC Contest



25°C



0

km/hr



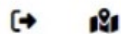
關機

解鎖

警報



歡迎, 瑋宸



代步車拍照

選單

資訊總覽

位置

訊息中心

使用者

設定

地圖

家屬安全



在陽明交通大學中

計算時間: 2023-07-05 17:37:03

安全圈

--安全圈清單--

臺灣微軟

新光三越 台北信義新天地A11

長庚大學

國立體育大學綜合體育館 (林口綜合體育館)

陽明交通大學

←安全圈清單

新增安全圈→





歡迎, 瑋宸



代步車拍照

選單

資訊總覽

位置

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地圖

家屬安全



超出所有圍籬範圍

計算時間: 2023-07-05 17:37:46



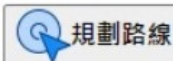
開車



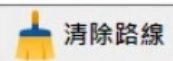
大眾運輸



走路



規劃路線



清除路線



333台灣桃園市龜山區文化一路259號

60.0 公里, 約 53 分鐘

1. 往東南 16 公尺
2. 向右轉 0.3 公里
3. 向左轉, 朝文化一路/體大一路前進 0.2 公里
4. 向右轉進入文化一路/體大一路 1.8 公里
繼續開在文化一路上
5. 向右轉進入文化一路/桃7鄉道 2.6 公里

安全圈

--安全圈清單--



安全狀態通知服務: 代步車已超過圍籬範圍

離開之圍籬為: 陽明交通大學

查看詳細資訊: <https://willy01010.github.io/newwebsite/root/maps.html>

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LIFE LONGER



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