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AU SENSES LIFE

IN EVERYDAY SITUATIONS



AU INC.

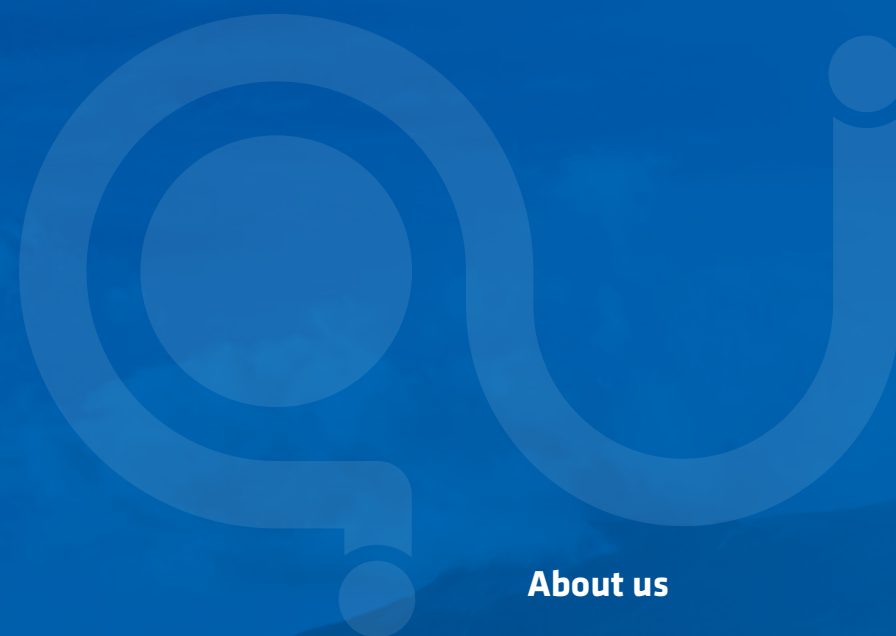
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About AU



**“AU senses everything
in the universe”**



Every object can be detected with the proper selection of sensors and detection algorithms.

Our current interests include but not limited to the detection of lifeforms, especially humans, using millimeter-wave radar sensors with the aid of deep learning.

Millimeter-wave radar sensors can detect a human itself but also its vital-signs, which are the characteristic signals generated due to heartbeats and respiration. This enables us to distinguish humans successfully from non-life form objects, or even detect humans staying still behind obstacles.

AU is planning to provide full-custom designing services, from designing RFIC to signal processing and target detection, in the future.

Market Analysis

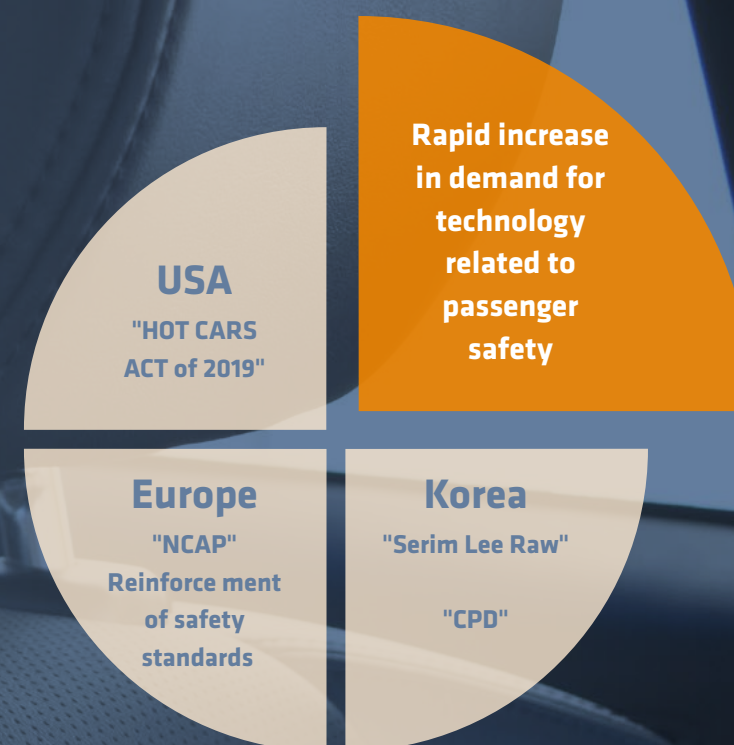
‘Legislation of a Child Presence Detection System’

From now,

A passenger detection system for vehicles will become **essential devices**

Global Trends

Compulsory installation of passenger safety devices



"Hot Cars Act of 2019"(From 2025)

- Reinforcement of vehicle safety device led by Global Automakers and Auto Alliance



Euro NCAP

New Car Assessment Programme
4 points additional for passenger detection system installed vehicle



"Serim Lee Raw"

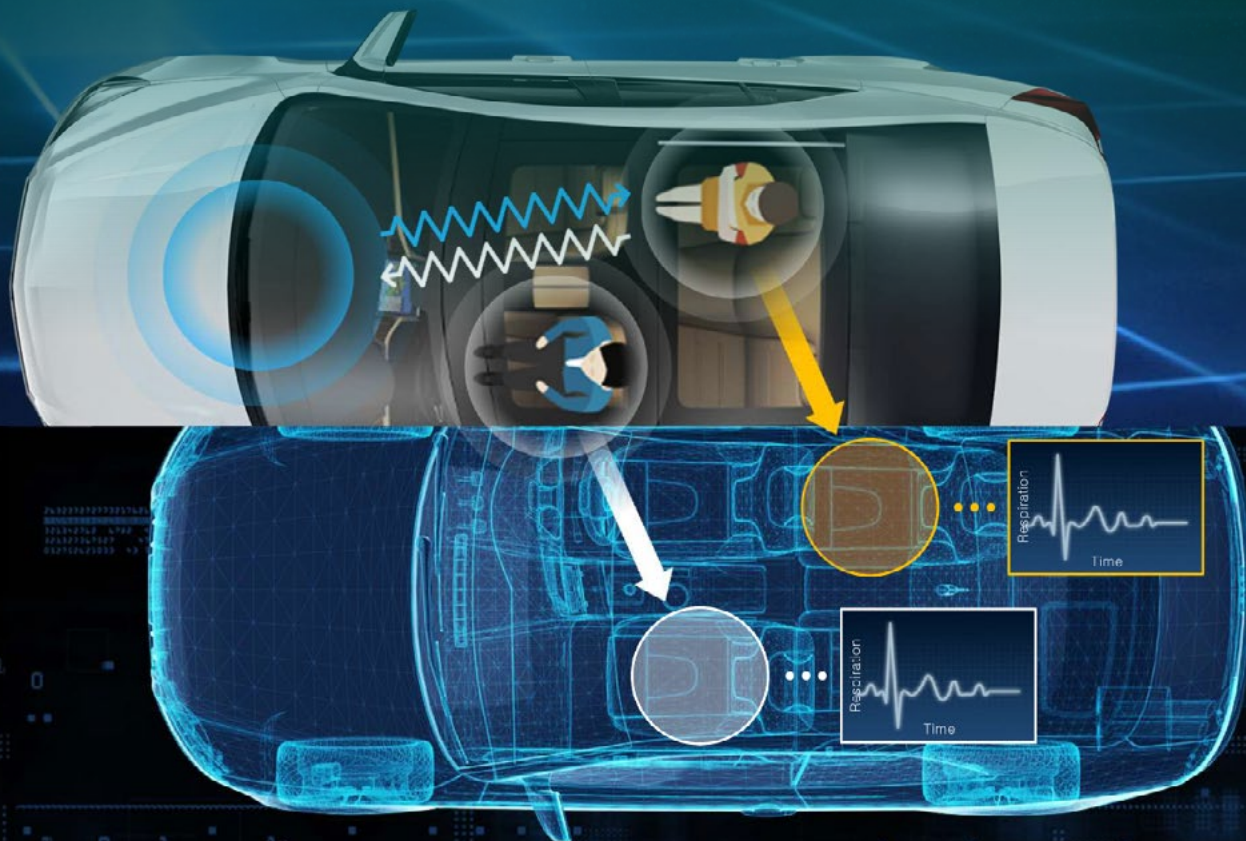
- Registration of vehicles for school use
- Boarding a companion guardian
- Expand driver and teacher safety education

Compulsory installation of Child Presence Detection system from 2019

• mmWave 60GHz Radar Sensor

Rear Occupant Alert sensor Using 60GHz Radar

- 01 **High Transmittance**
Easy to go through obstacles
- 02 **Sensing Biosignal**
Heart-beat & Breath
- 03 **Non-contact Sensor**
- 04 **Precise Phase Measurement**
60, 79GHz Radio Frequency
- 05 **Outstanding Detection Range**
Max. 70~80m
- 06 **Protection of Personal Information**



• H/W and S/W Introduction

> RADAR Module Design



> Signal Processing

01 Antenna Customizing for Application

02 Radome Design

03 Production Line for Full Package

01 Raw Data Capturing

02 Removal Engine Vibration

03 Removal External Shock and Data Noise

04 Reinforcement of Detection Accuracy with A.I algorithm

05 Human Body Identification

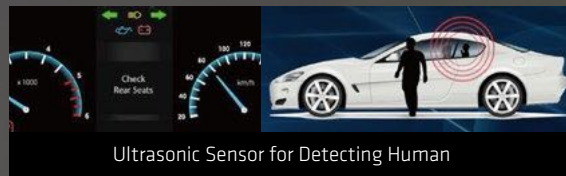
Competitive Advantage

	B **	AU		
Chip	Infineon (BiCMOS)	TI (CMOS) ↓ CMOS chip is cheaper		Reasonable Cost
MCU, Antenna	Off chip, Off package	On chip, On package ↓ No additional MCU, Antenna	TI single chip Module Size 60% Downsized 	TI Single chip
Chip output structure	I Only	I, Q ↓ Stable structure for detecting Bio-signal		Patents
Algorithm robustness	Medium	High ↓ Algorithm resistant to vehicle vibration and external shock		Patents

* MCU: Main Control Unit

Performance Required

- Problems of Existing Ultrasonic Sensors



01 Low Permeability and DetectionRange

02 Human body cannot be detected if there is no movement

03 Affected by engine vibration or external shock

- Rear Occupant Alert (ROA)

Hyundai-Mobis will replace its sensor to mmWave Radar Sensor

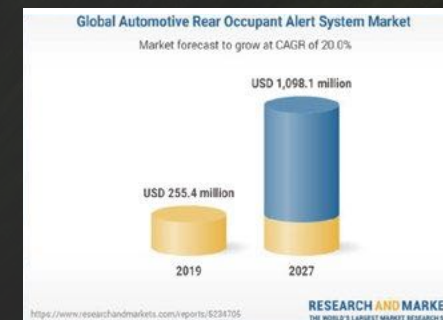


- EURO NCAP -Plus 4 Points with radar sensor

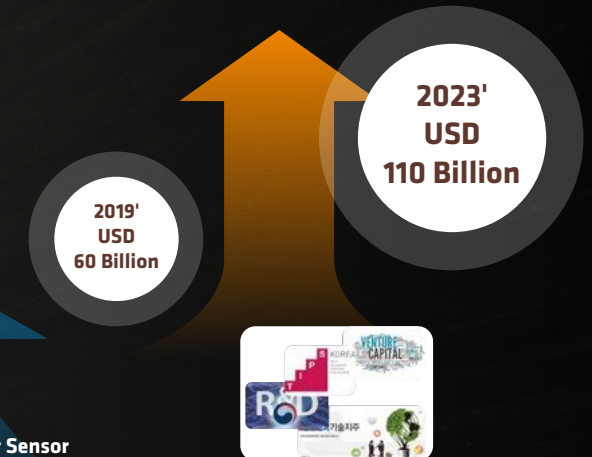
NCAP (New Car Assessment Program) : widely used standard in global automaker market

Market Expected and Sales Strategy

- Global Passenger Detection Sensor Market -
Annual Average Growth 20% in 2027



- Global Non-contact Sensor Market -
Annual Average Growth 17% in 2023



Direct Sales
To
Major Automaker

Rapid Market Growth of Radar Sensor

Major Customer / Investment / Accelerating / R&D Support Programme

PF Plan

Strategy	Action	Investment(\$)	Solution
R&D	H/W, S/W Development	880,000	Investment Attraction and Government Aid
Development of Breath and Heart-beat detector	Test of S/W Algorithm	35,000	Co-project and R&D support programme with Seoul National University Hospital
Initial Production Line Establishment	Production Facility Automation	3,090,000	Investment and Smart Factory Business
Development of Self-driving technology	F/S and R&D	1,060,000	Government R&D Support Business and Venture Capital Investment
Targeting Global Market	USA, EUROPE, South-eastern Asia	130,000	Export Assistance Programme
Sum		5.19 million	Additional Investments are on the table

Exit Plan and Business Relationship



In-Cabin Radar Sensor

Safe & comfortable driving
environment providing solution



• Product Details

SIZE
40 mm X 40mm (x 2mm)
FEATURE
Center frequency: 60 GHz – 64GHz Using AOP(Antenna on Package) type antenna Phased array antenna (3-ch TX & 4-ch RX) MIMO function available FMCW radar

Specifications	
Effective Detection Range	0~50m
Range Resolution	0.04m ~ 0.2m
Effective Detection Azimuth FOV	60 °
Azimuth Angle Resolution	5 °
Effective Detection Elevation FOV	60 °
Elevation Angle Resolution	5 °
Max Detection Velocity	250 km/h
Velocity Resolution	1 km/h

Application

/ Vehicular In Cabin Sensor

Safe & comfortable driving
environment providing solution



CPD
(Child Presence Detection)



SBR
(Seat Belt Reminder)



DMS
(Driver Monitoring System)

• **CPD** (Child Presence Detection)



- A radar sensor is used to detect infants left behind in a vehicle.

Distinguishable baby from objects

Detectable area (Sedan) → Rear two seats

Detect blind spot such as footwell

Eliminate false alarm due to engine starting or external shock

Detectable area (SUV) → Rear four seats (2nd row two seats + 3rd row two seats)

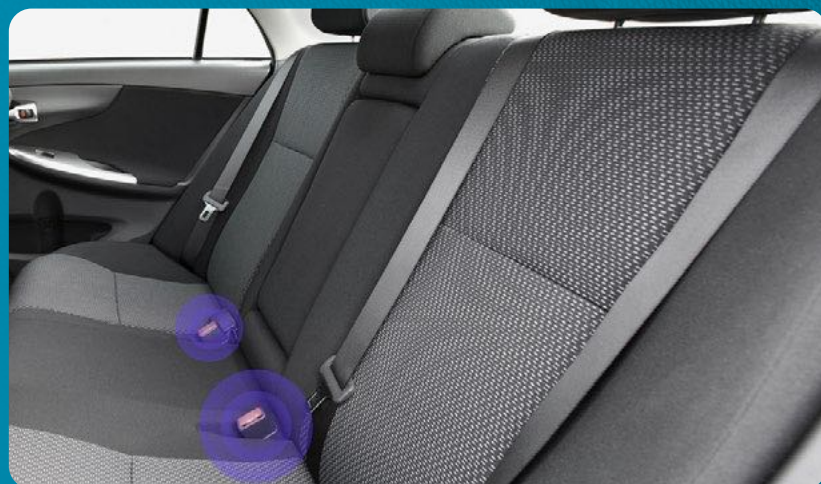
Application

• SBD (Seat Belt Reminder)



- Check whether the seat belt is worn using a radar sensor

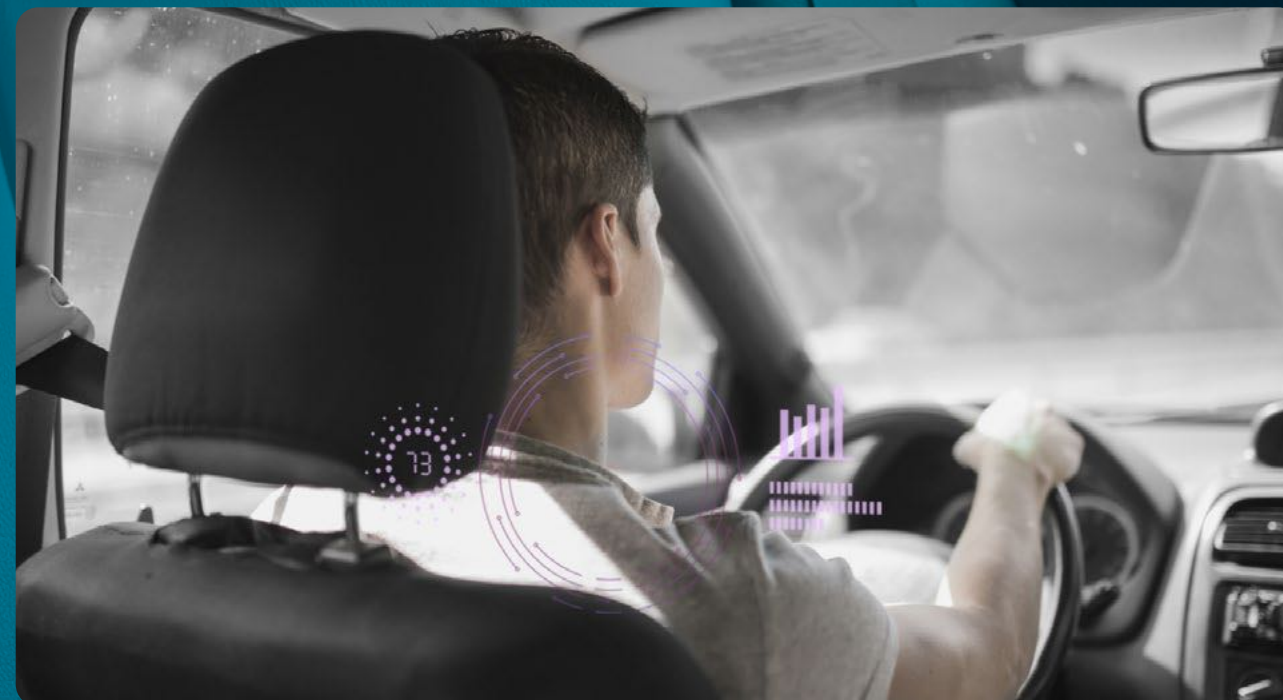
- Distinguishable human from objects
- Eliminate false alarm during driving
- Detectable area (Sedan) → Rear two seats



- Determining the location of passengers using radar sensors

- Detectable area (SUV) → Rear four seats (2nd row two seats + 3rd row two seats)
- Maximum detectable people at the same time → four people

• DMS (Driver Monitoring System)



- Monitoring driver's vital signs using radar sensor

- Real time driver respiration/heartbeat monitoring
- High accuracy compared to medical device

Application

/ Smart Home

Safe & convenient lifestyle
providing solution

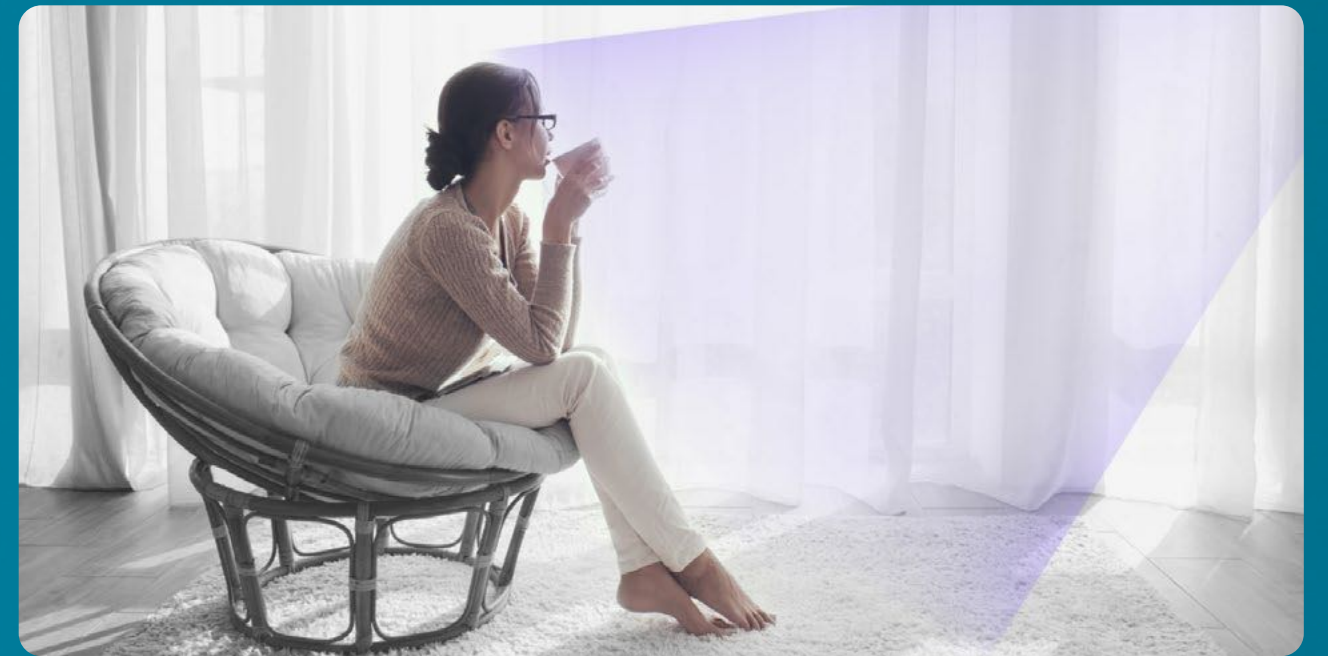


Digital Healthcare



Home/Building Security

• Digital Healthcare



- Daily vital data accumulation → Accurate diagnosis available
- Reducing social cost available
- Expeditious diagnosis available



Smartphone

Expeditious diagnosis available
Education of exercise and diet



AU Sensor

Non-contact Vital Sign Monitoring



Network Server

System Control
Data Collect & analysis
Technical Support



Feedback (Hospital)

Data review & feedback

Team Power



CEO
Baekhyun Kim

CEO Career and Ability

- Ph.D. in Electronic Engineering at KAIST
- Radar system / Radar IC, PA IC Development
- SCI Papers and Patents
- KAIST E5 Final Winner
- Radar IC Technology Instruction
- Career from SAMSUNG ELECTRONICS

TEAM

- mmwave Radar IC Development
- mmwave Radar Module Design
- Radar Signal Processing
- A.I and Deep-learning Application
- Electromagnetic Wave Material Analysis Sensor



KAIST



KAIST



KAIST



KOREA
UNI.



INHA
UNI.



HANYANG
UNI.



KAIST



KWANGWOON
UNI.



SOONGSIL
UNI.



KWANGWOON
UNI.



Consisting of Ph.D. in electrical and electrical radio engineering fields, as well as from Samsung, SK Hynix

• Facilities

- Temp. and Humid Chamber, Power Meter, Amplifier, 3D Printer, Oscilloscope etc.



• Demonstration

- Pilot Test



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