Smart Security with Multiple CCTVs and
Disaster Surveillance with UAV

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Senior Researcher
Su-Jin Youn

ETRI

Contents

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ETRI

Electronics and Telecommunication Research Institute

ETRI at a glance

'ETRI is a national ICT research institute with innovation at its core.'

Leader in the ICT Technology development.

- **Founded in 1976**

- **Total employees (June, 2018) 2,034**
  - Engineering (1,867(92%), Ph.D. 1,021(50%)
  - Administrative : 167 (8%)

- **Head office :DaeJeon, Korea**
  - 3 branches, 3 overseas offices (US, China, Europe)

- **Scope of area**
  - R&D in ICT area
  - Strategic Planning for national R&D Policy
  - Engineering support for SMEs
  - Leading international standardization activities

Growth Story

ETRI

Leading the ICT industry in Korea for 40 years

Most innovative research center in the world

Time-to-Market technology

Major Achievements

- TDX (Time Division Exchange) System : 1976
- DRAM (Dynamic Random Access Memory) : 1986
- CDMA (Code Division Multiplex Access) : 1989
- CDMA : 1996
- IMT 2000 : 2000
- WiBro : 2004
- DMB : 2005
- LoLA : 2007
- LTE (Long Term Evolution) : 2010
- 5G Telecommunications : 2017

ETRI 40 Anniversary

Leadership for commercialization (5 years)

ETRI

No. of patent application :16,062

SCI Papers :
No. of SCI Papers /
Average IF : 1,524 cases /2.14 av.

No. of Technology Transfer :
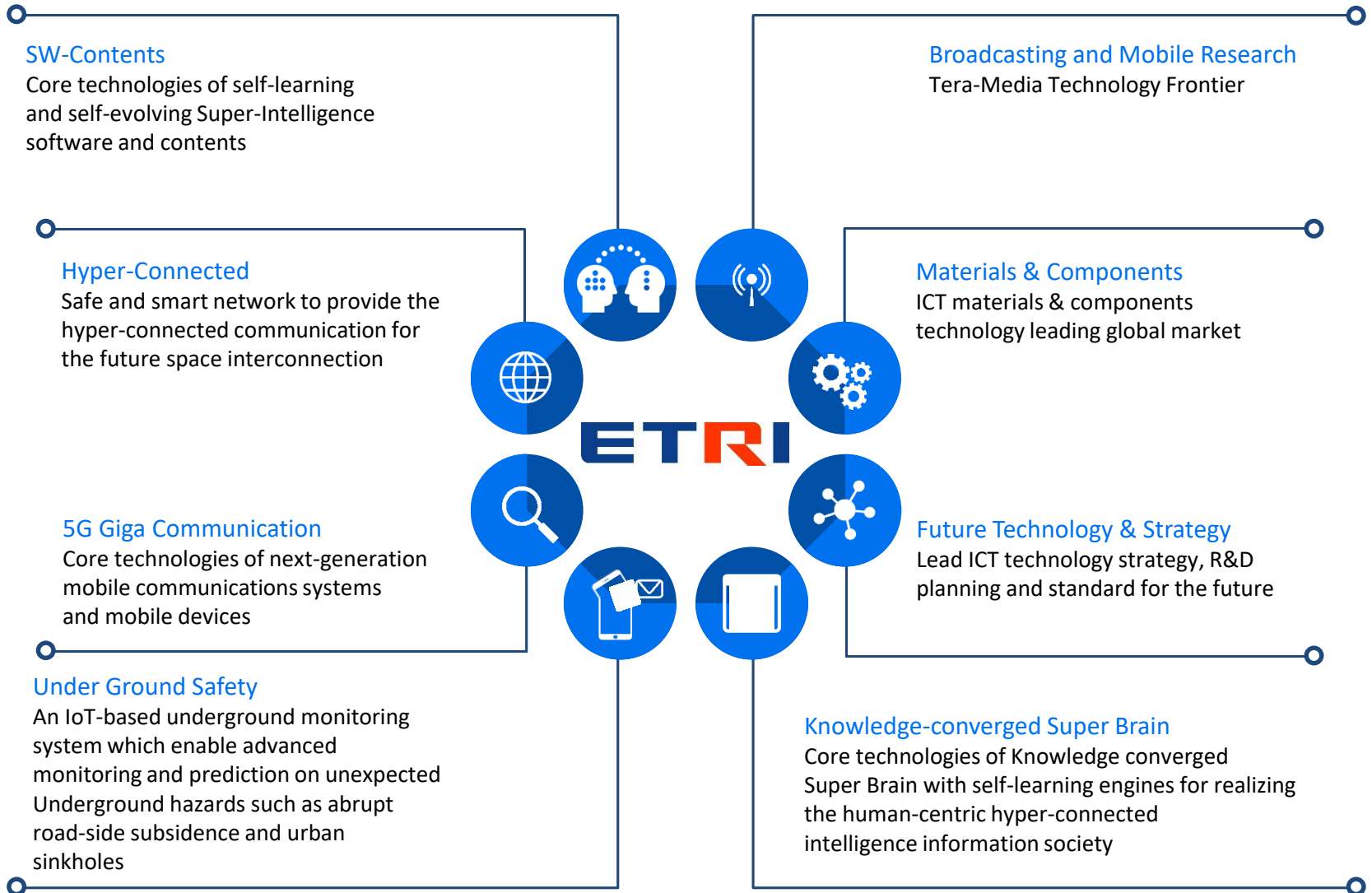Royalty revenue 2,479 cases /
US $152M.)

Engineering Alumni : 3,800

Standardization :
Standards Contributions Adopted :
7,309 cases /467 experts

R&D Project: 2,706 projects
(Budget US$2.5B.)

Common Core Technology

SW-Contents
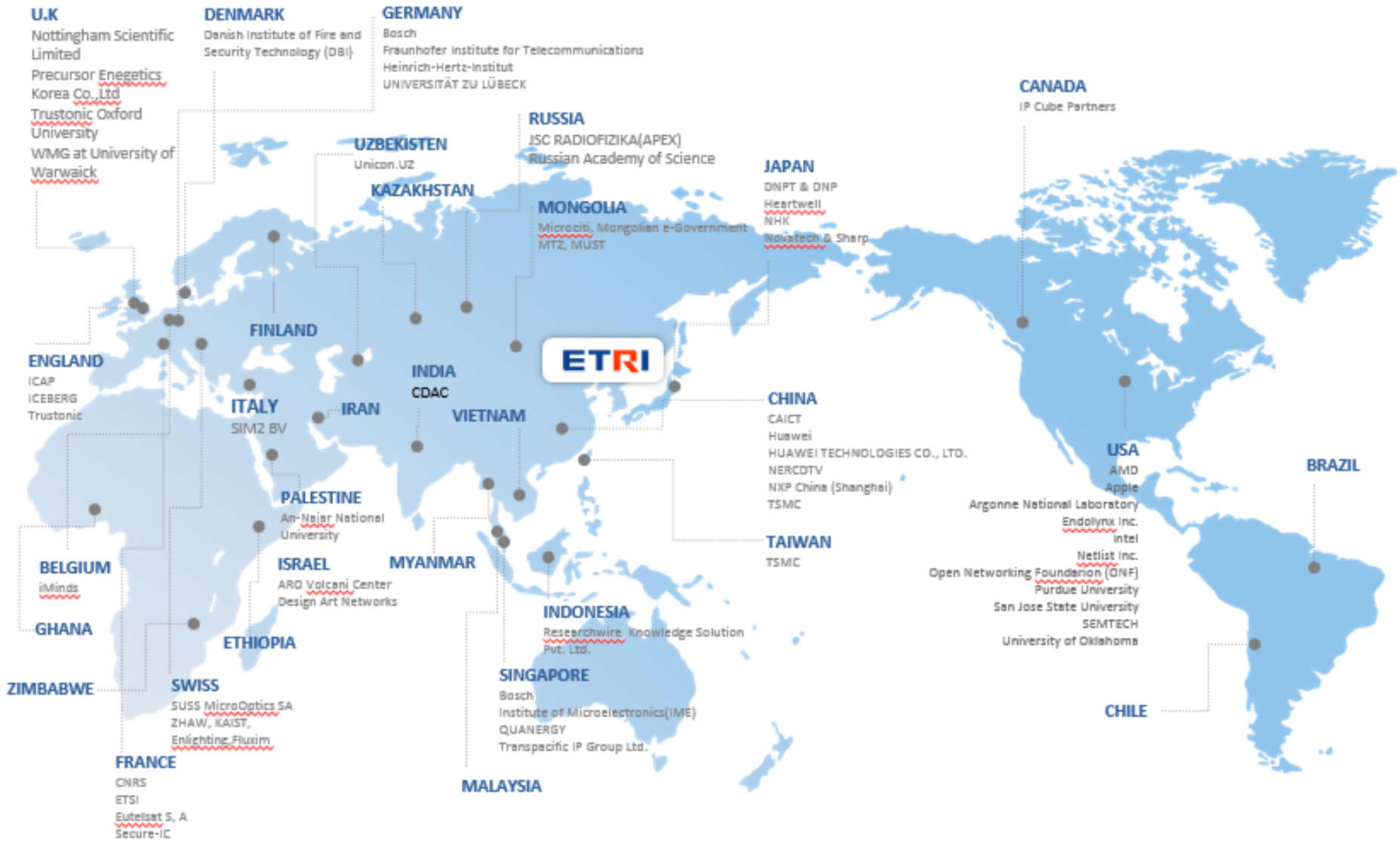Core technologies of self-learning and self-evolving Super-Intelligence software and contents

Hyper-Connected
Safe and smart network to provide the hyper-connected communication for the future space interconnection

5G Giga Communication
Core technologies of next-generation mobile communications systems and mobile devices

Under Ground Safety
An IoT-based underground monitoring system which enable advanced monitoring and prediction on unexpected Underground hazards such as abrupt road-side subsidence and urban sinkholes

Broadcasting and Mobile Research
Tera-Media Technology Frontier

Materials & Components
ICT materials & components technology leading global market

Future Technology & Strategy
Lead ICT technology strategy, R&D planning and standard for the future

Knowledge-converged Super Brain
Core technologies of Knowledge converged Super Brain with self-learning engines for realizing the human-centric hyper-connected intelligence information society

ETRI in National R&D Structure

- Policy
- Project Fund

- Technology Development
- Technology License

- Commercialization
- Royalty Sharing

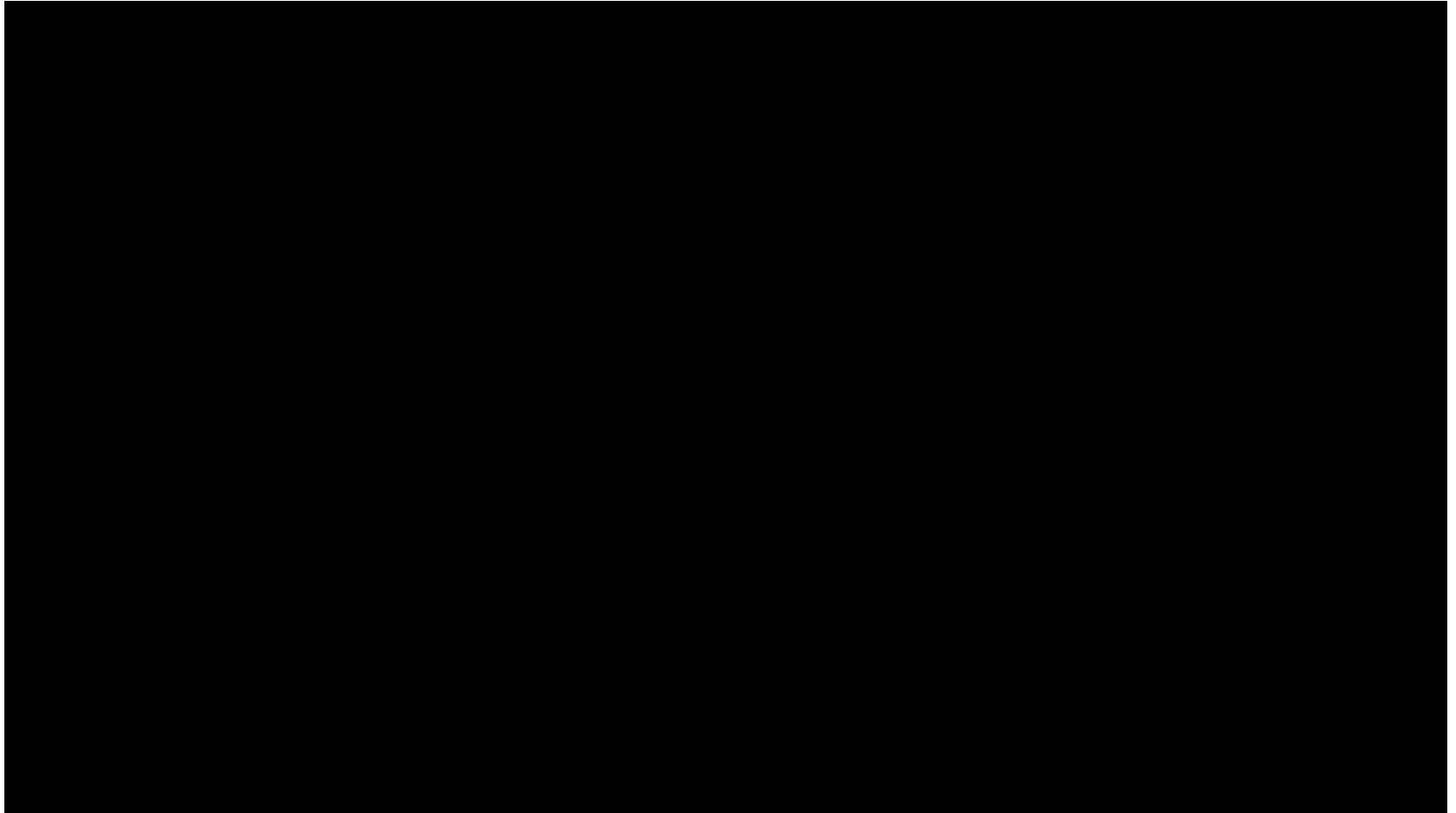Gov't

ETRI

Industry

Global Partners

U.K
Nottingham Scientific Limited
Precursor Enegetics Korea Co., Ltd
Trustonic Oxford University
WMG at University of Warwaick

DENMARK
Danish Institute of Fire and Security Technology (DBI)

GERMANY
Bosch
Fraunhofer Institute for Telecommunications
Heinrich-Hertz-Institut
UNIVERSITÄT ZU LÜBECK

CANADA
IP Cube Partners

RUSSIA
JSC RADIOFIZIKA(APEX)
Russian Academy of Science

UZBEKISTEN
Unicon.UZ

KAZAKHSTAN

MONGOLIA
Microciti, Mongolian e-Government
MTZ, MUST

JAPAN
DNPT & DNP
Heartwell
NHK
Novatech & Sharp

FINLAND

ENGLAND
ICAP
ICEBERG
Trustonic

ITALY
SIM2 BV

IRAN

INDIA
CDAC

VIETNAM

CHINA
CAICT
Huawei
HUAWEI TECHNOLOGIES CO., LTD.
NERCDTV
NXP China (Shanghai)
TSMC

USA
AMD
Apple
Argonne National Laboratory
Endolynx Inc.
Intel
Netlist Inc.
Open Networking Foundation (ONF)
Purdue University
San Jose State University
SEMTECH
University of Oklahoma

BRAZIL

PALESTINE
An-Najar National University

TAIWAN
TSMC

BELGIUM
iMinds

ISRAEL
ARO Volcani Center
Design Art Networks

MYANMAR

GHANA

INDONESIA
Researchwire Knowledge Solution Pvt. Ltd.

ETHIOPIA

ZIMBABWE

SWISS
SUSS MicroOptics SA
ZHAW, KAIST,
Enlighting Fluxim

SINGAPORE
Bosch
Institute of Microelectronics(IME)
QUANERGY
Transpacific IP Group Ltd.

CHILE

FRANCE
CNRS
ETSI
Eutelsat S, A
Secure-IC

MALAYSIA

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Smart Security with Multiple CCTVs

If you are…

Smart Security with Multiple CCTVs

- **CCTV Video Processing for accident prevention, crime tracing and stray child tracking**
  - Re-Identification of car and human from the multiple CCTV camera images
  - Alarming to prevent the car accident by analyzing the CCTV image and Blackbox image
- **Video encryption/decryption and masking to secure the privacy data with reliability**
  - Whole image or partial image protection for transmitting and storing data
- **Target Market : Local government, Transportation control center, CCTV Security Company**

Human/Vehicle Detection and Re-ID

Video Full-cycle Real-time Encryption/Decryption

Detection of traffic accidents and events

Privacy Masking for storage

Video inscription and decryption

AI (Artificial Intelligence) in CCTVSmart Security with Multiple CCTVs

Solving social problems **USING VIDEO CAUSED BY VIDEO**

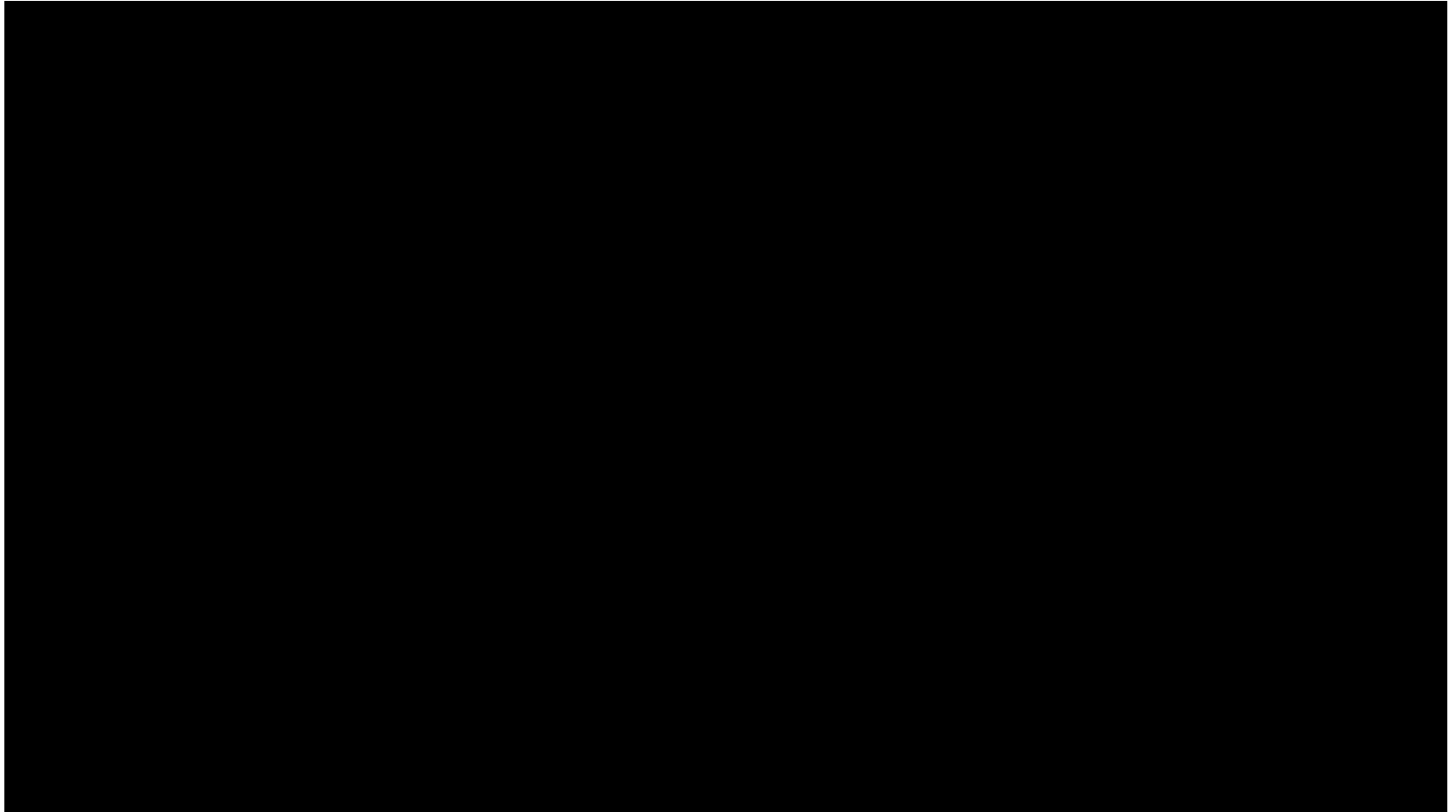# Smart Security with Multiple CCTVs

Disaster Surveillance with UAV

If you are…

Disaster Surveillance with UAV(Unmanned Ariel Vehicle)

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- **Still image processing with deep learning technology from the UAV for disaster surveillance**
  - Fire and flood detection and prevention
  - Longer than 4.5 hours flight with hybrid power source from fuel cell and battery
  - Wider coverage based on the autonomous navigation and longer flight distance
- **Target Market : Government (Forest Service), Local Government, Water management company**

KIMS

UAV with autonomous navigation and fuel cell

- **Power supply for UAV**
- **Hybrid tech. with fuel cell and battery**
- **Real-time data link**
- **4.5 hours flight with 70km/h speed**
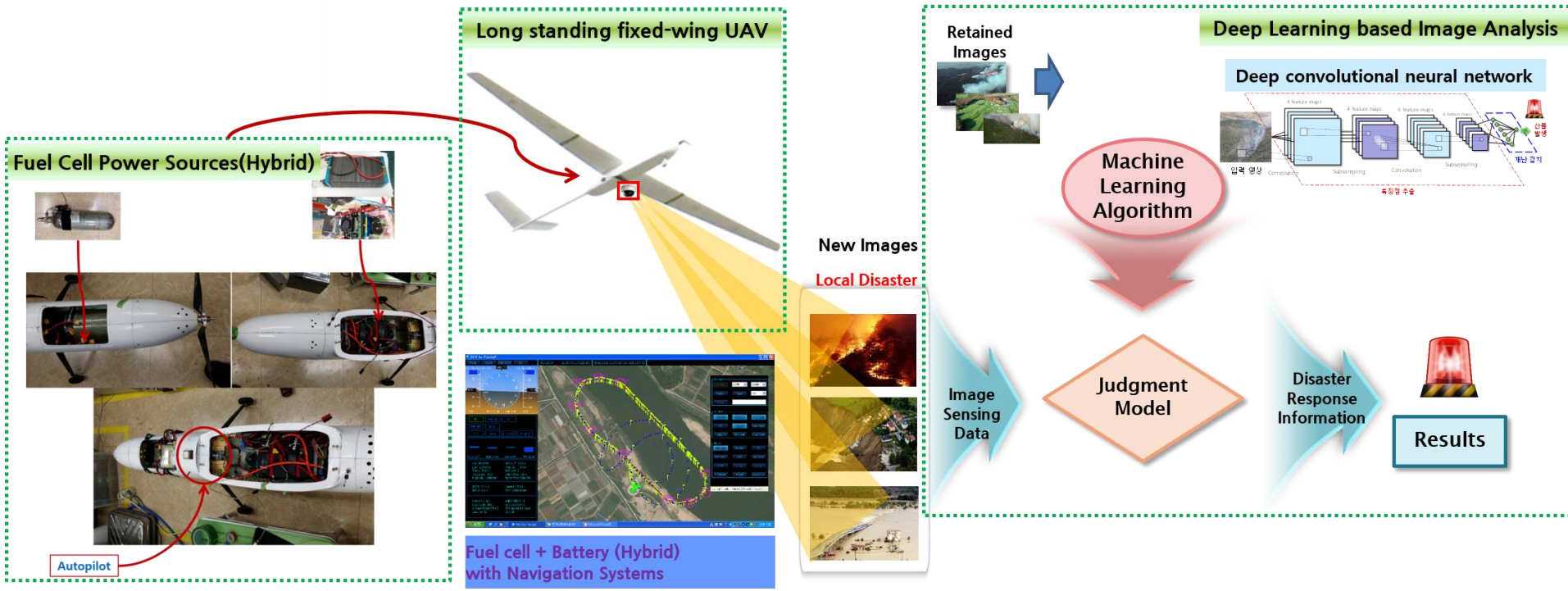

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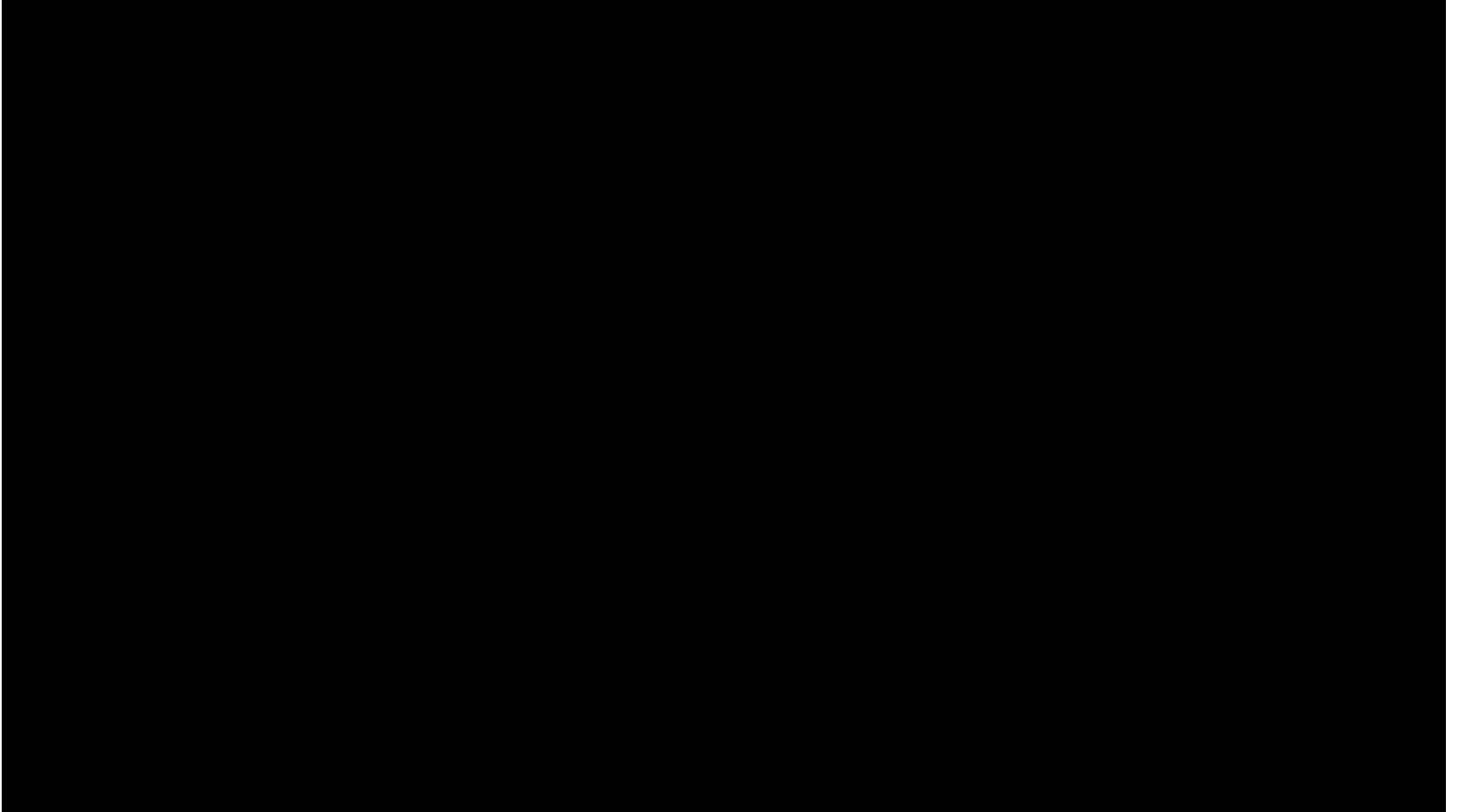**Deep learning image processing for disaster surveillance (fire and flood)**

- **High accuracy by deep learning analysis**
- **High speed big data processing by GPU**
- **Applicable to video image**
- **Receiving color image, data processing and transmitting to the network**

Disaster Surveillance with UAV(Unmanned Ariel Vehicle)

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Real-time video acquisition from unmanned aerial vehicles with hybrid power sources for fuel cells and batteries is analyzed based on deep learning to monitor disasters such as fires, landslides, and floods.

Fuel Cell Power Sources(Hybrid)

Autopilot

Long standing fixed-wing UAV

Fuel cell + Battery (Hybrid) with Navigation Systems

New Images

Local Disaster

Retained Images

Deep Learning based Image Analysis

Deep convolutional neural network

Machine Learning Algorithm

Image Sensing Data

Judgment Model

Disaster Response Information

Results

Disaster Surveillance with UAV(Unmanned Ariel Vehicle)

Disaster Surveillance with UAV(Unmanned Ariel Vehicle)

THANK YOU.

www.etri.re.kr/eng

Su-Jin Youn (sjy@etri.re.kr)