A*STAR

Institute for
Infocomm Research

Inventing the Future

MTI MINISTRY OF TRADE AND INDUSTRY SINGAPORE

A*STAR Institute for Infocomm Research

VISION

Powering a vibrant and strong infocomm ecosystem for Singapore.

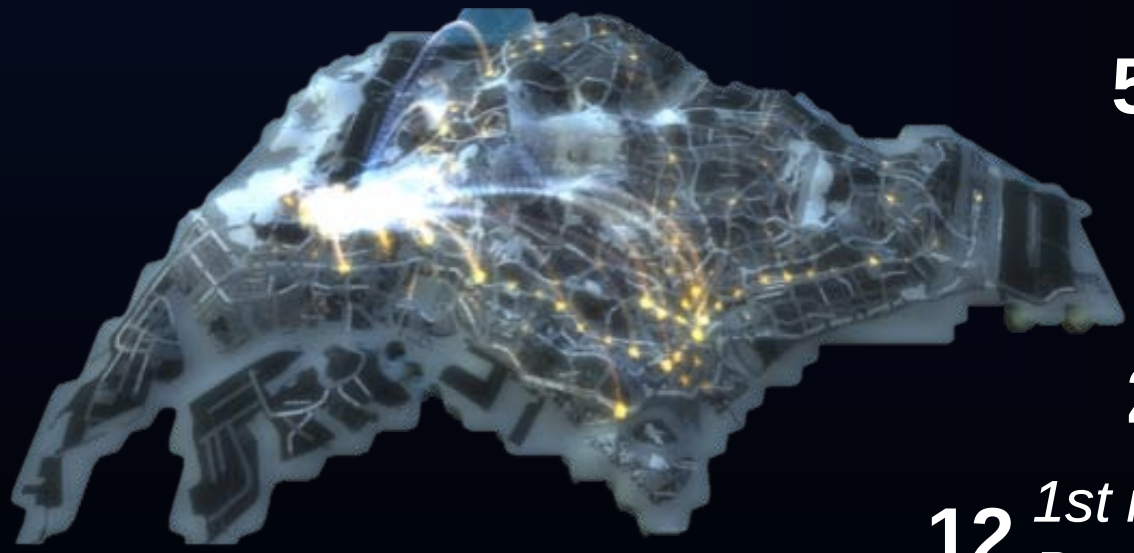
MISSION

Fostering world-class infocomm and media research and developing a deep talent pool of infocomm professionals to power a vibrant knowledge-based Singapore.

I²R
A*STAR

Singapore's *Largest* ICM Research Institute

600 *Staffs Today*



5546 *Research Publications*

1255 *Technology Disclosures*

223 *Patents*

12 *1st in International Benchmarking Competitions*

18 *Contributions to Industry Standards*

681 *Industry Collaborations*

Strategic Thrusts

INTELLIGENCE

- Machine Learning
- Semantic Understanding
- Text Mining
- Stream Processing
- Visualization
- Smart Grid
- Privacy Preserving
- Lightweight Cryptography
- iOS/Android OS Security
- Brain Computer Interface
- Ocular Imaging
- Medical Image Processing
- Biometrics
- Speech Recognition
- Speaker State Analysis
- Chatbots

COMMUNICATIONS

- MIMO
- Antenna Beam forming
- Cooperative Communications
- Meta-materials
- Satellite Communications
- LDPC
- Channel Models
- Network Coding
- Optical-Cross Connects
- Cognitive Radio
- Joint Source-Channel Coding
- Wi-Fi Test-beds
- TV White Spaces
- Dynamic Spectrum Allocation

MEDIA

- MP4 SLS
- Scalable Audio
- Perceptual Audio
- H.265/HEVC
- Scalable Video
- Web Streaming
- Image Forensics
- Scene Understanding
- Multimedia Content Analytics
- Video Analytics
- HDR De-ghosting
- Image Dehazing
- Augmented Reality

Our Industry Partners

A*STAR I²R

International Collaborations & Achievements

Our Editors and IEEE/IET Fellows

INTELLIGENCE

Dr. Guan Cun Tai

Associate Editor, IEEE Transactions on Biomedical Engineering
Associate Editor, Frontiers in Neuroprosthetics
Associate Editor, IEEE Access (Life Sciences and Biomedical Engineering)

Dr. Tang Huajin

Associate Editor, IEEE Transactions on Neural Networks and Learning Systems

Dr. Li Haizhou

Associate Editor, IEEE Transactions on Audio, Speech & Language Processing,
Associate Editor, ACM Transactions on Speech and Language Processing,
Associate Editor, Springer International Journal of Social Robotics,
Guest Editor, Proceedings of the IEEE

Dr. Su Jian

Action Editor, Transactions of Association for Computational Linguistics

COMMUNICATIONS

Dr. Chen Zhining

IEEE Fellow for contributions to small and broadband antennas for wireless applications

Dr. Tee Keng Peng

Associate Editor, IEEE Control Systems Society, Conference Editorial Board

Dr. Sun Sumei

Associate Editor, IEEE Transactions on Vehicular Technology Editor, IEEE Wireless Communications Letters

Dr. Liang Ying Chang

IEEE Fellow for contributions to cognitive radio communications

Editor-in-Chief, IEEE Journal on Selected Areas in Communications – Cognitive Radio Series,

Editorial Board Member, IEEE Signal Processing Magazine (2013 – 2015)

Dr. Qing Xianming

Editorial Board Member , International Journal of Microwave & Wireless Technologies

MEDIA

Dr. Tham Jo Yew

Associate Editor, IEEE Access

Dr. Shu Haiyan

Chief Editor, for the audio part of the IEEE Standard Association Audio Video Standard (AVS)

Dr. Yu Rongshan

IET Fellow, Electrical Engineering Associate Editors for IEEE Transactions on Audio, Speech and Language Processing, and IEEE Access online Mega-journal

International Benchmarking Competitions

2013

- General Electric Flight Quest Challenge Phase 1 2013
- Document Image Binarization Competition & Robust Reading Competition (Text Segmentation in Real Scenes) at International Conference on Document Analysis and Recognition (ICDAR 2013)

2012

- Best App for Corporate category in 2nd ITU IPTV Application Challenge 2012
- Accuracy Ranking at National Institute for Standards and Technology Speaker Recognition Evaluation International Benchmarking 2012
- "Consumer Segment" in the Data Mining Competition organized by 16th (PAKDD) 2012

2011

- Sleepiness Sub-Challenge of INTERSPEECH 2011 Speaker State Challenge
- Activity Recognition Challenge 2011 by the European Union-funded OPPORTUNITY project

We ranked FIRST in:

imagination at work

IPTV 2nd Application Challenge
Better Quality of Life

ITU

NIST

PAKDD

Interspeech 2011

OPPORTUNITY
The Activity Recognition Challenge

Contribution to International Industry Standards

Biometrics

ISO/IEC 24787: On-Card Biometric Comparison

ISO/IEC 29794-4: Biometric Sample Quality – Finger Image Data

INTELLIGENCE

Cellular

3GPP Lte

WPAN

C-WPAN

UWB (PRC)

WLAN

IEEE 802.11n

IEEE 802.11ah

IEEE 802.11aj

WPAN

IEEE 802.22

COMMUNICATIONS

Audio/Video

MPEG4 SLS

MPEG4 HEVC

MPEG4 ALS

H.264

H.264 Extension

JPEG

JPEG Search

JPEG 2000

Security

MEDIA

"Global Research Initiative to Launch Translation App Enabling 95% of the World's Population to Communicate",

- A*STAR Press Release on 27 June 2012

ITU-T Recommendations

←F.745 H.625→

Image and Pervasive Access Lab
A French-Singapore Joint Lab since 1998

ipal
Image & Pervasive Access Lab

Imagineering for Healthcare and Wellbeing

A*STAR I²R

INDUSTRY ENGAGEMENT

Developed in Singapore. **Proven** in Singapore. Taken out to the **World**.

Visa - E-commerce Payment Security

Detecting Online Fraudulent Merchant for greater security

Analyze payment transactions and detect fraudulent activities

Security System collects criminal evidences

Featured in: THE STRAITS TIMES ZDNet

I²R + Boeing

Joint Development of **Integrated Sensory Platform**

BOEING®

Intelligent Factory Alert System

Improve Production & Assembly Processes

Introduced in production of Boeing 777

Greater cost-saving with predictive maintenance

Awarded: Pride@Boeing 2011

Picture Source: Randy's Journal by Randy Tinseth

Baidu – I²R Research Center

Lenovo A586 Smartphone + Baidu OS + I²R VoicePrint Technology

User speaks to the phone in his language

The phone recognizes the voice signature in different languages and then unlocks the phone.

Prime Minister Lee Hsien Loong has commented I²R's 'voice activated lock' in his Facebook on 18 Dec 2012:

"Our efforts to promote R&D and startup companies in Singapore are making some small waves."

Featured in:

Institute for Infocomm Research
A*STAR

Feb 2012

Baidu - I²R Research Centre
- First overseas research laboratory on **South East Asian language capability**

Nov 2012
Voice biometrics for Lenovo A586 phone

Mar 2013
Online translations of Thai language for Baidu Search Engine

Sep 2013
Music Search Technology (听歌识曲) for Baidu Music App

Joint Laboratories

Research SEA language processing, utilizing I²R's technologies for semantic search engine called "box computing".

Advance technologies to improve accuracies and efficiency to detect eye diseases & disorders with cloud based data management system.

Develop advanced Software Defined Communication systems and train ST engineers in conceptualization and design.

Develop capabilities and solutions to enhance the reliability of Singapore's grid networks.

Develop the next generation of analytics techniques and technologies to enable personalized, context-sensitive and relevant information/service delivery to mobile users.

Develop novel capabilities and technologies for enhancing vision-related treatment

ST Electronics - Intrusion Detection System

FBG Perimeter Intrusion Detection System (PIDS)

Disturbance to fence

System can distinguish between genuine intrusion and false alarm

The Agilfence PIDS with intelligent signal processing has been developed by ST Electronics for Changi Airport's perimeter fence to beef up airfield security.

ST Electronics
A company of ST Engineering

AgilFence
Perimeter Intrusion Detection System

Featured in: The Business Times, A publication of SPH; The Straits Times

ZWEEC – Water Quality Monitoring System

I²R's Technology in Fish Activity Monitoring System (FAMS)

CCTV Monitor Fish Tanks

I²R's Technology in Fish Activity Monitoring System (FAMS)

Alert Operators at Control Center

ZWEEC Analytics

Awarded: IWA International Water Association Project Innovation Awards

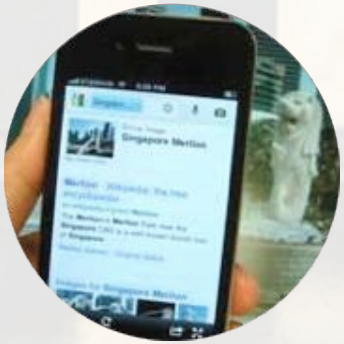
Deployed for: PUB Water for All: Conserve, Value, Enjoy

Featured in: CIO THE STRAITS TIMES

Knorex - Snap2Tell

Bringing images to life using Augmented Reality (Snap2Tell has 7 licensees so far)

Snap a picture



Users can access multimedia information

This app has been implemented in Thailand's The Nation, Malaysia's the Star, the Philippine Daily Inquirer, Indonesia's Jakarta Post and Kompas, Myanmar's Eleven, Singapore's the Edge and Hong Kong's China Daily.

Knorex® LDR

Deployed for: National Heritage Board, Singapore Tourism Board

Featured in: c|net Asia, 联合早报网 zaobao.com

BreathOptics - Fiber Optic Sensor Mat Technology

Baby monitor with Fiber Optic Sensor Mat Technology

Mat Monitors baby's breathing during sleep

Sensor detects irregular breathing and sets of alarm

home.

THE STRAITS TIMES FRIDAY, APRIL 1 2011 PAGE B10

This baby monitor is a breath-taking gadget

Technology developed by A*Star can detect breathing difficulties

BY CHUA HIAN HOU
TECHNOLOGY CORRESPONDENT

A HIGH-TECH baby monitor that can detect an infant's distress has been developed and tested in Singapore.

The device is more advanced than most commercial monitors which simply transmit sounds made by the child. The wireless, battery-operated foam mat is embedded with sensitive fibre-optic cables which are linked to a sensor system that monitors the infant's motions.

The device will send an alert to the caregiver's receiver if it detects a baby having breathing difficulties or movements that could be a precursor to choking, or if the baby is having an abnormal wet-

The BreathOptics technology used in the device was developed through research by the Agency for Science, Technology and Research (A*Star).

The agency was studying the use of fibre optics to detect minute movements. These movements include events that could be made by the breathing of a premature infant weighing 1.5kg.

In 2008, the national research agency licensed the technology to electronics manufacturer Excelpoint Systems, which spent two years and hundreds of thousands of dollars to create a product around it.

Excelpoint's director for R&D, Mr Desmond Ng, said it approached the KK Women's and Children's Hospital (KKH) to help test the product last year.

Hospital staff carried out a six-month trial on 21 full-term babies and 44 premature babies in its special care ward. They monitored the infants as usual, using a combination of the hospital's cardio-respiratory monitor, which is attached to the babies via electrodes, and regular checks by nurses. The results were then compared with those collected by BreathOptics.

BreathOptics was more accurate than the cardio-respiratory monitor, but less accurate than if the baby was under a nurse's constant observation.

Mr Ng said the device could be useful for first-time parents unsure of their ability to care for their baby.

KKH's neonatology head, Professor Victor Samuel Rajadurai, added that the mat offers an effective and unintrusive way for parents to tell if a previously healthy infant is falling sick from a new lung infection.

"This is because such infections usually cause babies to breathe faster, and BreathOptics should pick this up."

The product is expected to go on sale in the second half of the year for around $500, said Mr Ng.

Excelpoint is also working on a larger mat to help monitor the elderly.

The global patient monitoring market is expected to grow to US$30.4 billion (S$39 billion) by 2017, according to a report last month by market research firm Industry Experts.

The BreathOptics technology used in the device was developed through research by the Agency for Science, Technology and Research (A*Star).

The BreathOptics technology used in manufacturer Excelpoint's super-sensitive mat offers an effective and unintrusive way for parents to tell if their baby has developed a lung infection, says Prof Rajadurai (above) of KKH. ST PHOTO: ALPHONSUS CHERN

Few companies are exploring this technology for different applications such as baby monitoring, sleep monitoring, MRI respiratory gating, anti-hypertension, kidney treatment etc.

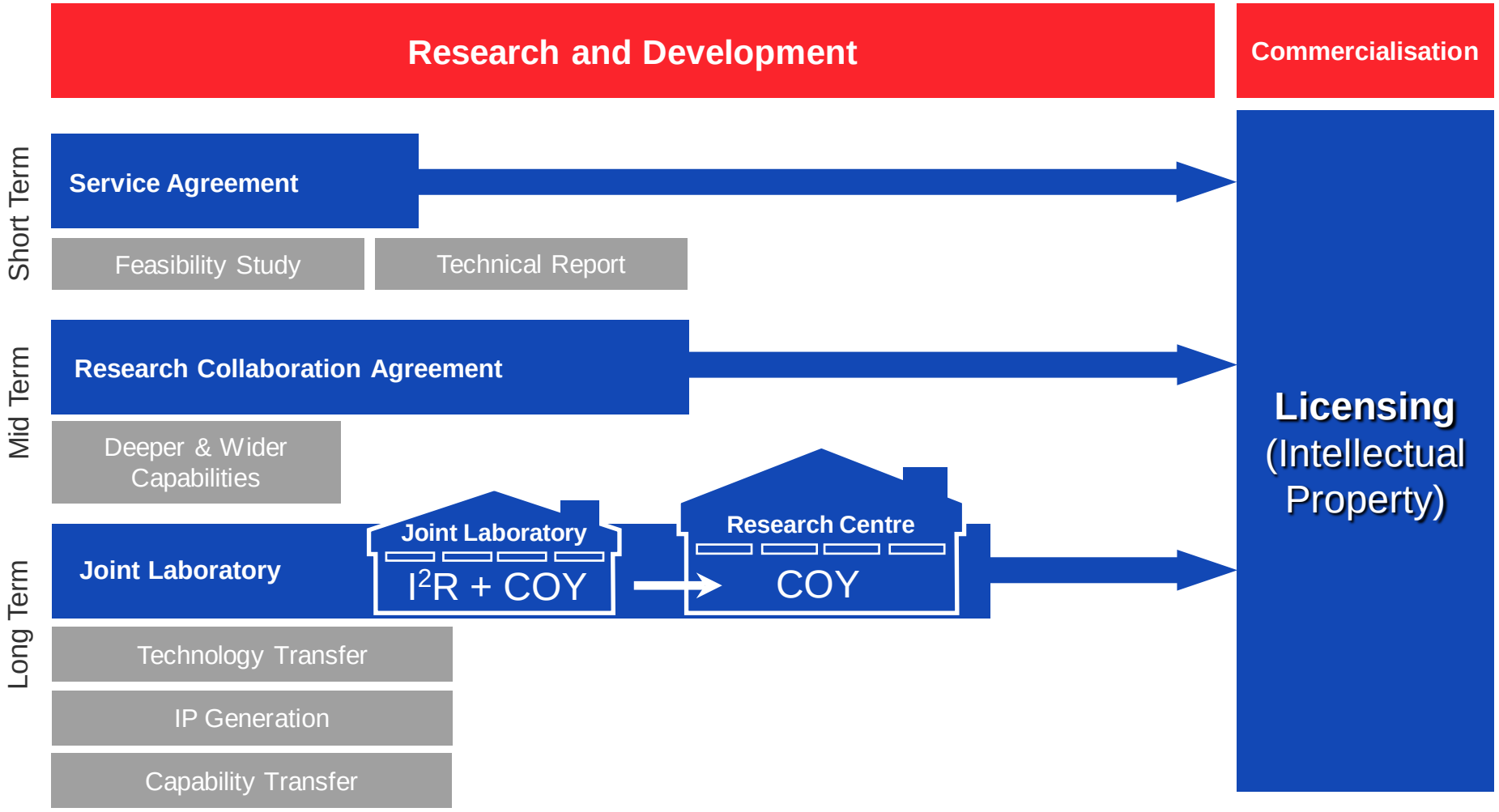
Excelpoint™

Featured in: THE STRAITS TIMES

Successes of Start-up Companies

A*STAR I²R

Collaboration Model



Institute for Infocomm Research

Research Departments		Programmes	Joint Laboratories	A*STAR Programmes
Intelligence	Cybercrime & Security Intelligence	Smart Grid	Baidu - I²R Research Centre	Urban Systems
	Infocomm Security	Intelligent Transport Systems	I²R - Singapore Power	Sense & Sense-abilities
	Human Language Technology	Robotics	I²R - ST Electronics (Info-Comm Systems)	BATC
	Data Analytics	Ocular	I²R - Topcon	
	Neural & Biomedical Technology	Situational Awareness Analytics	I²R - Singtel	
Communications	Modulation & Coding	Reconfigurable System	I²R – National Healthcare Group (Eye Institute)	
		Wireless Chipset		
	RF, Antenna & Optical	Photonic Switching		
		TV White Spaces		
Media	Visual Computing	Scalable Multimedia Platform		
	Signal Processing	Personalised Interactive Tele-services		

Institute for
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