

Catalysing the Technology Ecosystem through Industry-driven Research

Research & Development For Business

By Mr. Jaffri Ibrahim,
Chief Executive Officer (CEO) ,
Collaborative Research in Engineering, Science and Technology Centre (CREST)

How it all began

Creating the right environment for the transformation into an innovation-led economy

Accelerating R&D Growth in the Electrical & Electronics Sector



Can we take the curve at a higher speed?

Joint presentation to the Economic Council
18th April 2011

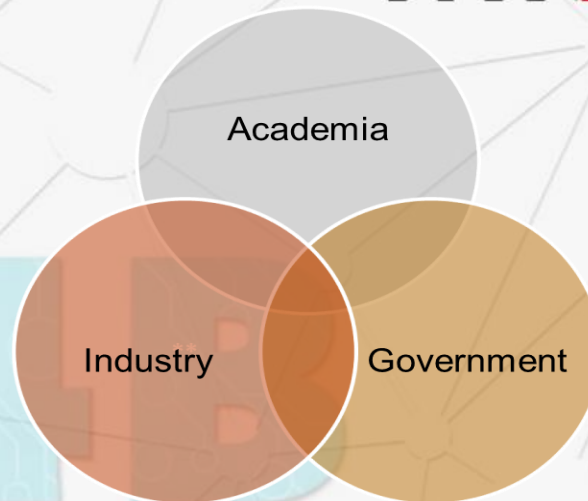


18th April, 2011

- Captains of the industry presented to the Economic Council on the need to accelerate R&D collaboration between industry & academia.
- Government endorsement to the formation of CREST for starting up R&D collaboration over 10 years
- CREST was incorporated in June 2011, and officially operational in **June 2012**.

CREST is an **Industry-led collaborative** platform for **market driven R&D**.

While CREST is industry-led, its member representation is the **triple helix** of government, industry and academia.



Since 2012, CREST has built a solid infrastructure of

161 R&D projects
approved

100 industry and
university members

14 shared facilities

20+ hosted startups at
our CREST Place*

2000+ databases of
subject matter experts

10000 university and
industry talent

Note: *CREST Place is a technology startup incubator operated by CREST.

**Electrical & Electronics (E&E)

The Board

Balanced representation between Industry-
Academia-Government



CHAIRMAN
DATO' AZMAN MAHMUD
(MIDA)



DIRECTOR
DR DAVID LACEY
(OSRAM)



DIRECTOR
ERIC CHAN
(INTEL)



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(USM)

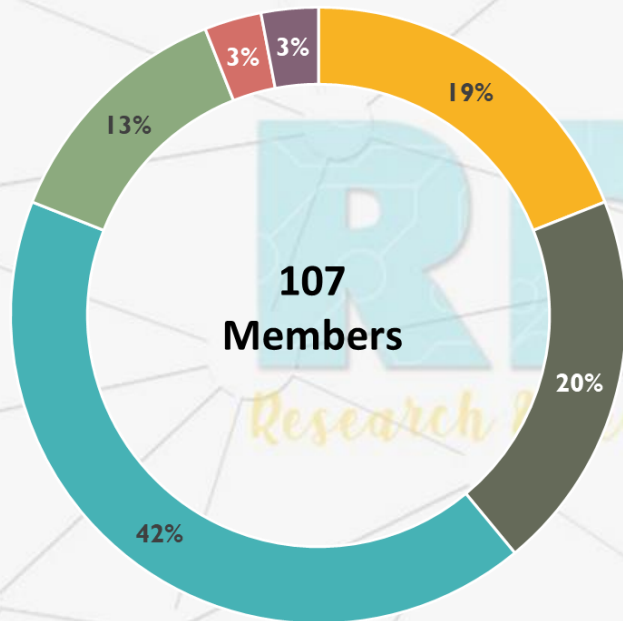


DATO' DR MOHD SOFI
BIN OSMAN
(EX-ALTERA)

ADVISOR

The Board

Balanced representation between Industry-
Academia-Government



**107
Members**

55%
SMEs & Large
Local
Companies

19%
Local
universities

20%
MNCs

Local Uni MNC SME LLC Foreign Uni Govt

Market Applications

Digital Healthcare



Precision Farming



Future Transportation



Digital Manufacturing

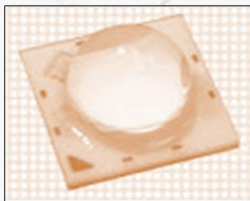


Innovative & Intelligent City



6 E&E Clusters

**1. LED /
Optoelectronics**



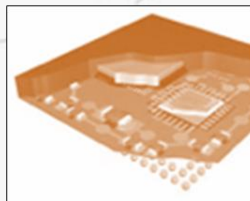
**2. IoT &
Embedded
Systems**



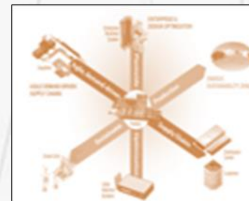
**3. IC Design,
Test &
Validation**



**4. Advanced
Material &
Packaging**



5. Industry 4.0



**6. Drones &
Autonomous
Vehicles**



Effectively Creating Impact

Stethee

Uberisation of Healthcare

GaN on GaN

Wide Bandgap Semiconductor for
LED, Power, Agriculture &
Medical

RM5 Billion

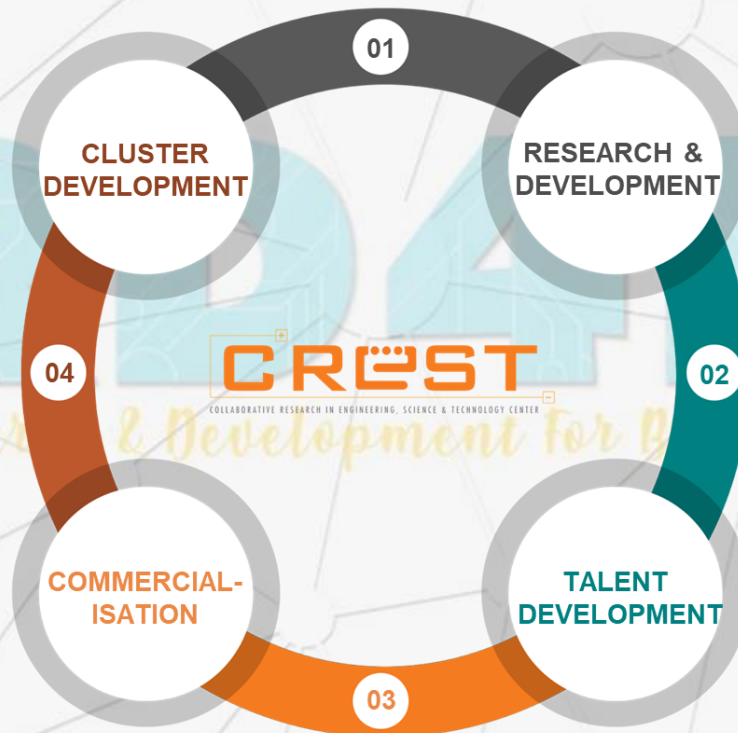
FDI realised in
high value-added activities

11x

Return for every RM1 of R&D spent

28%

Commercialisation rate from
completed R&D projects



161

Collaborative R&D projects
approved

102

Companies

25

Universities

64%

Industry Funding

36%

CREST Grant

516

Industry Talent &
Technopreneurs

250+

MScs & PhDs

8,000+

Graduates Trained

20

Technology Start-ups

Multinational Companies



Public, Private & International Universities



27
IPs identified
to create new
technology
businesses

44
IPs filed
(7 granted)

2 Cycles Annually

Open R&D Grant

- Main aim to promote industry-driven research collaboration in areas relevant to E&E sector
- **Company focused**

1st Jan –
28th Feb

1st Jul –
31st Aug

• Targeted R&D Grants

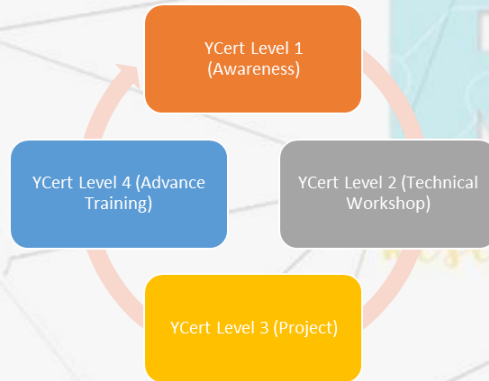
- Main aim to develop IP in specific domain for benefit of larger ecosystem
- **Cluster focused**

**R&D grant
support – RM100
million for 10
years from 2012
to support
collaboration
between
Companies and
Universities**

3-PHASED strategy to attract, develop and retain **STEM** talent

ATTRACT.

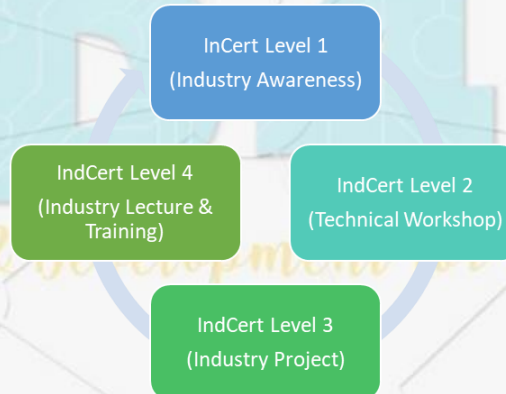
TheGreatLab Youth Program



2100 students from **>75** high schools in **3** regions, exposed to industry-relevant knowledge and skills and career opportunities in E&E and tech industry.

SEED.

TheGreatLab Industry-Relevant Talent Program



>8000 undergraduates from **>30** universities, trained on industry-relevant knowledge and skills in key E&E clusters, supported by **>150** industry partners
5 New Start-ups Launched & **3 R&D Grant Project** Initiated

NURTURE.

High Value-Added Talent 2012-2019



113 industry-driven MSc/PhD trained
223 MSc/PhD students funded
9 academic-based technopreneurs nurtured (in **5** university startups)

Project: Robotic Assessment of Motor Recovery after Stroke

Collaborators: UTM & NASAM & DF Automation Sdn Bhd

Lead Researcher: Dr Yeong Che Fai



CR₂ Compact Rehabilitation Robot
The new series of devices that improve your rehabilitation training

df
AUTOMATION
& ROBOTICS

nasam
NATIONAL STROKE
ASSOCIATION OF MALAYSIA

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Techcare
Innovation

“ A successful model of project initiated from Final Year Project through design competition, nurtured into postgraduate research project & launched as startup.

Replicating via The Great Lab platform”

Commercialisation of Research Summary

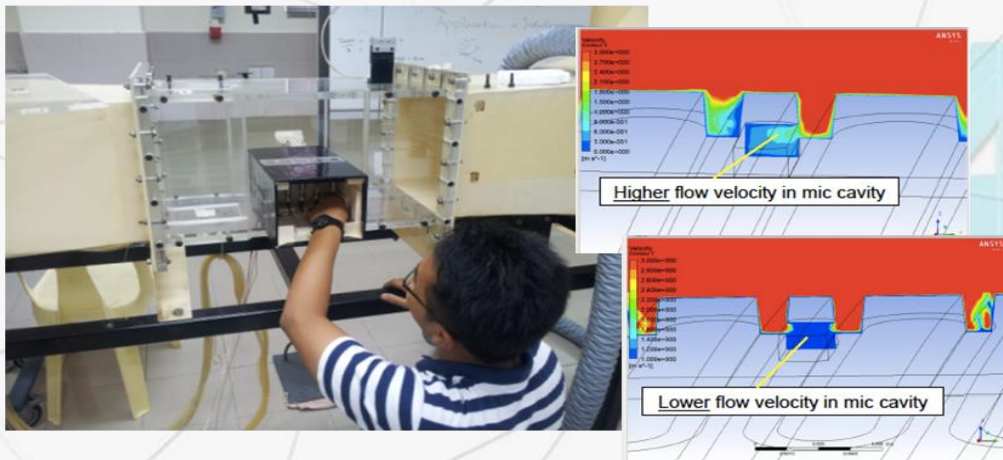
- Research on rehabilitation robot with assessment capability to monitor progress of stroke patient. iRest, a non-motorized system was developed to assess hand function of stroke patient. CR2-Haptic, a compact and portable reconfigurable robot was developed enhanced with the algorithm, UE-ARM an automated upper extremity classification model for evaluation of stroke patient's upper limb motor function performance. Startup company “TechCare Innovation Sdn Bhd” was launched to commercialise the research outcome. 8 units of CRE2-Haptic robots were sold to NASAM, China and India. TechCare is currently working on acquiring clinical validation and MDA/FDA approval for the product.

Accelerating Ideas to Market through Industry-driven Research Collaboration

Project: Prediction of Wind Induced Noise Over Bodies and Small Cavities

Collaborators: USM & Motorola Solutions

Lead Researcher: Prof Zaidi Mohd Ripin



Time from research to market less than 36 months

Completed Sep'14 TRL 9 with customer validation. New product launched in late 2015.



Commercialisation of Research Summary

- Research on Wind Noise Prediction over various geometries and cavities to Improved Audio Performance in a 2-Way Radio. **1 US Patent filed in late 2014; patent granted in Jan 2018.** Design features adopted in a new product released in late 2015. Estimated savings based on reduced customer complaints is RM500k over 5 years. Design applied in other new products. Wind tunnel and CFD software transferred to **TheVibrationLab** in USM for it to continue industry-driven research collaboration.

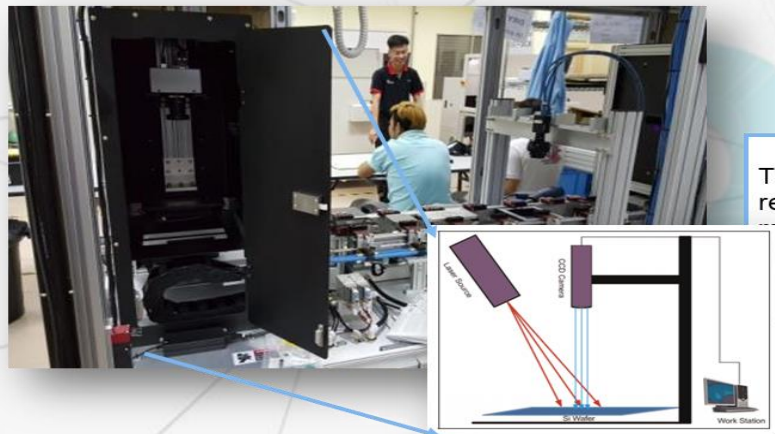
R&D Success Stories

Accelerating Ideas to Market through Industry-driven
Research Collaboration

Project: Machine Vision System for Micro-crack Detection in Solar Wafers

Collaborators: USM & TT Vision

Lead Researcher: Prof Mohd Zaid Abdullah




Time from
research to
market less
than 36 months

FRV-3600

solar wafer inspection

New products
launched late 2016,
ahead of project
completion date of
mid 2017



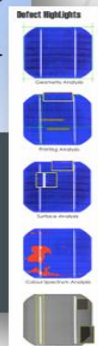
FRV-3600

- » Configurable Inline/ Offline
- » UPH > 3600
- » Concurrent front & rear inspection in single station.
- » On-the-fly inspection

Key technologies

- » Printing Analysis
- » Geometry Analysis
- » Colour Spectrum Analysis
- » Surface Analysis
- » Grid Analysis
- » Electrode / Busbar Analysis

Defect Highlights



Commercialisation of Research Summary

- Research on solar wafer micro-crack detection method based on photoluminescence imaging and machine learning-based algorithm. A real-time automated online inspection (AOI) module developed and **1st product released in 2016**, prior to project completion. More than **5 units sold at the end of project (mid 2017)**. Estimated revenue of **RM14.8 mil (over 5 years)**.

Deep R&D knowledge in Gallium Nitride (GaN) as the **semiconductor material** of the **future** is important. Since the **collaboration** with Shuji Nakamura, we now have **OSRAM** who invested RM5 billion in a front end epitaxy and fabrication facility in Kulim. CREST enables GaN research in Malaysia, a USD82 B combined potential market globally by 2024 and USD12 m investment locally.



III. N. Elmehe. © Nobel Media 2014

Shuji Nakamura

2014 Nobel Prize
in Physics



We facilitate **Collaborative R&D**

Collaboration between CREST & University of California Santa Barbara on **front end epitaxy for LED**



Growing Local Technopreneurs

Incubated @ CREST Place

Started by

3

partners in
2014 with 2
employees

OPPSTAR

Expanded to

25

IC designers
by 2015

Export its design
work to US,
China, Korea by
2016 with

60

engineers



2020 – **180** IC designers

IC is a \$464B market.

When Malaysia created its first
locally owned IC design
company in 2001 it was a
HUGE challenge.

Today at CREST Place we
have **4 IC Design**
companies working on various
projects. Among them Oppstar
whom has grown to **180**
designers and working
on research level **7nm** chip in
Malaysia.

Enabling Solutions in Healthcare



Stethee 

The first
AI enabled *stethoscope*
in the world in collaboration with MIT

In collaborating with
**Global
Technopreneurs**,
CREST bridges Malaysia's
E&E and Healthcare
ecosystem in enabling **next
generation IoT and AI**
enabled devices for the
global markets and towards
lowering the costs of
healthcare



**Dr Nayyar Hussain MD, Inventor of
Stethee and CREST's Collaborator**

CREST 2.0 Program Roadmap (2021-2025)

IoT Cluster

R&D Enhanced

Strategic Research Alliance & Centers (SRAC)

- ✓ Connected labs and network of research experts
- ✓ Eg: GaN SRAC

Talent Enhanced

TheGreatLab (TGL) Academy

- ✓ Collaborative learning and building a sustainable talent pipeline

E&E New Product Development & Innovation

Facilitating Ideas to Market

- ✓ Bridging R&D and commercialization

GaN-OS

Diversifying GaN applications

- ✓ GaN for Power Devices & Telecommunications
- ✓ Deep UV LED
- ✓ Micro LED

Digital Healthcare

Spearheading affordable and accessible healthcare innovations

Innovative & Intelligent City

Connected City Labs – scaling solutions for the community

- ✓ Focus areas: IoT Connectivity, AI on Mobility and Energy

Precision Agriculture

Scaling farming solutions for the community

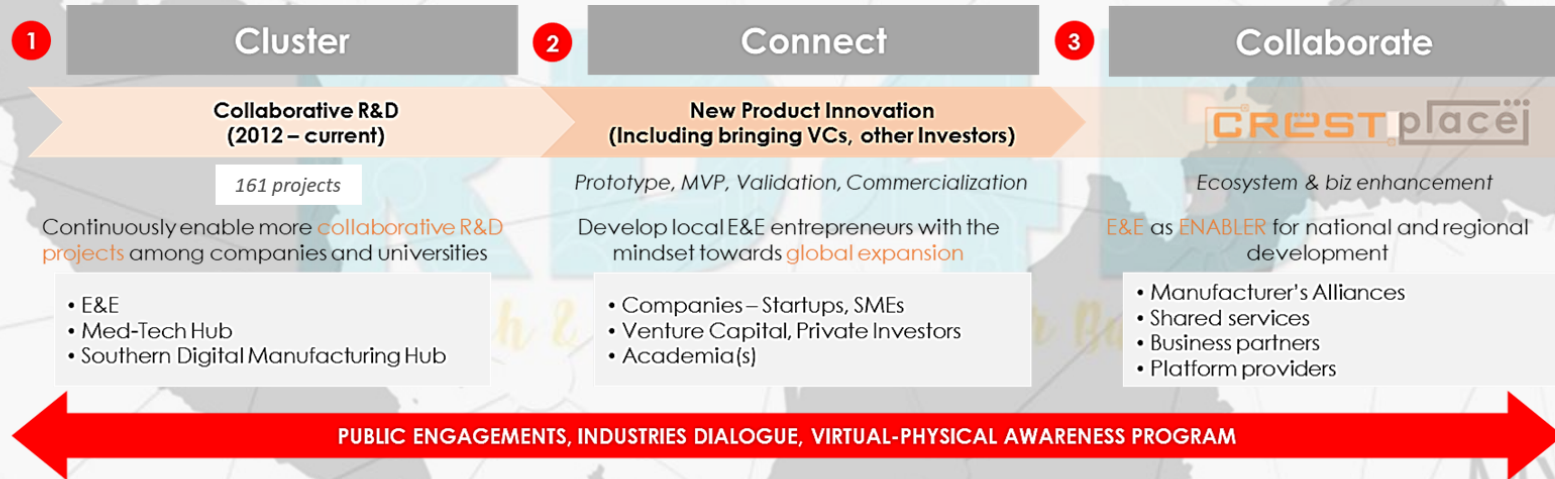
- ✓ Focus areas: automate and modernize farming, R&D for yield improvement etc

International R&D Collaboration

Establish global strategic research alliance (GSRA) to enhance industry relevant R&D collaboration in high technology areas



Replicating the collaborative model across geographies & industries



THANK YOU

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