Data Storage Institute (DSI)

Established in 1992 as the Magnetics Technology Centre (MTC), it was renamed Data Storage Institute (DSI) in 1996. DSI is dedicated to lead the data storage industry, with dynamic research and innovation through the development of tomorrow’s storage technologies and creating value for the international data storage industry. By utilizing the highly qualified researchers and state-of-the-art equipment, DSI’s strong domain knowledge and research capabilities have pushed the boundaries of both basic and applied research. DSI combines expertise and resources across disciplines to engineer data storage breakthroughs that can benefit the storage community.

Research Capabilities
- Advanced Concepts & Nanotechnologies (ACN)
- Data Centre Technologies (DCT)
- Drive Systems and Technologies (DST)
- Non-Volatile Memories (NVM)

Institute for Infocomm Research (I2R)

I2R was established in 2002 with the vision to power a vibrant and strong infocomm ecosystem in Singapore. I2R is Singapore’s largest ICT research institute that focuses on conducting mission oriented research to address key challenges faced locally. At I2R, intelligence, communications and media (ICM) form our 3 strategic thrusts. We perform R&D in ICM technologies to develop holistic solutions across the ICM value chain and we believe that the greatest impact is created when research outcomes are translated into technologies our partners can readily deploy at a competitive advantage.

Research Capabilities
- Intelligence
  - Data Analytics
  - Human Language Technology
  - Cybercrime & Data Forensics
  - Infocomm Security
- Communications
  - Cognitive Radio
  - Fiber Optics System
  - Heterogenous Network
  - Wireless Chipset
- Media
  - Augmented Reality
  - Audio, Video, Image Analytics
  - Audio, Video, Image Processing

Institute of Chemical and Engineering Sciences (ICES)

Established in 2002, the mission of the Institute of Chemical and Engineering Sciences (ICES) is to support economic growth in Singapore through world class scientific research, developing novel technology and nurturing creative scientists and engineers. ICES’ new process research techniques will create pathways for advances in the pharmaceutical, chemical and specialty chemical industries. ICES, through its deep scientific knowledge in chemistry and chemical engineering principles, continues to provide strong leadership in R&D to pharmaceutical, chemical and specialty chemical industries, which are key industry clusters in Singapore’s manufacturing sector.

Research Capabilities
- Crystallisation and Particle Science
- Heterogeneous Catalysis
- Industrial Biotechnology
- Organic Chemistry
- Polymer Engineering and Catalysis
- Process Science and Modelling

Associated Research Programmes
- Biomass to Chemicals
- Experimental Power Grid Centre (www.epgc.a-star.edu.sg)
- Innovative Marine Antifouling Solutions for High Value Applications
- Metabolic Engineering Research Laboratory
- Oilfield Chemicals
A*STAR Science and Engineering Research Council (SERC)

A*STAR provides the ideal environment to push the frontiers of science and engage in world class research that will benefit Singapore, industries and society at large. At A*STAR SERC, we promote public sector research and development (R&D) in science and engineering across a wide range of fields, ranging from communications to process manufacturing. Located at the iconic research hub Fusionopolis, SERC manages seven research institutes and one centre to tackle global technological challenges and create future industries. Our cutting-edge science and engineering R&D capabilities will propel your business to new heights of innovation.

The Institute of High Performance Computing (IHPC), established in 1998, spearheads scientific advances and technological innovations through computational modelling, simulation and visualisation. Our vision is to provide leadership in high performance computing as a strategic resource for scientific inquiry and industry development.

### Research Capabilities

#### Computing Science
- Computational Social Cognition
- Cross-disciplinary Data-Intensive Analytics
- Distributed Computing
- Geometrical Modelling
- High Performance Computing
- Intuitive Interaction Technologies

#### Electronics and Photonics
- Emerging Algorithms and Models
- Photonics & Plasmonics
- RF Engineering

#### Engineering Mechanics
- Engineering
- Mechano-Electronics

#### Fluid Dynamics
- Environmental Modelling
- Fluid-Structure Interaction
- Multiphase Flow

#### Nanomechanics
- Soft Matter

#### Materials Science and Engineering
- Applied Thermodynamics
- Functional Materials
- Interfaces
- Microstructure

The Institute of Microelectronics (IME), founded in 1991, is committed to enhancing the value-add of the microelectronics industry in Singapore by undertaking R&D in microelectronics, supporting the R&D needs in the industry and developing skilled R&D personnel. Our outstanding strengths are the ability and expertise in core research that have been continuously reinforced for these years. IME has broad and deep capabilities that form the core infrastructure to provide a multi-disciplinary approach to meet the needs of our industry partners.

### Research Capabilities

#### Integrated Circuits and Systems
- 3D IC, Opto-Electronics IC (OEIC), MEMS-ASIC
- High frequency analog / mixed signal IC designs

#### Interconnect and Advanced Packaging
- 3D IC / TSI platform with TSV technologies

#### Materials Development
- 3D stacking with Chip-to-Wafer and Wafer-to-Wafer bonding technologies
- Wire Bond, Flip Chip and Embedded Wafer Level Packaging

#### Reliability and Analysis Testing
- Failure analysis, yield enhancement, reliability, system design, performance evaluations, technology assessments, packaging, soldering joint analysis, FMEA and analytical techniques

#### Semiconductor / MEMS Process Technologies
- 200mm / 300mm wafer level packaging (WLP) fabrication process modules and in-line metrology
- 200mm Silicon-based process technologies for photonics, nano-electronics, MEMS and post-CMOS
- State-of-the-art R&D foundry and low-volume production
- 200mm Gallium Nitride on Silicon (GaN-on-Si) process technologies
The Institute of Materials Research and Engineering (IMRE), established in 1997, has capabilities in materials analysis & characterisation, design & growth, patterning & fabrication, and synthesis & integration. We house a range of state-of-the-art equipment for materials development, processing and characterisation. IMRE conducts R&D on novel materials for organic solar cells, photovoltaics, printed electronics, catalysis, bio-mimetics, microfluidics, quantum dots, heterostructures, sustainable materials and atom-level technology, to name a few.

**Research Capabilities**

**Analysis & Characterisation**
- Chemical & structural analysis
- Electrical & Optical analysis
- Mechanical modeling
- Microscopy, e.g. electron microscopy, scanning probe etc.

**Design & Growth**
- Electronic/ PV materials
- Ferroic materials

**Patterning & Fabrication**
- Chemical & biomedical devices
- Optoelectronics & photovoltaics
- Patterning & fabrication of nano/molecular structures for electronics

**Synthesis & Integration**
- Engineered nanocomposites & nanostructures
- Functional polymers
- Materials for consumer care products, cosmetics, healthcare, bio-imaging, diagnostic, etc.
- Molecular materials

**SERC nano Fabrication, Processing and Characterisation (SnFPC)**
- A variety of service work ranging from one-stage processing to full device fabrication
- Facilities in nanofabrication and characterisation technology

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The Singapore Institute of Manufacturing Technology (SIMTech), established in 1993, develops high value manufacturing technology to enhance the competitiveness of Singapore's manufacturing industry. The areas of its research include Manufacturing Process, Manufacturing Automation and Manufacturing System. Its research programmes focus on Large Area Processing and Microfluidics Manufacturing. SIMTech collaborates with multinational and local companies from the precision engineering, electronics, semiconductor, medical technology, aerospace, automotive, marine and logistics industry.

**Research Capabilities**

**Manufacturing Automation**
- Mechatronics, Precision Measurements

**Manufacturing Process**
- Forming Technology, Joining Technology, Machining Technology, Surface Technology

**Manufacturing System**
- Manufacturing Execution and Control, Planning and Operations Management

**Research Programme**
- Large Area Processing, Microfluidics Manufacturing

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National Metrology Centre (NMC), established in 1975, is Singapore’s measurement science and technology institute. NMC conducts R&D in the science of measurement to enable innovation for emerging technologies. The Centre establishes measurement standards at the highest level of accuracy in Singapore that are globally recognised and traceable to the International System of Units (SI Units). Our R&D and measurement capabilities help companies to improve their product design, innovation, testing and manufacturing, for better productivity, higher quality and more reliable products accessible to international markets. These include companies in the aerospace, energy, environment, medical technology, oil and gas, pharmaceutical and other industry sectors.

**Research Capabilities and Facilities**

**Electromagnetic Metrology**
- Mechanical Metrology
- Nanometry
- Optical Radiation Metrology

**Gas Metrology**
- Solar Photovoltaic Cells Measurement
- Solid State Lighting Measurement

**Length and Dimensional Metrology**
- Temperature and Humidity Metrology
- Time and Frequency Metrology

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**Research Capabilities**

**Manufacturing Automation**
- Mechatronics, Precision Measurements

**Manufacturing Process**
- Forming Technology, Joining Technology, Machining Technology, Surface Technology

**Manufacturing System**
- Manufacturing Execution and Control, Planning and Operations Management

**Research Programme**
- Large Area Processing, Microfluidics Manufacturing
PROGRAMMES AND CAPABILITIES AT A*STAR SERC RESEARCH INSTITUTES

With a broad spectrum of capabilities, A*STAR SERC research institutes are in a unique position to address key research challenges and develop new technologies that can help your company to innovate and excel in a competitive world. Our areas of focus are broadly encompassed by the following clusters:

Chemicals, Materials and Energy
The Chemicals, Materials and Energy Cluster works to promote the growth of Singapore’s knowledge-based economy through the development of R&D capabilities in the chemicals and materials space, supported by a spectrum of strong capabilities. These capabilities include computational chemistry, synthesis and formulation science, materials analysis & characterization, design & growth, patterning & fabrication, synthesis & integration to drive technologies from lab to fab. In the cleantech space, the cluster works to promote innovations in the broad areas of energy and sustainability, supported by unique capabilities in power engineering, smart grid technologies, advanced energy storage, tropical green building technologies and industrial process efficiency.

<table>
<thead>
<tr>
<th>Technology Focus</th>
<th>Snapshot of Technology Programmes</th>
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<tbody>
<tr>
<td>Chemicals</td>
<td></td>
</tr>
<tr>
<td>Alternative Feedstock and Sustainable Chemicals</td>
<td>Biomass-to-Chemicals Programme</td>
</tr>
<tr>
<td>Specialty Chemicals</td>
<td>Metabolic Engineering Research Laboratory</td>
</tr>
<tr>
<td>Materials</td>
<td></td>
</tr>
<tr>
<td>Printable and Flexible Electronics</td>
<td>Printed Electronics Programme</td>
</tr>
<tr>
<td>Industrial-Scale Additive Manufacturing</td>
<td>Additive Manufacturing Programme</td>
</tr>
<tr>
<td>New Optics and Photonics</td>
<td>Meta-Materials Programme</td>
</tr>
<tr>
<td>Personal Care</td>
<td>Consumer Care Product Technology Programme</td>
</tr>
<tr>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>Advanced Grid Technologies</td>
<td>Experimental Power Grid Centre (EPGC)</td>
</tr>
<tr>
<td>Energy Storage</td>
<td>Advanced Energy Storage Programme</td>
</tr>
<tr>
<td>Energy Efficiency</td>
<td>A*STAR-MND Green Building Programme</td>
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</table>

Electronics
The Electronics Cluster spearheads public sector R&D in microelectronics and information storage, and supports industry needs through nurturing potential and emerging technologies for adoption in the Electronics industry.

<table>
<thead>
<tr>
<th>Technology Focus</th>
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<tbody>
<tr>
<td>Advanced Packaging &amp; 2.5/3D Integrated Circuits</td>
<td>2.5D Through Silicon Interposers (TSI) Consortium</td>
</tr>
<tr>
<td>Drive Systems Technology</td>
<td>Electronics Packaging Research Consortium</td>
</tr>
<tr>
<td>Miniaturised Medical Devices &amp; Systems</td>
<td>Future Data Center Technologies</td>
</tr>
<tr>
<td>Network Storage &amp; Devices</td>
<td>Gallium Nitride-on-Silicon (8&quot;)</td>
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<tr>
<td>Next-generation Power Electronics</td>
<td>Hybrid Drive Technologies</td>
</tr>
<tr>
<td>Non-Volatile Memory</td>
<td>MEMS Consortium</td>
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<tr>
<td>Sensors, Actuators &amp; Integrated Microsystems (MEMS)</td>
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<tr>
<td>Silicon Photonics</td>
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<tr>
<td>Technologies to achieve 10Tb/in² &amp; Beyond</td>
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</table>

Engineering
The Engineering Cluster promotes and innovates in two major areas: Precision and Transport Engineering. These areas cover a wide spectrum of capabilities, involving high value manufacturing, material processing, computational modelling and metrology.

<table>
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<tbody>
<tr>
<td>Computational Design, Modelling, Simulation and Dynamics</td>
<td>Advanced Optics in Engineering</td>
</tr>
<tr>
<td>Inspection and Non-Destructive Testing (NDT)</td>
<td>Industrial Robotics</td>
</tr>
<tr>
<td>Laser &amp; Fibre Technologies</td>
<td>Innovations in Remanufacturing</td>
</tr>
<tr>
<td>Logistics &amp; Supply Chain Management</td>
<td>Collaborative Urban Logistics</td>
</tr>
<tr>
<td>Manufacturing Technology and Processes</td>
<td>Risk Management in Supply Chains</td>
</tr>
<tr>
<td>Material Technologies for Manufacturing</td>
<td>Marine Anti-Fouling Solutions</td>
</tr>
<tr>
<td>Metrology</td>
<td>Materials Innovation in Risers for Marine &amp; Offshore</td>
</tr>
<tr>
<td>Remanufacturing Technologies</td>
<td>Multiphase Flow Analysis for Marine &amp; Offshore</td>
</tr>
<tr>
<td>Robotics and Automation</td>
<td>Ruggedised Electronics for Marine &amp; Offshore</td>
</tr>
<tr>
<td>Sensors, Instrumentation &amp; Systems</td>
<td>SERC Aerospace Programme</td>
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</table>
The Infocomm, Media and Computing Cluster supports public sector R&D through setting up high performance computational facilities and spearheads innovations in the information technologies, communications, media and computing science.

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<th>Technology Focus</th>
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<td>• Analytics and Cyber Security</td>
<td>• Brain Computer Interface and Biomedical Imaging</td>
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<tr>
<td>• Computational Sciences and Engineering</td>
<td>• Computational Engineering Mechanics, Material Science and Fluid Dynamics</td>
</tr>
<tr>
<td>• Computational Social Cognition</td>
<td>• Data and Multimedia Analytics</td>
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<tr>
<td>• High Performance Computing</td>
<td>• Infocomm Security and Intelligence</td>
</tr>
<tr>
<td>• Human Language Technologies</td>
<td>• Intelligent Transport System</td>
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<tr>
<td>• Interactive Digital Media</td>
<td>• Scalable Multimedia Platform</td>
</tr>
<tr>
<td>• Neural and Biomedical Technologies</td>
<td>• Sense and Sense-abilities</td>
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<tr>
<td>• Social Robotics and Intelligent Systems</td>
<td>• Smart Grid</td>
</tr>
<tr>
<td>• Wireless Sensor Networks</td>
<td>• TV White Spaces</td>
</tr>
<tr>
<td>• Brain Computer Interface and Biomedical Imaging</td>
<td>• Urban System Initiatives</td>
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<td>• Computational Engineering Mechanics, Material Science and Fluid Dynamics</td>
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INITIATIVES FOR SINGAPORE SMEs

Apart from research and development in science and engineering, A*STAR’s SERC also has various programmes to help Small and Medium-sized Enterprises. There are two main initiatives under this thrust – GET-Up and TAP.

1. Growing Enterprises with Technology Upgrade (GET-Up) Initiative

GET-Up is an industry programme by SERC that seeks to upgrade the technological capabilities of local SMEs to enhance their global competitiveness. GET-Up is a multi-agency effort involving A*STAR, SPRING Singapore, EDB, MOE and IE Singapore to provide holistic and concerted assistance in addressing challenges faced by local technology enterprises.

To date, 418 local enterprises have benefited from one or more of these assistance schemes. The initiatives consist of three technical assistance schemes:

1.1 Technology for Enterprise Capability Upgrading (T-Up)

Secondment of A*STAR Research Scientists and Engineers (RSEs) to local enterprises to work on their capabilities, product and process development projects. This initiative enables local SMEs to tap on the pool of R&D talent across A*STAR Research Institutes (RIs).

1.2 Operation and Technology Roadmapping (OTR)

Development of technology acquisition and strategy or roadmap for meeting both current and future business goals.

1.3 Technical Advisory (TA)

Provision of focused and in-depth technological support and advice by senior A*STAR scientists with expert domain knowledge of the relevant industry.

2. Technology Adoption Programme (TAP) Initiative

TAP aims to improve the accessibility to technology for SMEs, enable growth and play a role in larger economic transformation. Through this programme, A*STAR will help to link the technology needs of companies to solution providers, increasing productivity through the adoption of technology innovations and solutions.

This initiative is currently piloted in six sectors: Marine, Aerospace, Precision Engineering, Construction, Food Manufacturing and Retail. The initiative consists of three main thrusts:

2.1 Technology Matching

Actively engage companies through outreach activities and company visits to identify productivity gaps and areas of improvement. Work with companies to understand industry-wide issues.

If there are deployable technology solutions, TAP will recommend and provide linkages to technology providers.

If there is no deployable technology-ready solution currently, TAP will work with RIs/IHLs to develop existing technology to ‘deployment-ready’ stage.

2.2 Training and Education

Formulate training and education initiatives to support adoption of technology platforms by companies.

2.3 Facilities and Infrastructure

Manage a database of current capabilities and facilities in the public sector to provide the best needs-to-solution match for SMEs.

HOW TO REACH US?
A-STAR_Get-Up@a-star.edu.sg

A-STAR_TAP@a-star.edu.sg