IRC-SET 2017 Conference Tour

9am – 6pm, 11 August 2017

1. **A*STAR**
    (1) FusionWorld (one hour)
    FusionWorld (https://www.a-star.edu.sg/fusionworld) features a dynamic and interactive showcase of award-winning inventions and cutting edge in-house and industry-collaboration prototypes created by A*STAR's research institutes.

    (2) LC-MS (30 minutes)
    Mass spectrometry (MS) is an analytical technique that ionizes chemical species and sorts the ions based on their mass-to-charge ratio. Liquid chromatography (LC) is a technique in analytical chemistry used to separate, identify, and quantify each component in a mixture. LC-MS is an analytical chemistry technique that coupled chromatography - MS systems are popular in chemical analysis because the individual capabilities of each technique are enhanced synergistically. LC-MS may be applied in a wide range of sectors including biotechnology, environment monitoring, food processing, and pharmaceutical, agrochemical, and cosmetic industries. We extensive experience in the analyses of protein using advanced technology including LC-MS and bioinformatics. We are involved in numerous research efforts in Biosciences, working within such areas as cancer research, cell signalling, microbial gene expression and drug discovery.

    (3) Secure Urban Transportation Systems (30 minutes)
    For a city with dense population like Singapore, the importance of securing its urban transportation systems could never be overemphasized. An urban transportation system is a complex coupling of heterogeneous subsystems that together supports continuous flows of a large number of people over geographically distributed areas. The lab tour will show a cyber-physical approach to designing security technologies for urban transportation systems, including effective defence mechanisms for legacy systems, persistent access control schemes, secure communication designs, and adaptive strategies to mitigate attacks.

2. **National University of Singapore** (1 hour)
    SINAPSE
    Singapore Institute for Neurotechnology (SINAPSE) brings together basic scientists, computational scientists, experimentalists and clinicians, engineers, innovators and entrepreneurs with a common goal of making an impact on society. SINAPSE focuses on Neurotechnologies for basic science, clinical application and commercialization. The research thrusts and focus areas involve brain and its cognitive and neurobiological mechanisms, modeling brain function and building mathematical and computational models, development of technologies for interfacing to brain and for treating brain disorders, building brain-inspired or neuromorphic computers and machines, and developing intellectual property that will result in

product of value to industrial society. The IRC SET 2017 lab tour will focus on showcasing cutting-edge research at SINAPSE, including but not limited to the areas of neurophotonics, neuromorphic engineering and neural prostheses.

3. **Singapore University of Technology and Design** (One and half hours)
   - Sharing on SUTD and our research programmes [30 min]
   - Tour of facilities [1 hour]:
   • iTrust
   • Temasek Laboratories
   • IDC
   • DManD
   • Fabrication Laboratory

   Brief description of the research focus of each facility:

   iTrust's research focus on the development of advanced tools and methodologies to ensure security and safety of current and future cyber physical systems and Internet of Things (IoT) systems. Systems of interest include large infrastructure of national importance (such as power grid, water treatment, oil refineries) as well as cyber-devices such as smart watches, pacemakers, defibrillators, insulin pumps, and VNS implants.

   Temasek Lab (TL@SUTD) is a partnership established by the Ministry of Defence (MINDEF) and the Singapore University of Technology and Design (SUTD) in Oct 2012. TL@SUTD undertakes cutting-edge research and development while building up both technical and human talent capabilities in vital fields. The current focus is on areas of defence system design and development, such as Unmanned Systems, Information Systems, Soldier Systems and Engineering Systems.

   SUTD-MIT International Design Centre (IDC) is a satellite research centre of the IDC in MIT and aims to drive design research and innovation in collaboration with a wide spectrum of global enterprise, government and social stakeholders. Specifically, it is defined by the following three core objectives: advancing design theory and methodology, using design to address key societal challenges, and integrating design methods and theories with practice.

   The Digital Manufacturing and Design Centre (DManD) focuses on the creation of frontiers in design and manufacturing enabled by the digital thread that integrates the design and manufacturing value chain. Its research agenda includes using computational simulation and design capabilities to exploit new design windows enabled by digital manufacturing technologies and creating previously unobtainable products; and creating innovative fabrication technologies based on the digital fusion of sensing, additive and subtractive processes, as well as new ideas in multimaterial and multifunctional fabrication.