Annex A

Background info

The Intel ISEF is the world's largest pre-college science fair held annually to provide a platform for top science and engineering talents of different nationalities to showcase their projects. This year, there are more than 1750 finalists from more than 75 countries, regions and territories took part. There are 22 scientific categories in Intel ISEF 2016 and within each category, the *Best of Category*, *First*, *Second*, *Third* and *Fourth* awards are given out. Further to that, two finalists from amongst the 22 winners of the *Best of Category* will be awarded the *Intel Foundation Young Scientist Awards*. These finalists are selected for their commitment to innovation in tackling challenging scientific questions, using authentic research practices, and creating solutions to the problems of tomorrow. Special Awards sponsored by various organizations are also given out in recognition for the science and engineering innovations in projects.

Details of projects submitted by the Singapore team

Students	Project description
Samuel Leong (Individual) IP Year 6 Hwa Chong Institution	**Project title** – Optically-illuminated Directional Sensing for Guidance and Alignment Systems **Category** – Embedded Systems A low cost, low power, highly versatile circuit that is able to lock on to a specific laser frequency has been designed and built. This compact and responsive laser guided system which is free from all external light interferences, has potential applications in security, defence, elderly care and smart robotic systems. Samuel has developed his system under the guidance of Dr Wee Keng Hoong and Mr Lee Jin Yu from the DSO National Laboratories.
Sim Yu Ki (Individual) IP Year 6 National Junior College	**Project title** – Early, Affordable and Rapid Viral Detection: Revolutionizing Home Diagnosis of Dengue and Zika through Lateral Flow Biosensing **Category** – Biomedical Engineering: Biomedical Devices Capacity to mitigate outbreaks and manage patient care for debilitating mosquito-borne flaviviral diseases hinges critically on early, rapid and accurate diagnosis. In this work, nanoparticles to be embedded on lateral flow biosensors were developed, potentially revolutionizing current flaviviral diagnostic methods by enabling precise, prompt and cost-effective diagnosis. Yu Ki did her project under the guidance of Dr Paul Free Francis from the Institute of Materials Research and Engineering (IMRE), A*STAR.

Wang Yuhang (Individual) IP Year 6 National Junior College	**Project title** – Nickel Oxy-hydroxide Thin Film as Efficient Electrocatalysts for Dye Wastewater Treatment **Category** – Chemistry: Materials Chemistry The novel application of nickel oxy-hydroxide thin-films proves critical as an energy-efficient, maintenance-free and cost-effective treatment and management of industrial dye wastewater. Yuhang did his project under the supervision of Dr Ren Yi from the Institute of Materials Research and Engineering (IMRE), A*STAR.
Jia Shu Yi (Individual) IP Year 6 National Junior College	**Project title** – Immobilization of Glycans on Silicon Substrates for Diagnostic Microarrays **Category** – Chemistry: Analytical Chemistry Three different methods of immobilization of glycans onto silicon substrates were developed. This allowed Precision Ellipsometry (PREL), a sensitive, simple, yet inexpensive instrument for the analysis of glycan microarrays as well as diagnosis of common diseases. Shu Yi did his work under the supervision of Dr Nikolai Yakovlev from Institute of Materials and Research and Engineering (IMRE), A*STAR.
Clara Keng and Chow Kit Mun (Team) IP Year 5 Raffles Institution and River Valley High School	**Project title** – Tailored Synthesis for Morphology Control of Hematite Nanoparticles **Category** – Materials Science: Nanomaterials Through tailored hydrothermal synthesis, hematite nanoparticles with high coercivity to size ratios were obtained. These nanoparticles are poised as a prime candidate as cheap, efficient and reliable data storage materials. Clara and Kit Mun conducted their research under the mentorship of Mr Koh Huan Kiat and Ms Deborah Ho from DSO National Laboratories.
Brandon Foong and Victor Huang (Team) Year 6 NUS High School of Mathematics and Science	**Project title** – A novel reactor with a transparent electrode to improve UV-mediated electrochemical wastewater treatment **Category** – Environmental Engineering The project aims to design a cost-effective and eco-friendly electrochemical reactor to treat industrial wastewater contaminated with organic toxic compounds. The reactor takes advantage of sunlight through the use of transparent electrodes and specific reactor geometry to quickly degrade organic toxic compounds. Brandon and Victor carried out

	their project under the supervision of Dr Olivier Lefebvre from the Department of Civil and Environmental Engineering in NUS.