The conference was well organised with strict time keeping. The two days before and after the main conference were allocated to workshops and there was an exhibition running over the three days of the main event.
Workshop on Autonomous Structural Monitoring and Maintenance Using Aerial Robots

This is an application oriented workshop that addresses the deployment of robots in challenging conditions.

If you are interested in the topic, I highly recommend checking the videos and presentations provided here: http://www.aerial-monitoring-maintenance-workshop.com/agenda--presentations.html
Workshop on Robotics and Vehicular Technologies for Self-Driving Cars

This is another example of real deployment of robots in realistic conditions. This workshop was very popular, unsurprisingly. The two stars in the workshop were Planning and Deep Learning.

Check the speakers and the topics here: http://cim.mcgill.ca/~malika/ICRA17_WS/#about
The main players on the floor were:

- Amazon Robotics
- DJI.
- Clearpath Robotics.
- Fetch robotics.
- PAL Robotics.
- HEBI.
- And the various robotic manipulators companies, ABB, Kuka, Kinova, ITRI.
A refreshing and eye-opening talk. The main message was, and I quote: “The challenge comes when [mathematical] models become so familiar that they are no longer taken as simplifications but mistaken for reality itself. Opportunities and possibilities that lie outside the bounds of those simple models are subsequently missed.”
This talk was about the journey to take research ideas to the market in the field of medical robotics. After this talk, I have a great appreciation to the people who manage to push through the technical and medical challenges and build a robot that operate on human subjects. It is a very difficult process indeed.
Hiroaki Kitano of Sony Computer Science Laboratories, Inc

The talk was titled “Nobel Turing Challenge: Grand Challenge of AI, Robotics, and Systems Biology” It is a call to develop AI that will, itself, makes major scientific discoveries which lead to giving the AI a Nobel Prize. Interesting.
All of the start-ups presented something to do with machine learning using computer vision.
Reducing Drift in Visual Odometry by Inferring Sun Direction Using a Bayesian Convolutional Neural Network

“Bayesian Convolutional Neural Networks to train and implement a sun detection model that infers a three-dimensional sun direction vector from a single RGB image.”
we formulate an optimization problem over sensor states and semantic landmark positions that integrates metric information, semantic information, and data associations, and decompose it into two interconnected problems: an estimation of discrete data association and landmark class probabilities, and a continuous optimization over the metric states.”
A Dataset for Developing and Benchmarking Active Vision

“The dataset includes 20,000+ RGB-D images and 50,000+ 2D bounding boxes of object instances densely captured in 9 unique scenes.”
“Unlike an aerial environment, an underwater environment contains larger particles and is dominated by a different image degradation model. Our method starts with a thorough understanding of underwater particle physics (e.g., forward, back, multiple scattering, and blur)”
Driving in the Matrix: Can Virtual Worlds Replace Human-Generated Annotations for Real World Tasks?

“This paper describes a method to incorporate photo-realistic computer images from a simulation engine to rapidly generate annotated data that can be used for the training of machine learning algorithms.”
Direct Visual Odometry in Low Light Using Binary Descriptors

"we propose to use binary feature descriptors in a direct tracking framework without relying on sparse interest points."

Fig. 1: Top row shows an example of commonly encountered low signal-to-noise ratio imagery from an underground mine captured with a conventional camera. The bottom row shows a histogram-equalized version emphasizing the poor quality and the significant motion blur.
UAV-Based Crop and Weed Classification for Smart Farming

“we address the problem of detecting value crops such as sugar beets as well as typical weeds using a camera installed on a light-weight UAV. We propose a system that performs vegetation detection, plant-tailored feature extraction, and classification to obtain an estimate of the distribution of crops and weeds in the field.”
Semantics-Aware Visual Localization under Challenging Perceptual Conditions

"we propose a novel approach for learning a discriminative holistic image representation which exploits the image content to create a dense and salient scene description. These salient descriptions are learnt over a variety of datasets under large perceptual changes."

Fig. 2: Fast-Net architecture used in our approach for image segmentation. Only convolutional, pooling, and up-convolutional layers are visualized.
4D Crop Monitoring: Spatio-Temporal Reconstruction for Agriculture

“We propose a 4D reconstruction approach to crop monitoring, which employs a spatio-temporal model of dynamic scenes that is useful for precision agriculture applications. Additionally, we provide a robust data association algorithm to address the problem of large appearance changes.”

Fig. 3: Overview of multi-sensor SLAM system.
“This paper proposes a framework for predicting localization performance in the context of visual landmark-based mapping. Specifically, we propose an algorithm for predicting performance of vision-based localization systems from different poses within the map.”
A SLAM session
The reception

Gardens by the Bay

The Flower Dome
The ballroom is 106m x 50m and can fit 10,000 people.
Thanks