ELEC1030
The Rise of Autonomous Robots

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Lecture: Wed & Fri 13:30 – 14:50
                                   Zoom Meeting ID 945 3411 2225
Tutorial: Thu 18:00 – 18:50
                                   Zoom Meeting ID 925 5901 6495

Course Description:

As a Common Core Course, this course is designed to educate students with little or no technical background and experience to have a general understanding and a fun learning experience of the charismatic subject of robots. Our society is on the verge of a new era of technology convergence: robotic devices are envisioned to become a nearly ubiquitous part of our day-to-day lives. New technologies such as wireless communication and voice and visual recognition will make robots become behaviour-based, cognitive and biologically inspired humanoids. Fundamental social, economical, and technological issues of a human-machine society will be identified and discussed in interactive sessions. This learning process transcends the conventional boundaries between technology and other disciplines, and it is facilitated with a series of demonstrative sessions which present students with opportunities to observe, evaluate, examine, and interact with a variety of commercial robots and humanoids. Guided by internal and external experts, students will also focus on a specific social, business or technology issue, identifying and exploring potential solutions with robotic and automation technology that could potentially impact the quality of our life. In this exploration process, students are encouraged to apply their personal background and interest to conceive and experiment, if possibly, with the aid of an available technical kit. The course will cultivate students with enriched perspectives of a future society.

Course Contents:

1. Basic concept and the making of robots:
    -   their physical composition and their behaviour functionalities
    -   enabling elements for autonomous robots: actuators, sensors, communications, computing, algorithms, and data fusion and processing
    -   historical perspectives and current state of the technology
    -   social, economic and behavioural impacts of the technology
    -   a robot-augmented future society.

2. Understanding the roles, functions and the contemporary use of robots:
    -   field observations and evaluation of robots in the service industry (e.g. restaurant service and entertainment robots);
    -   examination and interaction with robots (e.g. hospital robots, robot assistants and humanoid robots in laboratories)
    -   reflections on the characteristics and values of robotic technology from the social, economic and technological perspective
3. Comprehensive overview of the whole autonomous vehicle technology and related social

issues, including deeper exploration of the various technologies and issues:
- Introduction to Autonomous Vehicles
- Benefits of Autonomous Driving
- Autonomous Ride Services
- Trucks, Delivery Vehicles, and Buses
- Technologies Enabling Autonomous Vehicles
- Disruptions Caused by Autonomous Vehicles
- Government Regulation & Support

Topics

1. Technology trend
2. Basic concepts and the making of robots
3. Machines to live with: Social robots
4. Machines to live with: Medical robots
5. Machines to live with: Mobile robots and drones
6. Introduction to Autonomous Vehicles
7. Benefits of Autonomous Driving
8. Autonomous Ride Services
9. Trucks, Delivery Vehicles, and Buses
10. Technologies Enabling Autonomous Vehicles
11. Disruptions Caused by Autonomous Vehicles
12. Government Regulation & Support

Textbook:

1. **Autonomous Vehicles: Opportunities, Strategies, and Disruptions, 2018, by Michael E. McGrath.**
(HKUST textbook ordering service was not able to purchase the book from the publisher. Thus, the students may consider making online purchase of the book directly from Amazon at https://www.amazon.com/Autonomous-Vehicles-Opportunities-Strategies-Disruptions/dp/1706683596)

Reference:

1. **Creating Autonomous Vehicle Systems, Morgan & Claypool, 2018, by Shaoshan Liu; Liyun Li; Jie Tang; Shuang Wu; Jean-Luc Gaudiot.**
(Through HKUST Library system, HKUST students may access this book at https://www.morganclaypool.com/doi/10.2200/S00787ED1V01Y201707CSL009)

Grading:

Course & Interactive Session Participation	10%
Homework	20%
Mid-Term Examination	30%
Project Report and Presentation	40%