

Internet of Things: Technology and Applications

Instructor: Associate Professor (Practice) Tan Hwee Pink, School of Information Systems

Course Description

In the near future, we can envision a world in which billions of devices can sense, communicate, and collaborate over the Internet, in the same way that humans have interacted and collaborated with one another over the World Wide Web. This vision is now known as the Internet of Things. The knowledge created from these interconnected objects can potentially offer new anticipatory services to improve our quality of lives, and can be applied to various application domains - such as smart cities, homes, transport and healthcare.

In line with worldwide efforts to realize smart cities through IoT technologies, this course is intended to equip students with the state-of-the-art in IoT technologies, to enable them to conceptualize practical IoT systems to realize citizen-centric applications.

Topics include IoT Applications, IoT Protocols, Security, and Societal Impact of IoT, to name a few.

Learning Objectives

By the end of this course, students will:

- acquire knowledge in state-of-the-art IoT systems and technologies;
- know potential IoT applications that can be created, through real-world examples;
- be able to identify and translate real needs into system requirements and constraints;
- be able to identify suitable IoT technologies to realize a practical system; and
- be able to build simple proof-of-concept applications.

Course Format

Each lesson comprises a seminar-style lecture, followed by a practical hands-on session, and an end-of-class quiz. During the practical session, students will have extensive opportunities to explore and try out the various state-of-the-art technologies (both hardware and software) that are used in IoT applications. Guest lecturers from the industry and/or agencies will also be invited from time-to-time, to speak about their experiences with real-world IoT systems and provide relevant industry perspectives.

Assessment

Students will be assessed through a combination of group projects and individual contributions.

Managing in a VUCA Context

Instructors:

1. Prof Howard Thomas (Course designer and coordinator), Professor of Strategic Management, Lee Kong Chian School of Business
2. Dr Saumya Sindhwani, Lee Kong Chian School of Business

Course description

The dynamic and fast changing nature of our world today is best described by VUCA, a term coined by the US Army War College. VUCA stands for Volatile, Uncertain, Complex and Ambiguous. The Arab Spring saw a change of government in countries like Tunisia, Egypt, Libya and Yemen. Once powerful countries in Europe are now fighting bankruptcy. The growth of the developing world which was taken for granted has begun to slow down.

Even companies that were synonymous with their product categories just a few years ago are now no longer in existence. Kodak, the inventor of the digital camera had to wind up its operations. HMV, the British entertainment retailing company and Borders, once the second largest US bookstore, have shut down due to their inability to evolve their business models with the changing times.

With such momentous changes happening in the world today, this course prepares the students to better understand the complexity of those changes and how a simple phenomenon may have ripple effects on multiple issues. This course helps students to understand the tensions in a given situation and how they need to think through a problem from multiple dimensions.

Topics include Understanding the Future, Leading and Managing on the Edge, and VUCA Integration, to name a few.

Learning objectives

By the end of this course, students will be able to:

- Describe the mega trends impacting our world and what are the ramifications of those on the world of business.
- Explain the factors due to which the problems are becoming increasingly complex.
- Understand the larger context of a problem, while examining the finer details of the same.
- Learn the ability to analyse a problem from various perspectives and develop a mindset to appreciate the complex nature of problems.
- Define their own ways of dealing with VUCA situations.

Assessment

Students will be assessed through a combination of group projects and individual contributions.

The Design of Business

Instructor: F. Ted Tschang, Associate Professor of Strategic Management, Lee Kong Chian School of Business

Course description

The world is changing rapidly, with market, political and organizational boundaries and futures being reshaped by disruptive technological innovations and world-changing environmental and social forces. Academic environments traditionally provide the knowledge for analyzing and understanding these separate forces as a preparation for managing business. However, in today's current environment it is critical to move beyond understanding to application as organizations require integrative and business design skills to ensure that they thrive in this environment, as they shape the world for the better.

The capstone course prepares students for these complex environments by providing a platform for bridging their academic knowledge to the solution of real world problems. The course does this by developing an integrative thinking ability that draws on the knowledge accumulated in prior core courses, as well as an understanding of how to innovate and transform organizations in dynamic (real world) business contexts. The course develops in students an ability to identify problems and develop solutions, through design methods and business model frameworks. Critical reasoning and means of testing are used to validate solutions. To action this, the capstone will simulate a "real world" innovative project implementation, consisting of three aspects of a business that must be innovatively and iteratively designed and developed: the product/service idea, the business model and the firm's strategy.

In order for students to "construct" ideas, business models and strategies for the "real world", the course is designed to relate to prior courses, in particular, strategy, business, government and society (supplying the concept of the business environment), and perspectives from the technology, globalization and thinking skill clusters. It further blends cross-disciplinary perspectives from studies of organizations and strategy, forward-looking conceptions of management and change, and human decision-making behavior.

Topics include Strategy, Design and Business Models, Customer Insight, Ideation Methods and Building Business Models, to name a few.

Learning objectives

By the end of this course, students will be able to:

- Identify business problems associated with opportunities from the complex regional and global business environments, including new and untapped markets.
- Iteratively design interdisciplinary solutions to the 'business problem' on the product/service, business model and strategic levels.
- Reason critically through the problem identification/solution process by scientific thinking and other modes of analysis, while appreciating the cognitive biases involved.
- Describe the solution's implementation issues and processes with regards to the firm's existing strategy, market, and organization.

Assessment

Students will be assessed through a combination of group projects and individual contributions.

Annex 4

Below are examples of projects the students have embarked on under the pilot of 'The Design of Business'. The pilot course was run in Term 2 of AY2014-15, i.e. January – April 2015.

(i) Project with Fonterra: "Under the Capstone course, eight groups of students were involved in a project with Fonterra on understanding how to leverage insights from their customers' storefronts to offer total business solutions. Under the mentorship of Fonterra's business leaders in Foodservice, students explore ways in which to engage customers in meaningful dialogue to grow their customers' business and go beyond having a transactional relationship."

(ii) Project with OCBC: "24 students (working in five groups) were involved with OCBC on a project titled 'SME Banking in 36 months'. Under the mentorship of senior leaders from OCBC Bank's Emerging Business Unit, students worked with OCBC Bank and SME business owners to design innovative banking solutions that would potentially change the way SMEs do business with the bank in the next three years."

(iii) Project with A*STAR: "A group of students worked with A*STAR's Institute for Infocomm Research (I²R) to study business innovation for virtual assistants using human language technology in a tourism context. Under the mentorship of I²R's research scientists and business development managers, students collaborated with the public as lead users and industry partners to explore new areas of opportunities, such as enhanced services and modes of service delivery to existing and new customer segments."
