

What is **Connected System**?



- **Connected System** refers to a **collection of interrelated parts** comprising IT devices, sensors, and actuators that can **seamlessly interact with each other**, usually wirelessly.
- By incorporating the functions of **sensing, measuring** and **interpreting**, these systems can **analyze, predict** and **learn** to make decisions to **act** and **optimize** both with and without human intervention.



Photo credit: <https://babin-business-consulting.com/the-internet-of-things-or-connected-objects>

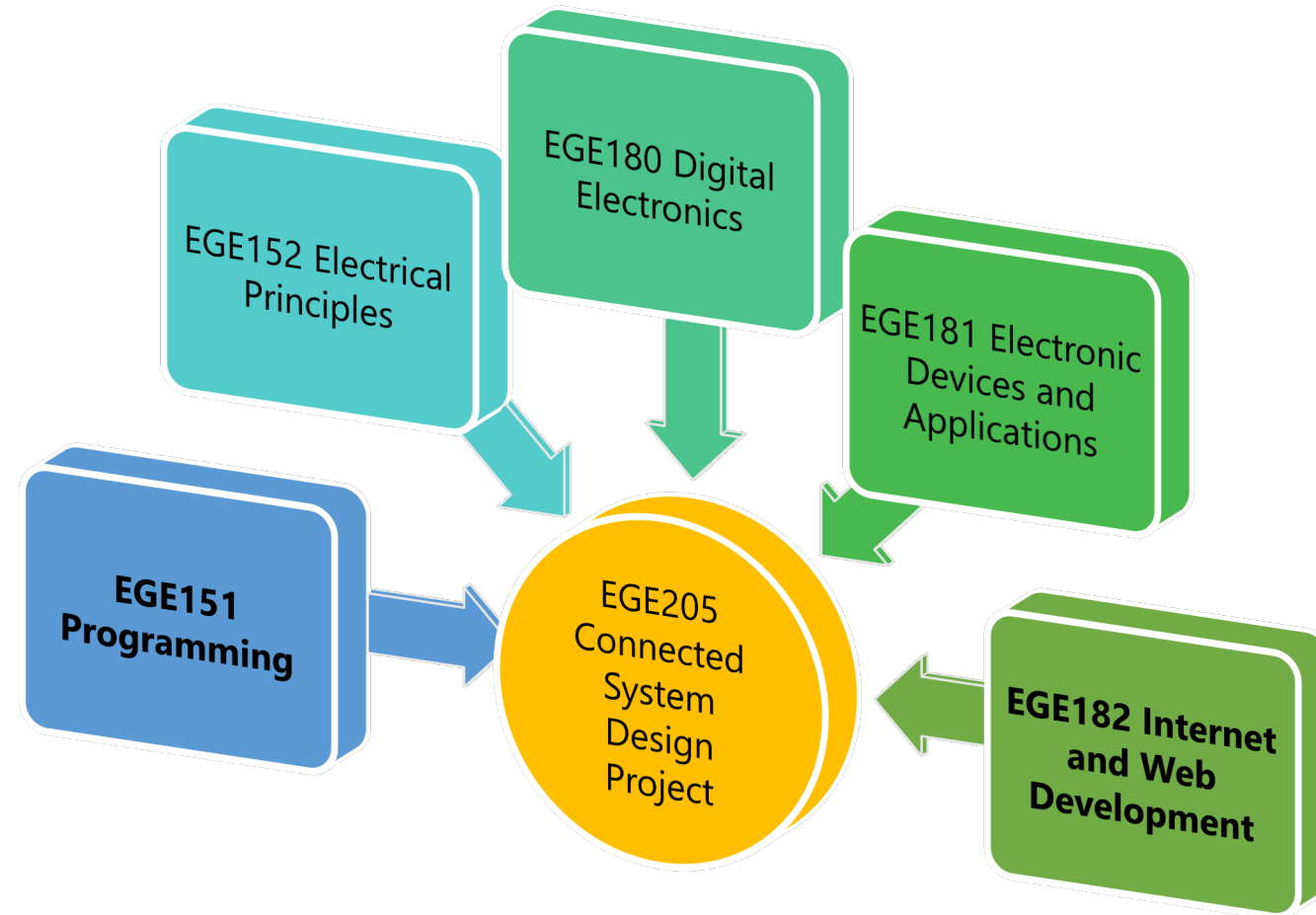


Why Connected System?

- Without even realizing it, many consumers have already integrated electronic devices into their lives via popular connected devices that are already on the market such as smart thermostats, connected cars and activity trackers.
- **In 2014** connected devices and applications produced **\$180+ billion** in revenue. The future revenue opportunities as stand-alone products and application markets increasingly become part of larger networked systems is expected to grow to **over \$1 trillion by 2020**.
- Many companies are expected to be prepared to adapt to the way the connected system will change the way people learn, work and innovate. So the **skill set of knowing how to design and develop connected systems** will be highly sought after in future. **Do you have this skill set already?**

Source credit : <https://www.postscapes.com/what-exactly-is-the-internet-of-things-infographic/>

Which Modules Are Linked To This Module?





What Is The Uniqueness Of This Module?

- This module will be taught using the **Project-Based Learning (PBL)** teaching method.
- **PBL** is a teaching method that enables you to gain knowledge and skills by **investigating and responding** to an **authentic** complex **problem, project or challenge**.
- The teaching method is designed in a **structured manner** to provide **scaffolded learning, facilitation and coaching, team empowerment, industry exposure** and **balanced assessment**.
- It embraces the learning and strengthening abilities of **I&E skill competencies** in 4 areas namely **digitalization, design processes, resourcing** and **collaboration practices**.
- Ultimately, the PBL teaching method aims to **motivate you, boost your self-confidence level** and **stretch your strength further** to produce high quality project work.



Module Learning Outcome

- At the end of this module, students will be able to:
 - **describe** the **functional blocks of a connected system** by identifying key concepts and technologies of network architecture, modern communications, and electronic systems.
 - **develop** a **connected system** by using open-source hardware and software platform.
 - **ideate** and **create solution for real-life problems** by conducting technical research and applying modern tools that support independent learning.



Topics

1. Briefing and Discussion of Project
 - 1.1 Project Scope and Desired Outcome
 2. Design & Planning
 - 2.1 Prototype Design and Project Planning
 - 2.2 Guided Labs on Connected System Development Platform
 3. Implementation
 - 3.1 Individual Development and System Integration
 - 3.2 Testing and Iteration
 4. Project Closure
 - 4.1 Project Documentation & Presentation
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Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 1 17 Apr 23	<i>Module Introduction</i>		
	<u>Briefing and Discussion</u> <ul style="list-style-type: none"> Know the driving question. Contribute to a facilitated inquiry session to generate a list of questions for learning. Understand the project delivery and rubrics. Forming teams. 	<u>Guided Lab</u> <u>Lab 1a</u> <ul style="list-style-type: none"> Introduction: Getting Started with BeagleBone Black Wireless (BBBW) Board 	<u>Guided Lab</u> <u>Lab 1b</u> <ul style="list-style-type: none"> Introduction: Getting Started with BeagleBone Black Wireless (BBBW) Board



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 2 24 Apr 23	<u>Design & Planning</u> <u>Project Report (Part 1)</u> <ul style="list-style-type: none"> Identify targeted user. Design questionnaire for survey or interview. 	<u>Guided Lab</u> <u>Lab 2a</u> <ul style="list-style-type: none"> Display: Controlling the LED Segment using BeagleBone Black Wireless (BBBW) Board 	<u>Guided Lab</u> <u>Lab 2b</u> <ul style="list-style-type: none"> Display: Controlling the LED Matrix and OLED using BeagleBone Black Wireless (BBBW) Board
Week 3 1 May 23 (Mon, 1 May is Labour Day)	<u>Design & Planning</u> <u>Project Report (Part 2)</u> <ul style="list-style-type: none"> Analyze and interprets the collected data through graphical representation. 	<u>Guided Lab</u> <u>Lab 3a</u> <ul style="list-style-type: none"> HMI: Reading the Digital Inputs using BeagleBone Black Wireless (BBBW) Board 	<u>Guided Lab</u> <u>Lab 3b</u> <ul style="list-style-type: none"> HMI: Reading the Analog Inputs using BeagleBone Black Wireless (BBBW) Board



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 4 8 May 23	<u>Design & Planning</u> Home-based Learning	<u>Guided Lab</u> Home-based Learning	<u>Guided Lab</u> Home-based Learning
Week 5 15 May 23	<u>Design & Planning</u> <u>Project Report (Part 2)</u> <ul style="list-style-type: none"> Analyze and interprets the collected data through graphical representation. 	<u>Guided Lab</u> <u>Lab 4a</u> <ul style="list-style-type: none"> Sensor and Actuator: Reading the Digital Sensor Data and Controlling the Actuator using BeagleBone 	<u>Guided Lab</u> <u>Lab 4b</u> <ul style="list-style-type: none"> Sensor and Actuator: Reading the Analog Sensor Data and Controlling the Actuator using BeagleBone



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 6 22 May 23	<u>Design & Planning</u> <u>Project Report (Part 3)</u> <ul style="list-style-type: none"> • Generate and evaluate ideas. • Design the selected idea using block diagram. • Indicate task allocated for each member. 	<u>Guided Lab</u> <u>Lab 5a</u> <ul style="list-style-type: none"> • Networking: Setting up a Web Server using BeagleBone Black Wireless (BBBW) Board 	<u>Guided Lab</u> <u>Lab 5b</u> <ul style="list-style-type: none"> • Networking: Setting up a Web Client using BeagleBone Black Wireless (BBBW) Board
Week 7 29 May 23	<u>Design & Planning</u> <u>Project Report (Part 3)</u> <ul style="list-style-type: none"> • Generate and evaluate ideas. • Design the selected idea using block diagram. • Indicate task allocated for each member. 	<u>Implementation</u> <u>Lab 6a</u> <ul style="list-style-type: none"> • Networking: Setting up a connected system using BeagleBone Black Wireless (BBBW) Board 	<u>Implementation</u> <u>Lab 6b</u> <ul style="list-style-type: none"> • A Practical Example of A Connected System



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 8 5 Jun 23 (Fri, 2 Jun is Vesak Day)	<u>Design & Planning</u> <u>Project Report (Part 3)</u> <ul style="list-style-type: none"> • Generate and evaluate ideas. • Design the selected idea using block diagram. • Indicate task allocated for each member. 	<u>Implementation</u> <ul style="list-style-type: none"> • Assignment (Individual) 	<u>Revision and Test</u> <ul style="list-style-type: none"> • eQuiz (Individual) • Submission of Individual Assignment
Week 9 12 Jun 23	<i>Term Break</i>		



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 10 19 Jun 23	<i>Term Break</i>		
Week 11 26 Jun 23 (Thu, 29 Jun is Hari Raya Haji)	<u>Design & Planning</u> <u>Project Report (Part 4)</u> <ul style="list-style-type: none"> • Introduction to TEAMMATES • Formulate a project development timeline and action plan by using a Gantt Chart. 	<u>Implementation</u> <ul style="list-style-type: none"> • System Integration and Testing 	<u>Implementation</u> <ul style="list-style-type: none"> • System Integration and Testing



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 12 3 Jul 23	<u>Design & Planning (Zoom)</u> <u>Project Report (Part 5)</u> <ul style="list-style-type: none"> Formulate a project deployment plan with key milestones by assessing the readiness of the project and resources needed. 	<u>Planning and Design (Zoom)</u> <ul style="list-style-type: none"> System Integration and Testing 	<u>Planning and Design (Zoom)</u> <ul style="list-style-type: none"> System Integration and Testing
Week 13 10 Jul 23	<u>Design & Planning</u> System Integration and Testing	<u>Implementation</u> <ul style="list-style-type: none"> System Integration and Testing 	<u>Implementation</u> <ul style="list-style-type: none"> System Integration and Testing
Week 14 17 Jul 23	<u>Design & Planning</u> <ul style="list-style-type: none"> System Integration and Testing 	<u>Implementation</u> <ul style="list-style-type: none"> System Integration and Testing 	<u>Implementation</u> <ul style="list-style-type: none"> System Integration and Testing



Module Delivery Plan

Week	Design & Planning (2h)	Practical Session 1 (2h)	Practical Session 2 (2h)
Week 15 24 Jul 23	<u>Design & Planning</u> <ul style="list-style-type: none"> Home-based Learning 	<u>Implementation</u> <ul style="list-style-type: none"> Home-based Learning 	<u>Implementation</u> <ul style="list-style-type: none"> Home-based Learning
Week 16 31 Jul 23	<u>Project Closure</u> <ul style="list-style-type: none"> Design and Review of Presentation Slides (Value Proposition) 	<u>Implementation</u> <ul style="list-style-type: none"> System Integration and Testing Submission of Group Project Report 	<u>Implementation</u> <ul style="list-style-type: none"> Demo of Integrated System (Group)
Week 17 7 Aug 23 (Wed, 9 Aug is National Day)	<u>Project Closure</u> <ul style="list-style-type: none"> Class Reflection if Lab zoom session held after the Final Presentation 	<u>Project Closure</u> <ul style="list-style-type: none"> Design and Review of Presentation Slides (Value Proposition) 	<u>Project Closure</u> <ul style="list-style-type: none"> Final Presentation



Assessment Plan

Type	Percentage	Submission By
Test <ul style="list-style-type: none"> eQuiz (Individual) 	15%	Week 8
Assignment (Individual)	25%	Week 8
Project <ul style="list-style-type: none"> Project Report (Group) Project Prototype (Group) Critical Core Skill (Individual) 	15% 25% 10%	Week 16 Week 16 Week 16
Presentation (Group & Individual)	10%	Week 17



Assessment Timeline

