

## Copyright Notice

Material used in this recording may have been reproduced and communicated to you by or on behalf of **The University of Western Australia** in accordance with section 113P of the *Copyright Act 1968*.

Unless stated otherwise, all teaching and learning materials provided to you by the University are protected under the Copyright Act and is for your personal use only. This material must not be shared or distributed without the permission of the University and the copyright owner/s.

# CITS 5506 The Internet of Things Lecture 01

Dr Atif Mansoor  
[atif.mansoor@uwa.edu.au](mailto:atif.mansoor@uwa.edu.au)

## Contact Information

### Email:

[atif.mansoor@uwa.edu.au](mailto:atif.mansoor@uwa.edu.au)

### Consultation:

Room G.06A, CSSE Building  
Through email appointment

## Timings

### Class (Face to Face)

Monday, 1200 - 1400

Location: Physics Building, Room G-41

### Lab (Face to Face) ( No Lab in first week)

Room G.01A, CSSE (IDEAS lab)

Monday 14:00 - 16:00

Tuesday 11:00 – 13:00

Wednesday 10:00 - 12:00

Wednesday 12:00 - 14:00

Thursday 10:00 - 12:00

## Material Delivery

- Microsoft Teams and LMS will be used for material delivery and discussions
- Mutual discussion through MS Teams
- LMS for related announcement
- Discussion Board at LMS should be first place to write generalized nature of queries.

## Lab Instructions

No lab in Week 01

The first lab will be in week 02

Bring your laptops for lab 01 as there are no computing machines in IDEAS lab (G.01 of CSSE Building)

## Lab Facilitator & Lab Technician

### Lab Facilitators

Dr Nasir Ahmad

[nasir.ahmad@uwa.edu.au](mailto:nasir.ahmad@uwa.edu.au)

Yuliang Zhang

[yuliang.zhang@research.uwa.edu.au](mailto:yuliang.zhang@research.uwa.edu.au)



### Lab Technician

Andrew Burrell (Andy)

– [andrew.burrell@uwa.edu.au](mailto:andrew.burrell@uwa.edu.au)

## Course Details

- **Theoretical Component**
  - Discussion on Technology, Presentations, Research Papers/Articles
  - Guest Lectures
- **Practical Component**
  - Labs (Arduino board, Raspberry Pi, Dragino for LoRa Communications, TTGO ESP 32 (built-in features such as LoRa, GPS, Wi-Fi and Bluetooth module))
  - Term Project

## Grading

- Lab Participations = 15% of unit marks
- Report on Academia/Industry Lectures = 15% of Unit marks
- Term group Project (4 to 5 members) = 30% of Unit marks
- End Semester Exam = 40% of Unit marks

## USE of AI Tool

Use of AI Tools is allowed but must be acknowledged.

## Academic Conduct & Late Submissions

### University Policy on Academic Conduct

<http://www.governance.uwa.edu.au/procedures/policies/policies-and-procedures?policy=UP07%2F21>

### Late Submission Penalties

[https://ipoint.uwa.edu.au/app/answers/detail/a\\_id/2711/~consequences-for-late-assignment-submission](https://ipoint.uwa.edu.au/app/answers/detail/a_id/2711/~consequences-for-late-assignment-submission)

## Group Project Aims



- To learn working in a team
- To learn collaboration
- To learn time management
- To work in a real life scenario

## Survey Form for Project's Team Selection



Kindly fill the survey form by midnight of Monday 31 July, 2023

<https://bit.ly/3Y0Ede8> or QR code



This is required to know the skill set of students and help selecting a balanced project team

Project Teams will be formed by the Unit coordinator by Tuesday, 8 August, 2023

## Group Project



- Term Projects should be decided by 6 pm, Tuesday, 22 August, 2023. Titles will be approved by UC by Thursday 24 August, 2023.
- A list of topics will be uploaded in advance, but Groups are encouraged to propose their own projects.
- Project Proposal Document to be submitted by Thursday, 31 August, 2023. See the rubric for grading.
- Feedback on Project Proposal by Unit Coordinator by Thursday, 07 September, 2023.
- A video of student group project "Pet feeder" of 2020 can be seen at following link:

<https://www.youtube.com/watch?v=jDTOLjIALMA>

## Group Project



- Individual Private Groups at MS Teams.
- Group Accountability Document
  - Recommended to plan and distribute tasks among group members
  - Weekly contribution of each group member
  - Submit separately week-wise along with the project

*Any dispute or disagreement need to be reported at the earliest to Unit Coordinator, and not at the end of the semester.*

## Team Accountability Document

Team Project/Team Accountability Form 1

Dates of the report week \_\_\_\_\_/Semester Week for \_\_\_\_\_

Project Name: \_\_\_\_\_

Group Members: \_\_\_\_\_

Team Accountability Document for the project: CITS 5506 Semester 02, 2023

To be uploaded at your group channel at MS Teams weekly by midnight of Sunday

This sheet is due in your team folder. It becomes part of your team's intellectual Property notebook, which is part of your project delivery documentation. Each team member needs to state explicitly what they contributed to the work of the team during the work day. Who found relevant references, drafted a section of the project proposal, wrote code for particular function, or researched a project element and explained it to the rest of the team etc. Team accountability document needs to be uploaded at MS Teams weekly by midnight on every Sunday, starting week 7 (first one due on midnight of 17 September, 2023).

Student Name	What I contributed to the teamwork this week

By submitting this document, we all Team members agree that the individual work reported above is true. Any dispute or disagreement is to report at the earliest to Unit Coordinator, and not at the end of the semester.

Note: The Unit Coordinator will regularly review the team accountability document. This will be part for Professional Conduct, if any team action.

## Students Right and Responsibilities

Read UWA's Charter of Student Rights and Responsibilities

<http://www.aps.uwa.edu.au/home/policies/charter>

## Every Student has right

1) to expect the University to provide a high quality of education including a high quality of teaching, supervision, curriculum and unit content, a commitment to inclusivity, and good access to staff;

2) to assessment that is valid, educative, explicit, reliable and fair;

## Every Student has the responsibility

1) to bring an open and enquiring mind and enthusiasm to their studies;

2) to participate actively in the teaching and learning and research environment, in particular by attending classes as required, complying with workload expectations, and submitting required work on time;

3) to be mindful of language in writing any feedback as per UWA policy  
<http://www.governance.uwa.edu.au/regulations/computer>

## In your opinion, what is Internet of Things ?

## In your opinion, What is the Significance of IoT and what are related prospects for you?

## The Internet of Things

The term Internet of Things \* generally refers to scenarios where network connectivity and computing capability extends to objects, sensors and **everyday items** not normally considered computers, allowing these devices to generate, exchange and consume data with minimal human intervention.

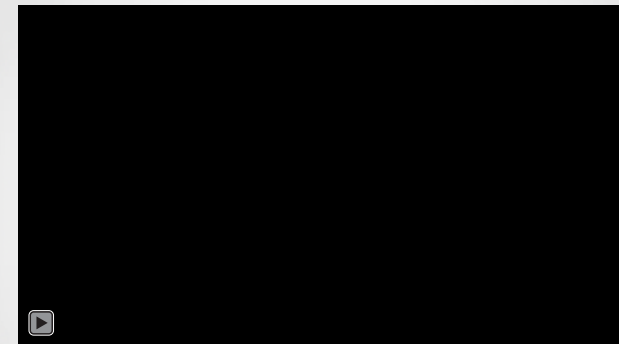
There is, however, no single, universal definition.

\* An Overview : Understanding the Issues and Challenges of a More Connected World, Whitepaper, 2015 by The Internet Society.

## The Internet of Things

- IC, electronic chip-- integrated circuit which can **sense** some physical event, which can **compute** to process that event in some way or fashion, and finally, which can **communicate**.
- Chip gets attached to the thing enabling this thing to become a piece of a bigger thing. Typically (but not always) the data that is collected off of the thing is sent initially to a gateway. The gateway aggregates the data and sends the data to a Cloud, a computing Cloud.
- Data is going to create value from the things --- **Analysis, Feedback, Act**

## How IoT works : A Video



## The Internet of Things

Billions of things ---- All of these things have to get **networked**.

So one aspect of Internet of Things that really deals with massive networking connection of all of these devices in a fashion where the connectivity

- can be maintained,
- can be reliable,
- can be secure, and
- it doesn't overwhelm computing resources, or bandwidth in the radio frequency domain,

## The Internet of Things

- We have **things** which can **sense** (provide some useful information about some physical phenomena) have some **computing** capability
- Able to **communicate** - A mechanism or means of communicating to other devices or to a network should exist
- **Act** - On the basis of analysis /insight gained from collected data something useful to happen

## The Internet of Things

IoT is really all about data. We collect data, we analyse data, we act upon what the data tells us.

## The Internet of Things

There are many different ways of calling the Internet of Things. Some call it as:

- web of things,
- internet of everything,
- Cloud or Fog network.

There are distinctions between them but to a great degree they are very similar.

## The Internet of Things

The Internet of Things is an emerging topic of **technical**, **social**, and **economic** significance.

Consumer products, durable goods, cars and trucks, industrial and utility components, sensors, and other everyday objects are being combined with **Internet connectivity** and powerful **data analytic** capabilities that promise to **transform** the way we **work**, **live**, and **play**.

## The Internet of Things

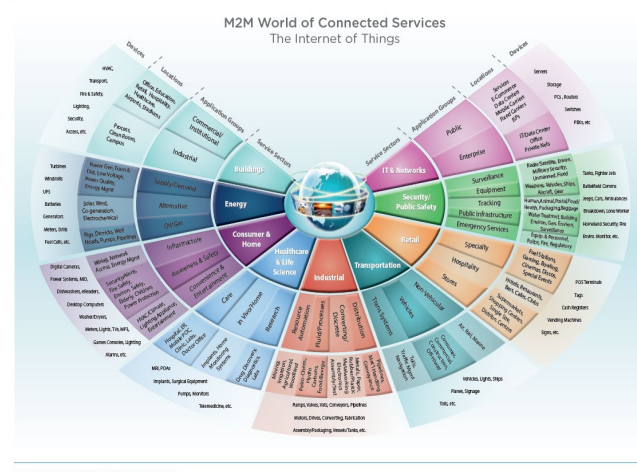
Projections for the impact of IoT on the Internet and economy are impressive, with some anticipating as many as 100 billion connected IoT devices by 2025<sup>1</sup>

Estimated global economic impact of more than \$11 trillion by 2025<sup>1</sup>.

1. The Internet of Things : An Overview , Understanding the Issues and Challenges of a More Connected World Published by the Internet Society

## The Internet of Things

© The Internet of Things - Connecting Technologies for the Internet of Things and Cloud



© 2017 Stanford Research Ltd. All rights reserved. | www.stanfordresearch.com

## HAPPY FORECAST





## What is your opinion ?

## Challenges for IoT

However, the Internet of Things raises significant challenges that could stand in the way of realizing its potential benefits.

### Societal Challenges

- privacy fears
- surveillance concerns
- Security Concern (hacking of Internet-connected devices)

## Challenges for IoT

### Technical challenges

- Sensors
- Power Consumption
- Security & Privacy
- Data Analytics
- Communication Technologies
- Interoperability / Standards
- Development Challenges/ Enabling Technologies

## Challenges for IoT

- **Enabling Technologies:** The concept of combining computers, sensors, and networks to monitor and control devices has existed for decades.
- The recent confluence of several technology market trends, however, is bringing the Internet of Things closer to widespread reality.
- These include Ubiquitous Connectivity, Widespread Adoption of IP-based Networking, Computing Economics, Miniaturization, Advances in Data Analytics, and the Rise of Cloud Computing.

## Challenges for IoT

### Legal Challenges

The use of IoT devices raises many new regulatory and legal questions:

- Issues related to cross border data flows
- Data collected by IoT devices is sometimes susceptible to misuse, potentially causing discriminatory outcomes for some users.

## Challenges for IoT

### Legal Challenges

- Conflict between law enforcement surveillance and civil rights
- Data retention and destruction policies
- Legal liability for unintended uses
- Security breaches or privacy lapses

It may force a shift in thinking about the implications and issues in a world where the most common interaction with the Internet comes from passive engagement with connected objects rather than active engagement with content.

## Additional Reading

THE INTERNET OF THINGS: AN OVERVIEW  
Understanding the Issues and Challenges of a More  
Connected World

<https://www.internetsociety.org/wp-content/uploads/2017/08/ISOC-IoT-Overview-20151221-en.pdf>

## Reading List



### **Internet of Things: Concepts and System Design**

Milenkovic, Milan

Publisher, Springer

Identifier

ISBN: 3030413454

ISBN: 9783030413453

EISBN: 9783030413460

EISBN: 3030413462

## Reading List



From Machine-to-Machine to the Internet of Things :  
Introduction to a New Age of Intelligence.

Tsiatsis, Vlasios.; Mulligan, Catherine.; Avesand,  
Stefan.; Karnouskos, Stamatis.; Boyle, David.; Holler,  
Jan.Jordan Hill : Elsevier Science; 2014

ISBN : 9780080994017

OCLC : (OCoLC)905840122

ISBN : 9780124076846

## Reading List



From Machine-to-Machine to the Internet of Things :  
Introduction to a New Age of Intelligence.

Tsiatsis, Vlasios.; Mulligan, Catherine.; Avesand,  
Stefan.; Karnouskos, Stamatis.; Boyle, David.; Holler,  
Jan.Jordan Hill : Elsevier Science; 2014

ISBN : 9780080994017

OCLC : (OCoLC)905840122

ISBN : 9780124076846

## Reading List



### **Internet of Things with ESP8266.**

Schwartz, Marco.

ISBN : 9781786466679

### **Internet of Things with 8051 and ESP8266.**

Gehlot, Anita.; Singh, Rajesh.; Malik, Praveen Kumar.;  
Gupta, Lovi Raj.; Singh, Bhupendra.

ISBN : 9781000258646

ISBN : 9780367534783

\* ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability

## Reading List



### **Internet of Things : Integration and Security Challenges**

Velliangiri, S. ,Kumar, Sathish A. P. ,Karthikeyan, P.

ISBN : 9781000291636

OCLC : (OCoLC)1204142479

ISBN : 9780367893873

## Reading List



### **Internet of Things Security : Challenges, Advances, and Analytics.**

Patel, Chintan.; Doshi, Nishant.

Milton : Auerbach Publishers, Incorporated; 2018

Identifier

ISBN : 9780429845734

## Reading List



### **The Internet of Things : Technologies and Applications for a New Age of Intelligence.**

Höller, Jan.; Tsiatsis, Vlasios.; Mulligan, Catherine.;  
Avesand, Stefan.; Karnouskos, Stamatis.; Boyle, David.

2nd ed.; San Diego : Elsevier Science & Technology;  
2018

ISBN : 9780128144367

OCLC : (OCoLC)1076802386

ISBN : 9780128144350