Introduction

Internet of Things
LABORATORY

UTEC
UNIVERSIDAD DE INGENIERÍA Y TECNOLOGÍA

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Instructor

Department of Computer Science

I am a graduate of the National University of Engineering (UNI) and a member of the GRFMO research group. My main research areas include Instrumentation, Small Satellites, and Interdigitated Circuits.

I enjoy sharing knowledge, always willing to support my students. I look forward to guiding you through this course and learning together.

Executive Summary

- **Overview:**
  - Course logistics.
  - About the laboratory course.
  - About the laboratory reports.
  - Groups.
  - Questions and doubts.

Outline

Course Logistics

About the laboratory course

About the laboratory reports.

Groups

Questions and doubts.

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Evaluation

Theory (35%)

- Evaluación Continua 1 (**5%**)
- Examen Parcial (**15%**)
- Examen Final (**15%**)

Laboratory (65%)

- Laboratorio L1 (**10%**)
- Laboratorio L2 (**10%**)
- Laboratorio L3 (**10%**)
- Laboratorio L4 (**10%**)
- Proyecto P1 (**5%**)
- Proyecto P2 (**20%**)

Evaluation

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- Laboratorio L4 (**10%**)
- Proyecto P1 (**5%**)
- Proyecto P2 (**20%**)

Evaluation

- Please refer to the course Syllabus in Canvas

Important Rules

UTEC rules:

- https://z9r4docs.utec.edu.pe/sites/default/files/2024-09/reglamento_de_disciplina_de_los_estudiantes_2024.pdf

Do not:

- **Publish your solution repos or share with other students before evaluation in canvas.**
- **Use partial or entire solutions and code implementations** from: a) online repositories, c) or other students (including those who have already taken the course).
  - **In doubt, ask instructor**

Do:

- Discuss ideas and problems with other students
- **Ask** your instructor

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Regarding lab reports and project reports

- Turnitin Originality will be used: Reports **exciding 25% will get -5 points.**

Important Rules

Punctuality:

- **Tolerance** time for arrival to class: **10 minutes.**

Order:

- **No profanity or bad language**.
- **Respectful** treatment.

Questions?

Call with **respect** (“Profesor”)

Logistics

- **Use email for emergencies. (garias@utec.edu.pe)**
  - **Case: one or more members of your team go AWOL**
    - Each report must have the list of people which where working on the project/lab and their contributions, e.g.

Universidad
Escuela

Título del Reporte
Curso

Integrantes del Grupo

- Integrante 1: revisión bibliográfica/búsqueda de normas/
- Integrante 2: implementación de nodo sensor/revisión bibliográfica
- Integrante 3: implementación de nodo sensor/revisión bibliográfica/frontend

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- **Introduces** fundamental **concepts of IoT paradigm for design and implementation.**
- **Objectives:**

- Show the principles of interconnected IoT systems.
- Explain the interaction between computing and sensing for IoT.
- Implement an IoT application system as a solution.

- **Content:**

Distributed in two modules:

- First module, from Week 1 to Week 8
- Second module, from Week 9 to Week 16

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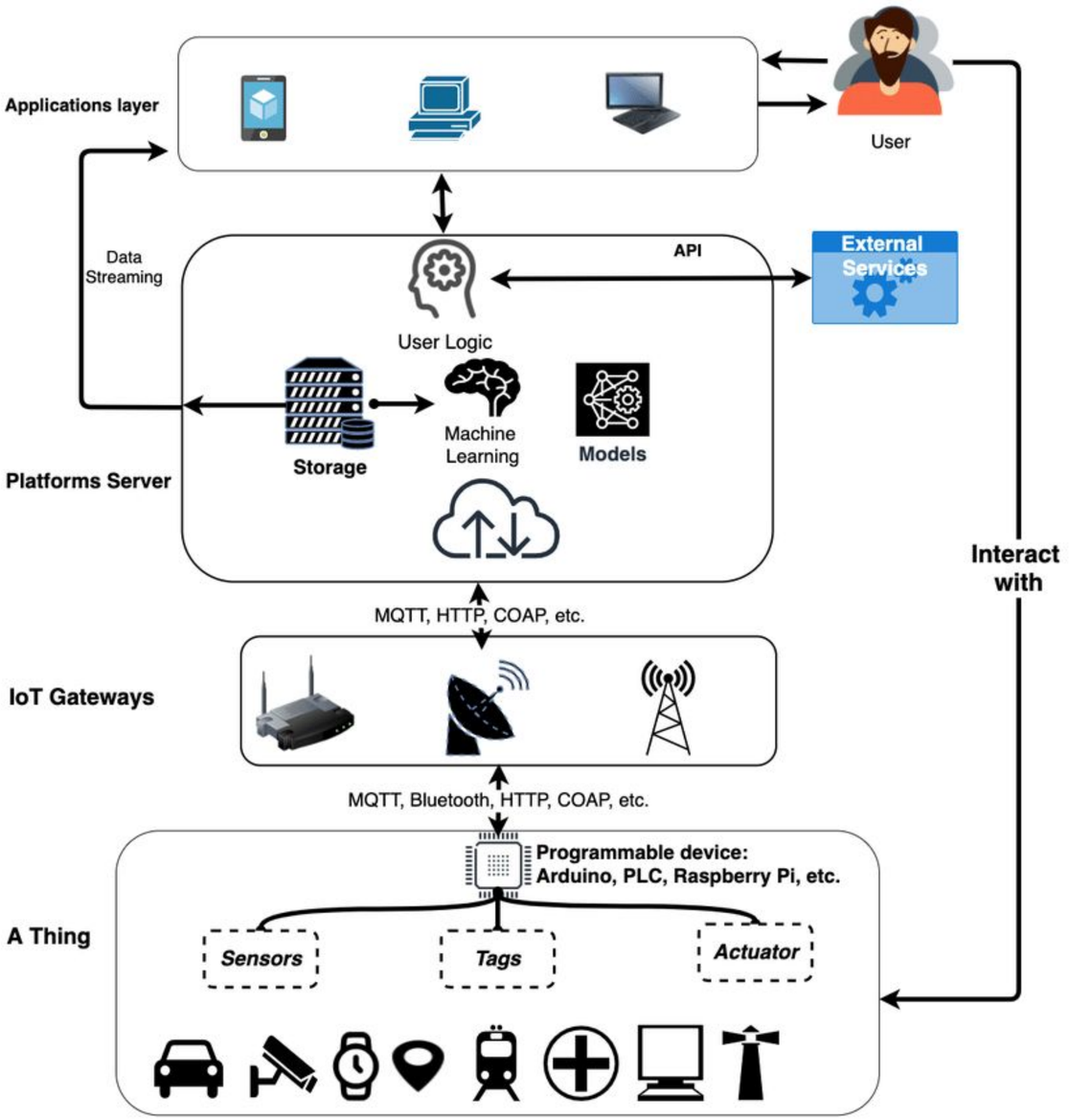
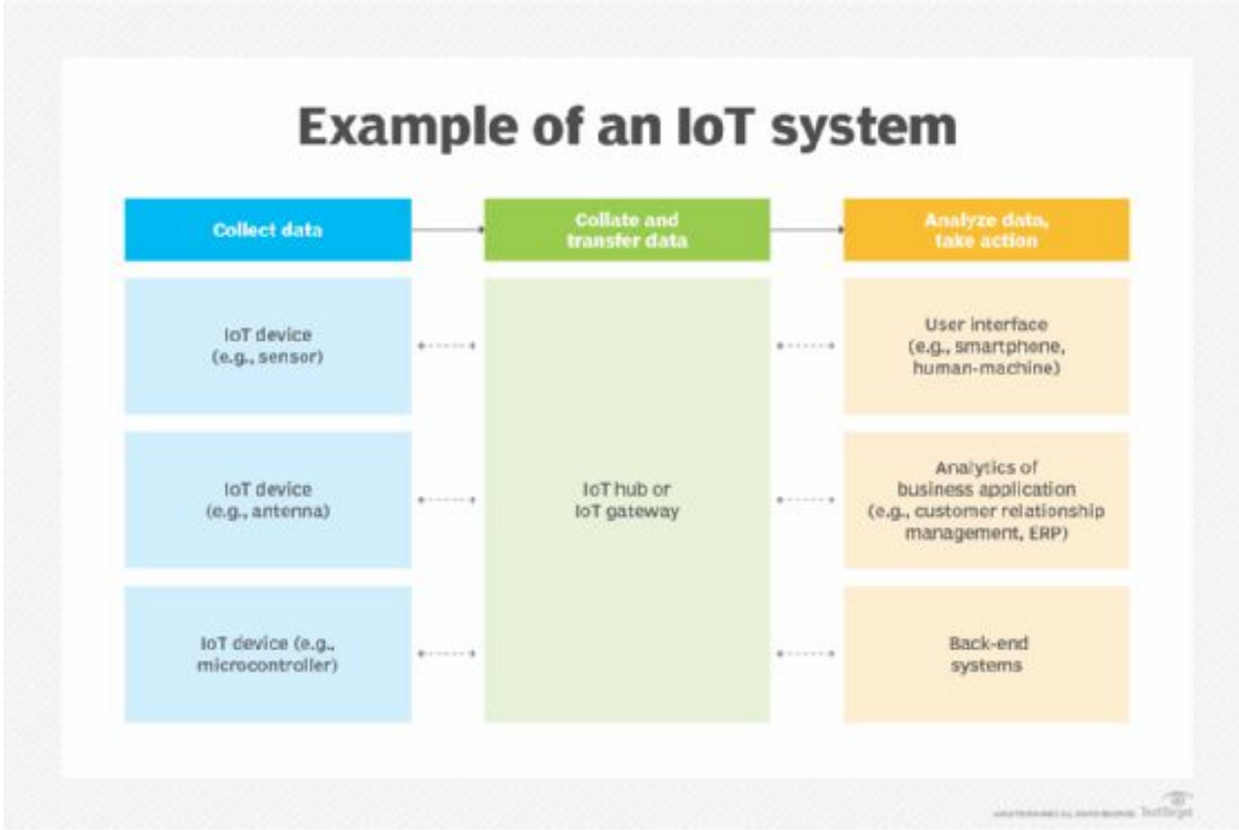
- The laboratories will be carried out with **electronic components kits.**

- **Each group will be assigned a lab kit,** which have to be taken care of by the students themselves.

- **What are we going to study along this half-year?**

CS5055 Internet of Things





Source: TechTarget

Source: Ihirwe, F. et al. DOI: 10.1145/3417990.3420208

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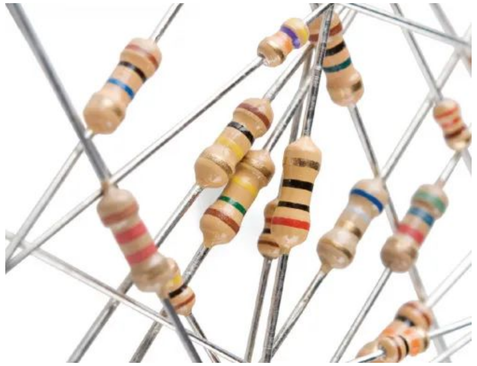
- Electronic Components



Resistencias

Diodos LED

Capacitores

Diodos

Botones

Inductores

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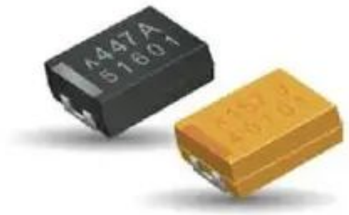
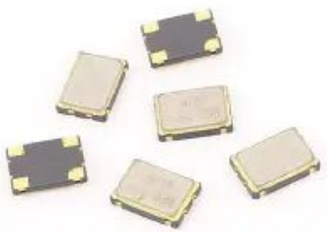
- SMD Components



SMD Capacitors

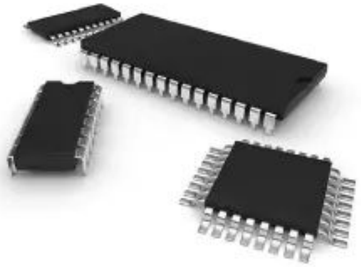
SMD connectors



SMD Crystal Oscillators

SMD Diodes

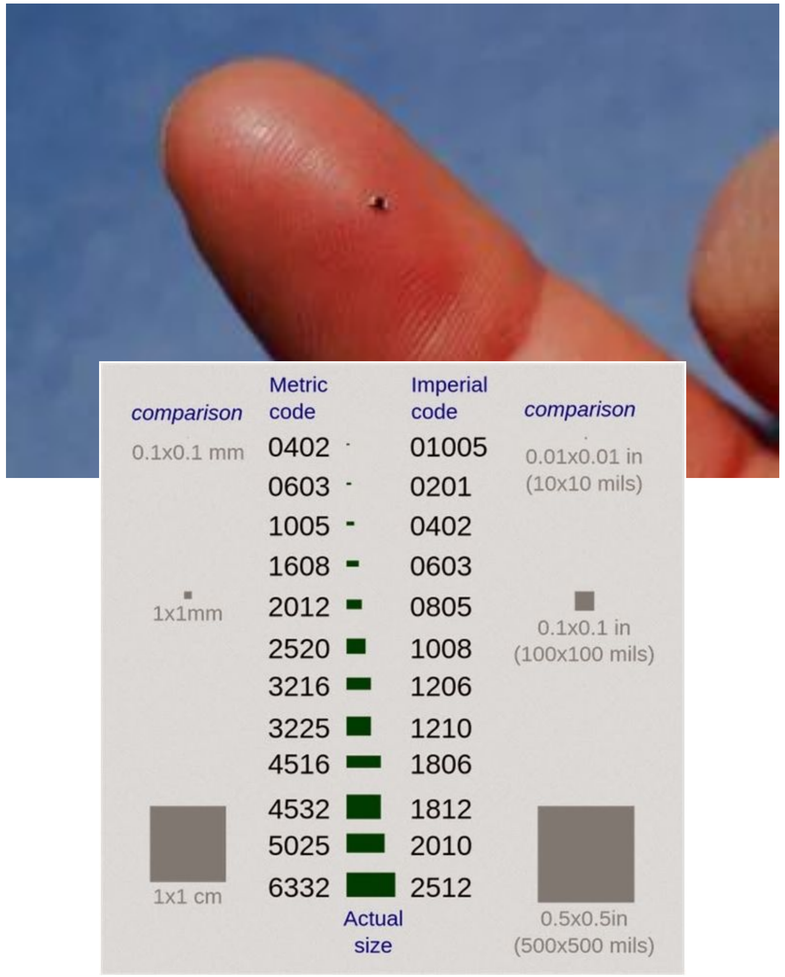
SMD Inductors



SMD Integrated Circuits (ICs)

SMD Resistors

SMD Switches



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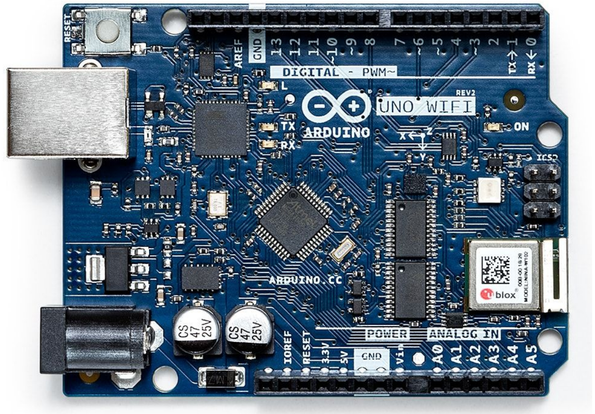
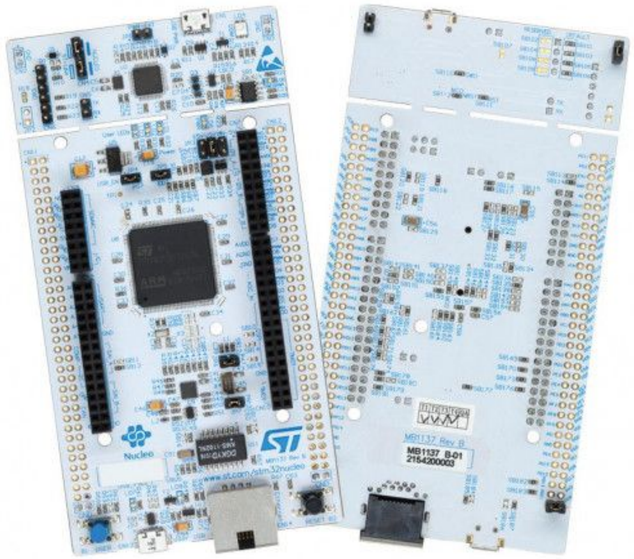
- Microcontrollers



Arduino UNO

ESP32

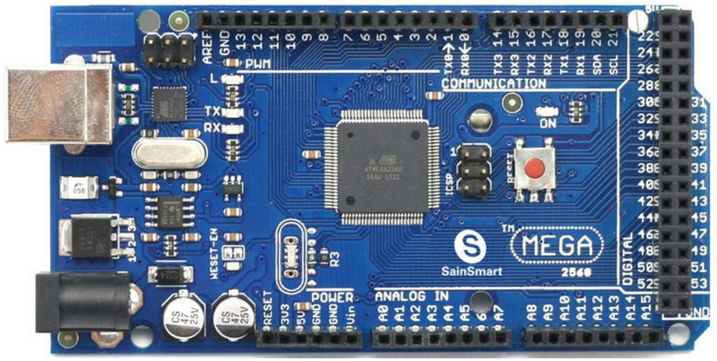


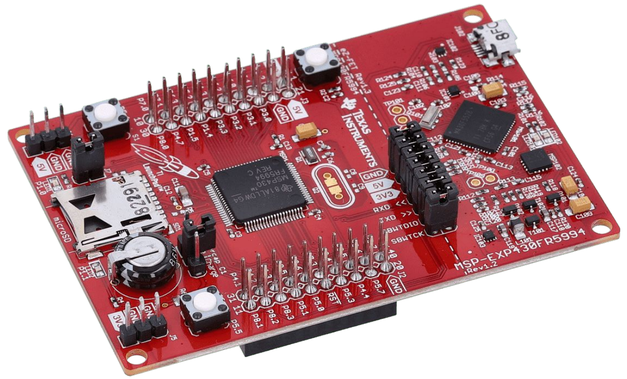
STM32 Nucleo 144

Arduino MEGA

Raspberry Pi

MSP430





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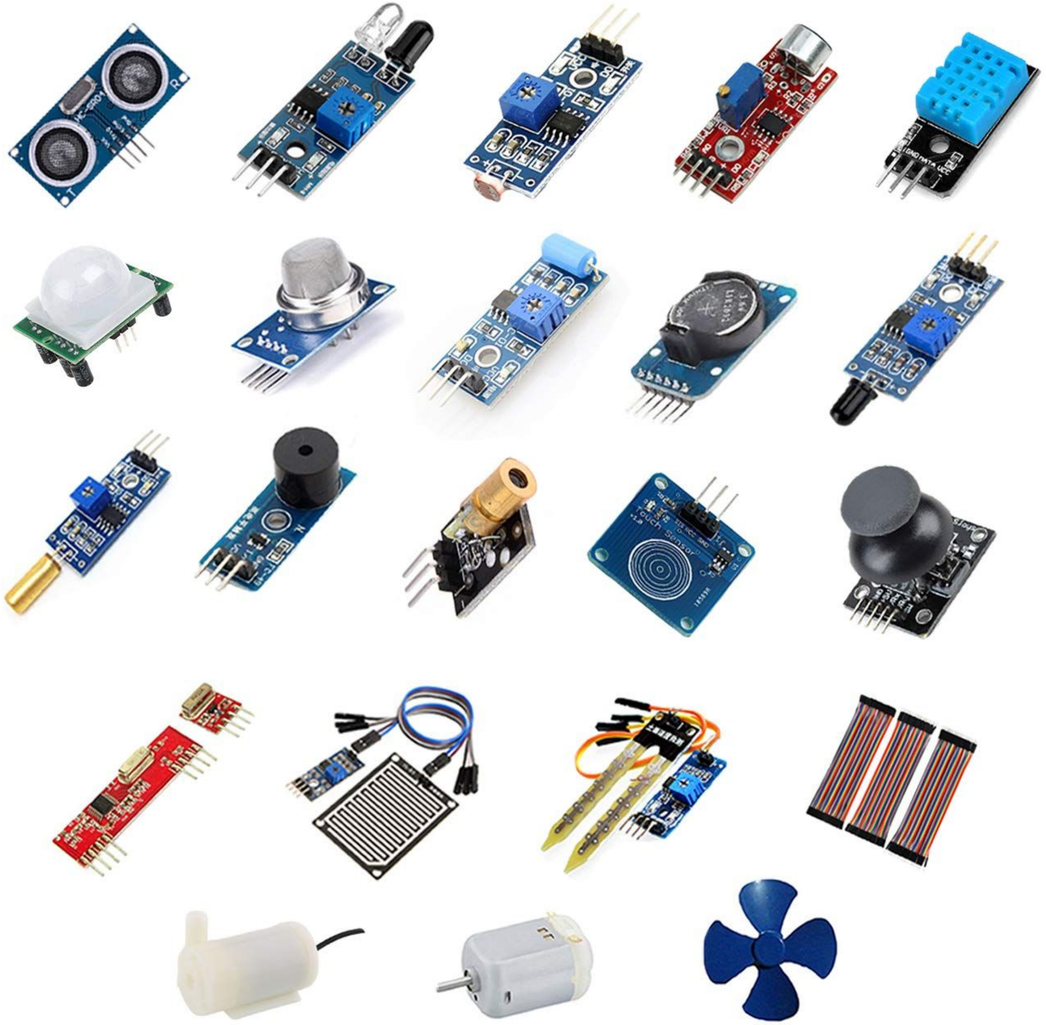
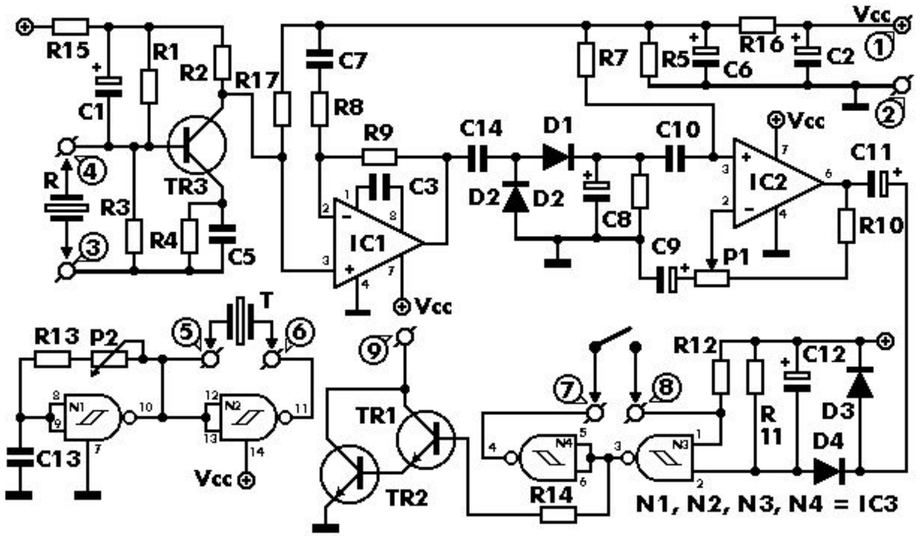
- Sensors and Actuators



Proximity Ultrasound Sensor

Internal Schematic Design



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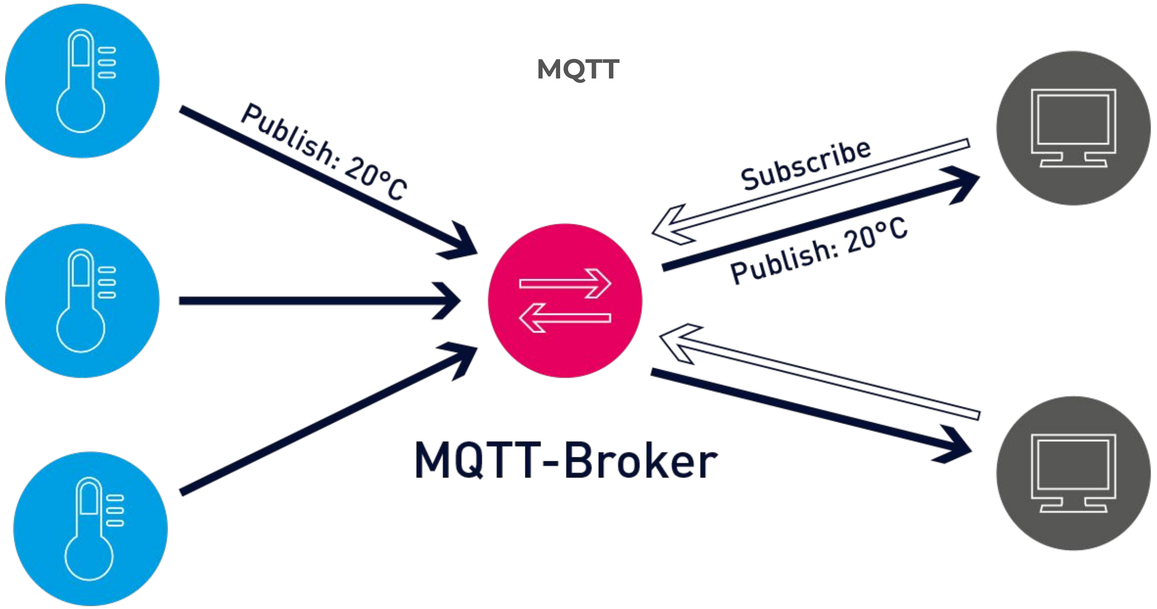
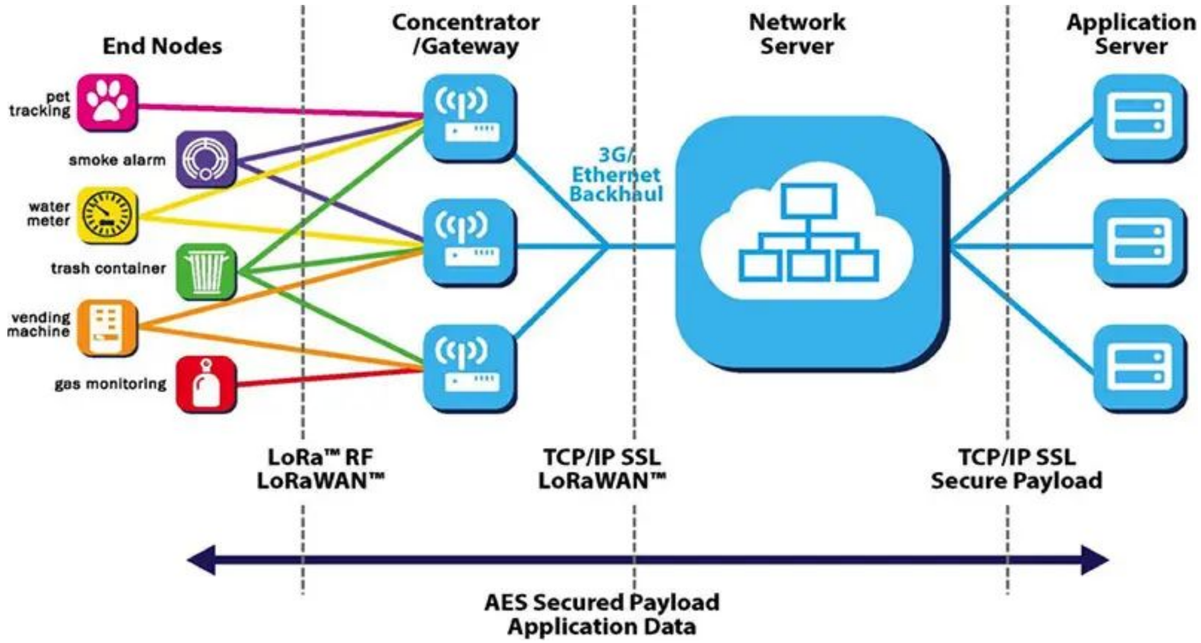
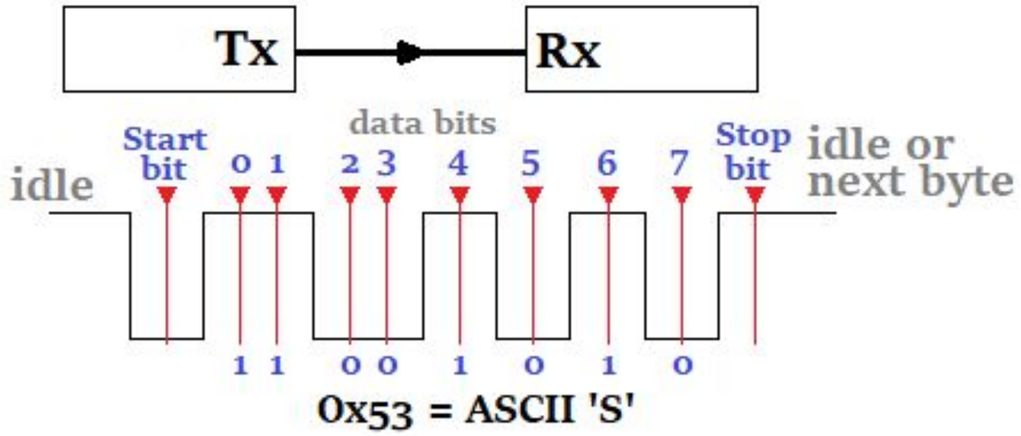
Communication Protocols





Serial/UART

LoRa/LoRaWAN



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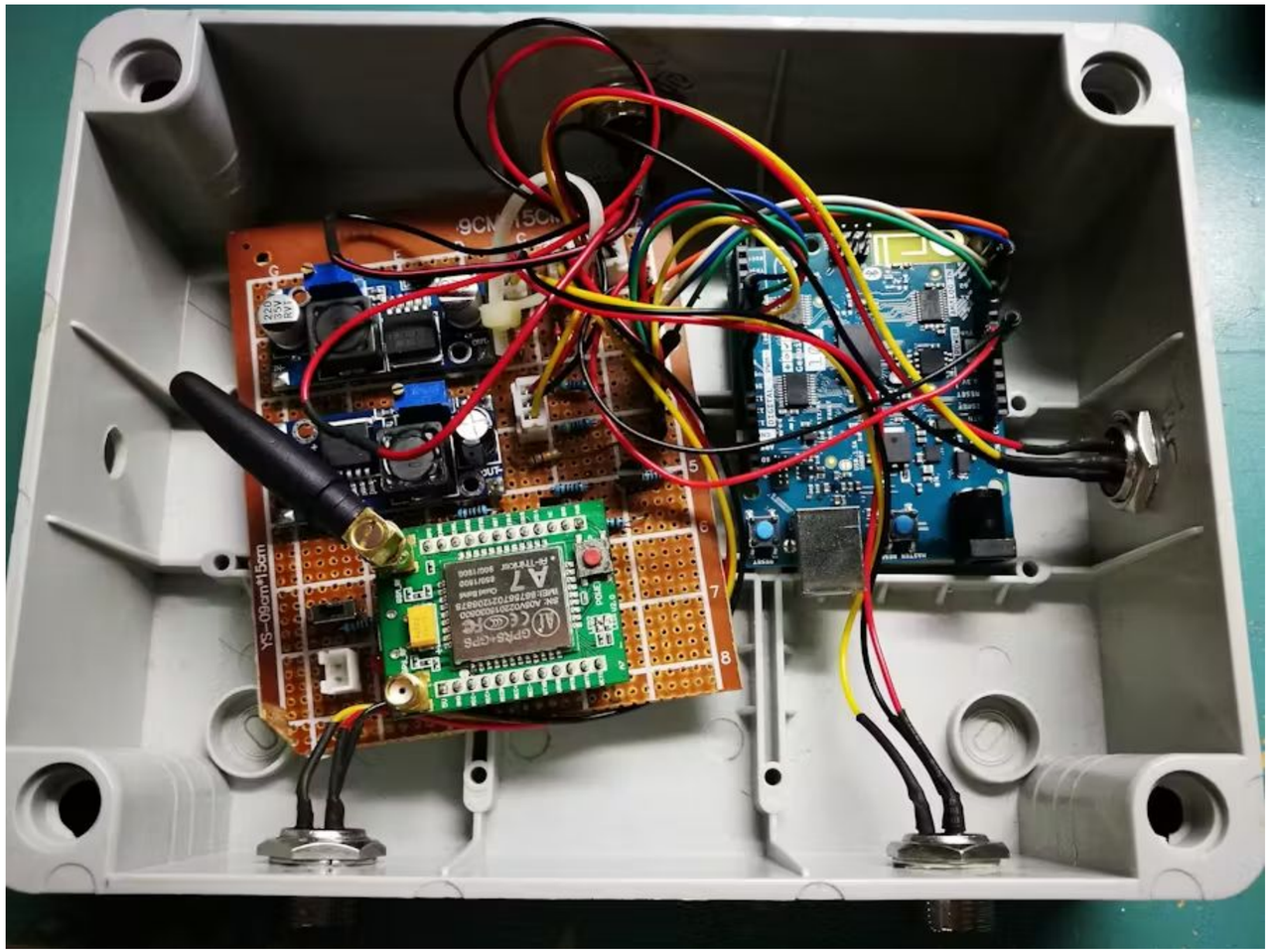
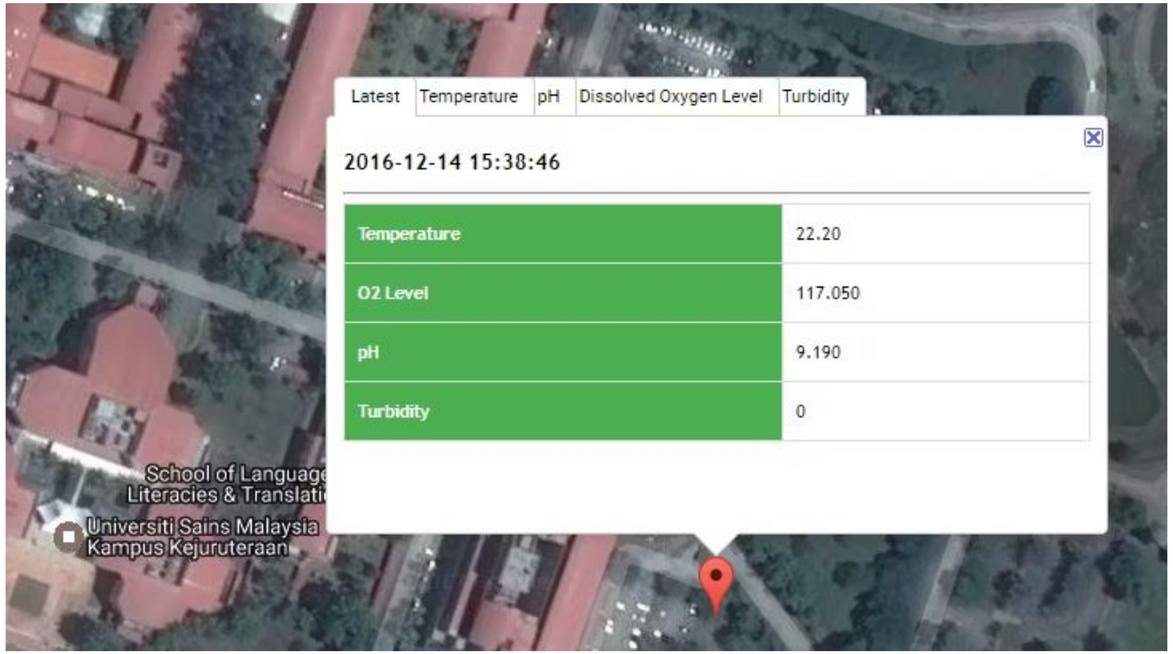
You are going to become an expert!





Source: Chan, Hao J.

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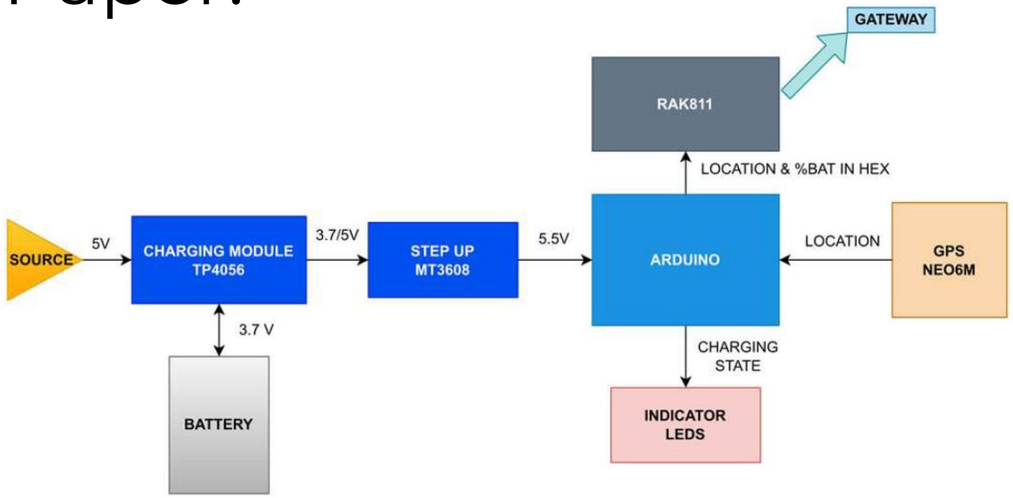
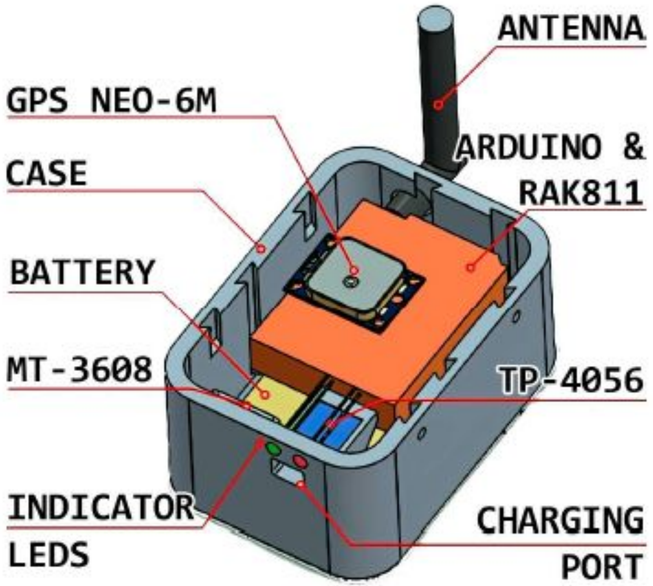
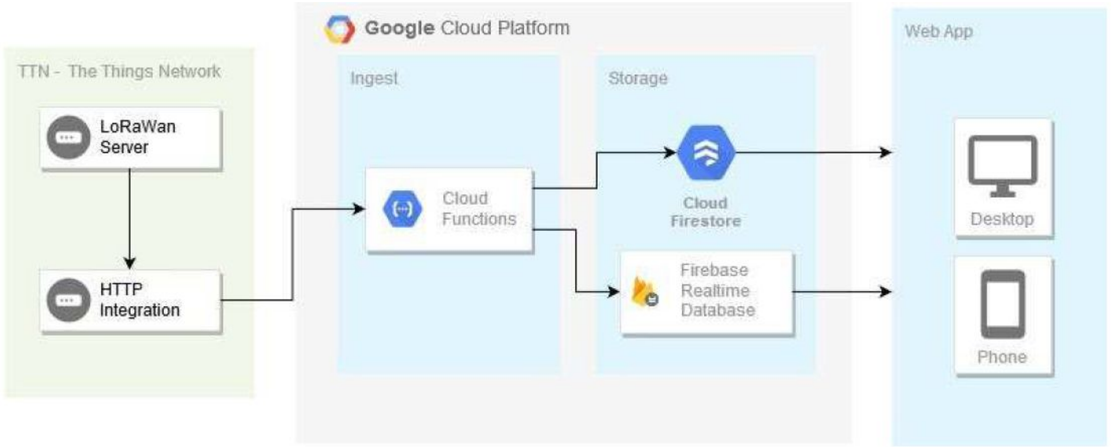
Paper!







Source: Arévalo, M, et. al.

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Laboratory Reports

The reports are recommended to be written in LaTeX (Overleaf).

- **Template:** https://www.overleaf.com/latex/templates/ieee-journal-paper-template/jbbbdkztwxrd

The submission should consist of:

1. **Introduction**
   a. Theoretical Framework
   b. State of the Art
2. **Methodology** (how?)
3. **Development** of the experience (including discussion*)
4. **Conclusions**
5. **References**

Laboratory Reports

- It is a **requirement** to have checkpoints marked by the teacher, so that the development of your lab report can be reviewed.
- **Without checkpoints, the developed section is not reviewed.**
- The **deadline** is defined by the teacher.
- Submission of checkpoints is **only given during lab time**.

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- All laboratory experiments will be done in **groups of 3 students (or 4, with the teacher's authorization).**

- The groups are **fixed**, ***no changes*** will be made between labs.

- All group members **must be present** at the lab session to validate the group checkpoint.
- In case a student is not present without prior notice or authorization from the teacher, **the checkpoint will not be counted (even if the group has done it).**

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Questions?

Enjoy the IoT trip ☺️

Thanks!