Embedded System Architecture - CSEN 701

Lecture 00

Course Policy

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Outline

- Our Code of Ethics
- Meet the Team!
- Let’s get to know each other ☺

- Let’s Play Together ☺
- Prerequisites
- The Resources
- Learning Outcomes
- Learning Tools
- Extra-Curricula Events
- Course Assessment

Our Code of Ethics

- We are all engineers.
- We are **all** here to learn.
- **Mutual Respect** will be the common policy that we will adopt in our classroom.

***Credit goes to Dr. Omar Shehata, MCTR, EMS*

Meet the Team!

Dr. Eng. Catherine M. Elias
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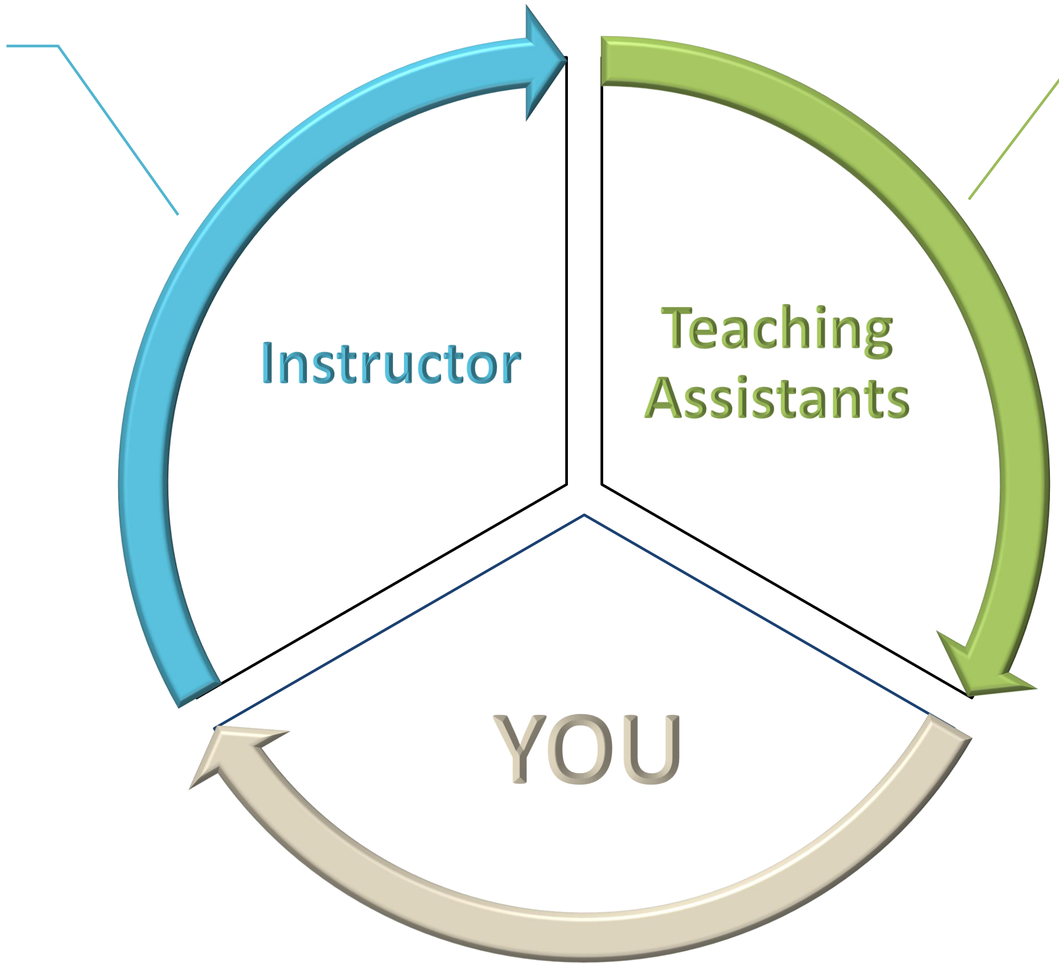
Office: C7.206
Office Hours: Via email



Eng. Abdalla Mohamed
Eng. Mohamed Elshafie
Eng. Maysarah El Tamalawy

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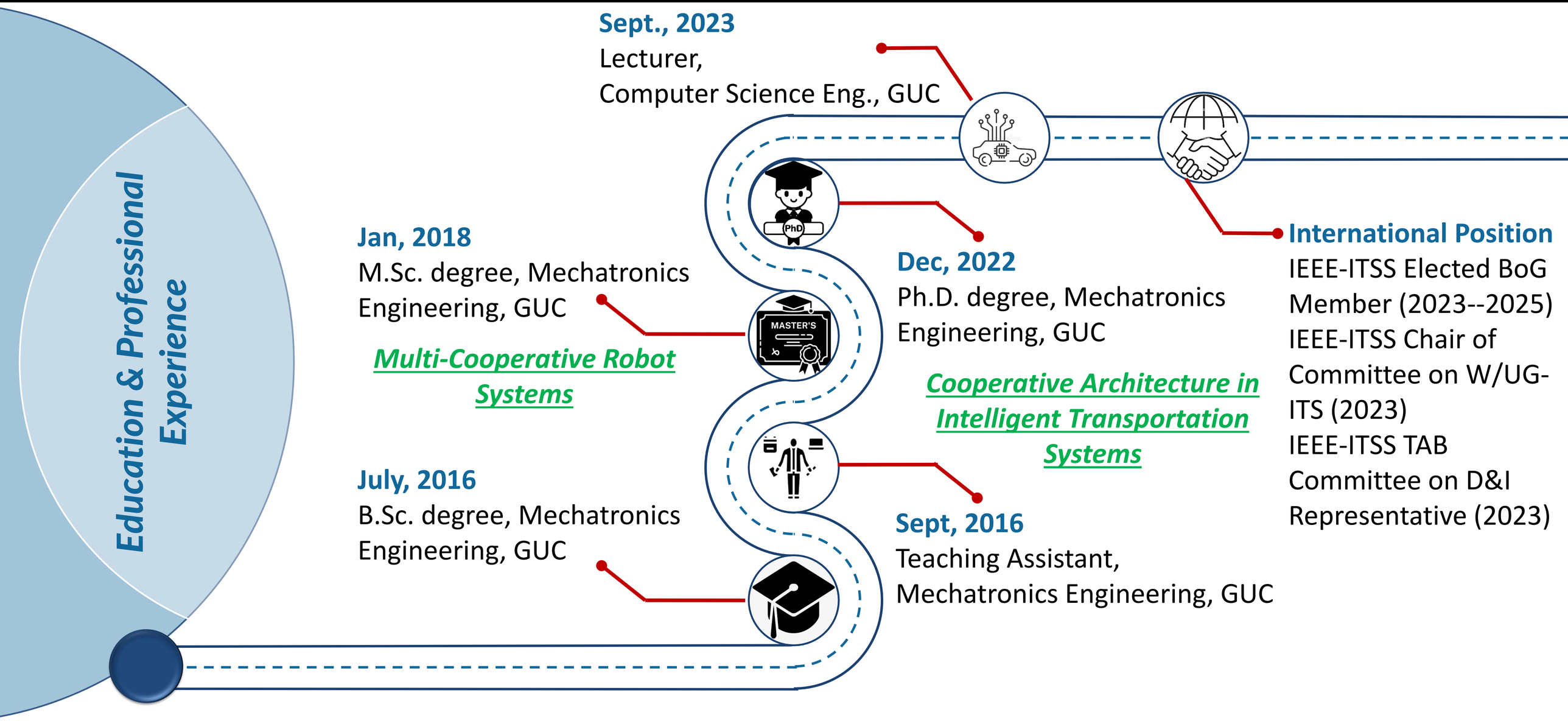
Let's get to know each other ☺

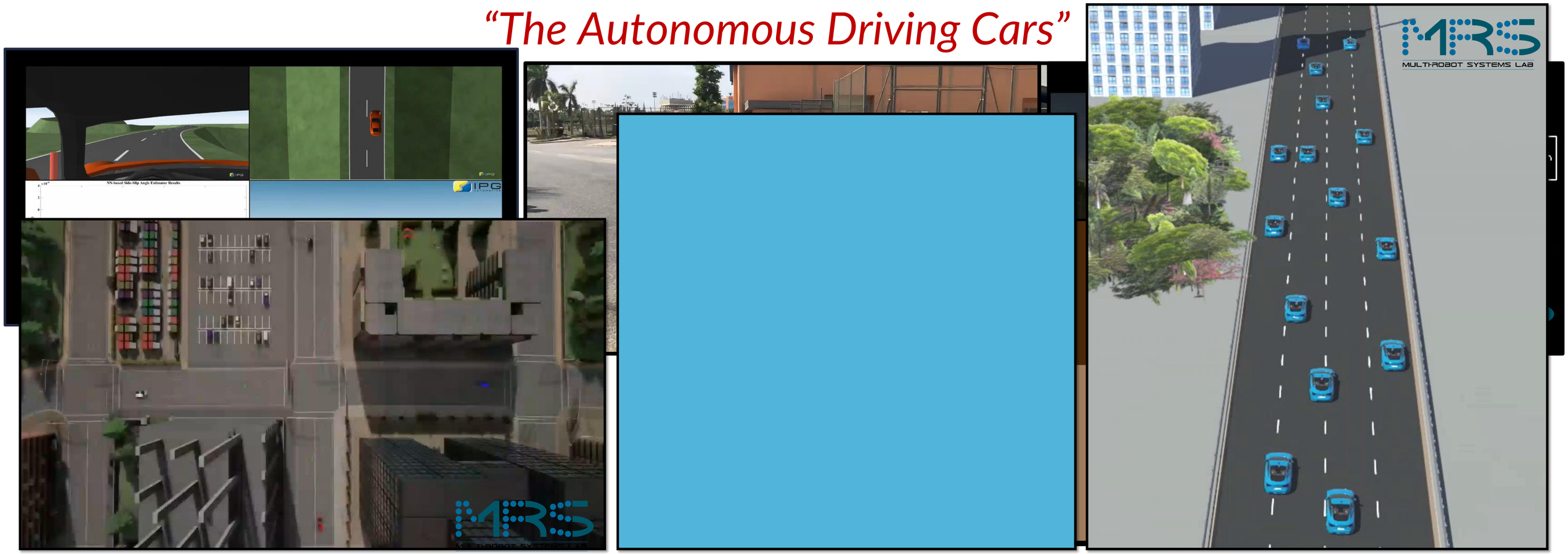


Let's get to know each other ☺

Research Interest

The Intelligent Transportation Systems

"The Autonomous Driving Cars"



Let's get to know each other ☺

Research Interest

C-DRiVeS Lab: Cognitive Driving Research in Vehicular Systems

- IT
- M
- S
- V
- C
- M
- E

new junior researchers ☺

C-DRiVeS Lab

Cognitive Driving Research in Vehicular Systems

***Previously known by the Self-Driving Car (SDC) Lab*

Let's Play Together ☺

Prerequisites

- CSEN605 Digital System Design
- CSEN601 Computer System Architecture
- CSEN602 Operating System

- Basic knowledge of programming concepts (C/C++ recommended).
- Familiarity with electronic components and circuits.
- Prior experience with Arduino or similar microcontrollers is beneficial but not required.

The Resources

The course will rely on multiple resources in its material

- Textbook,

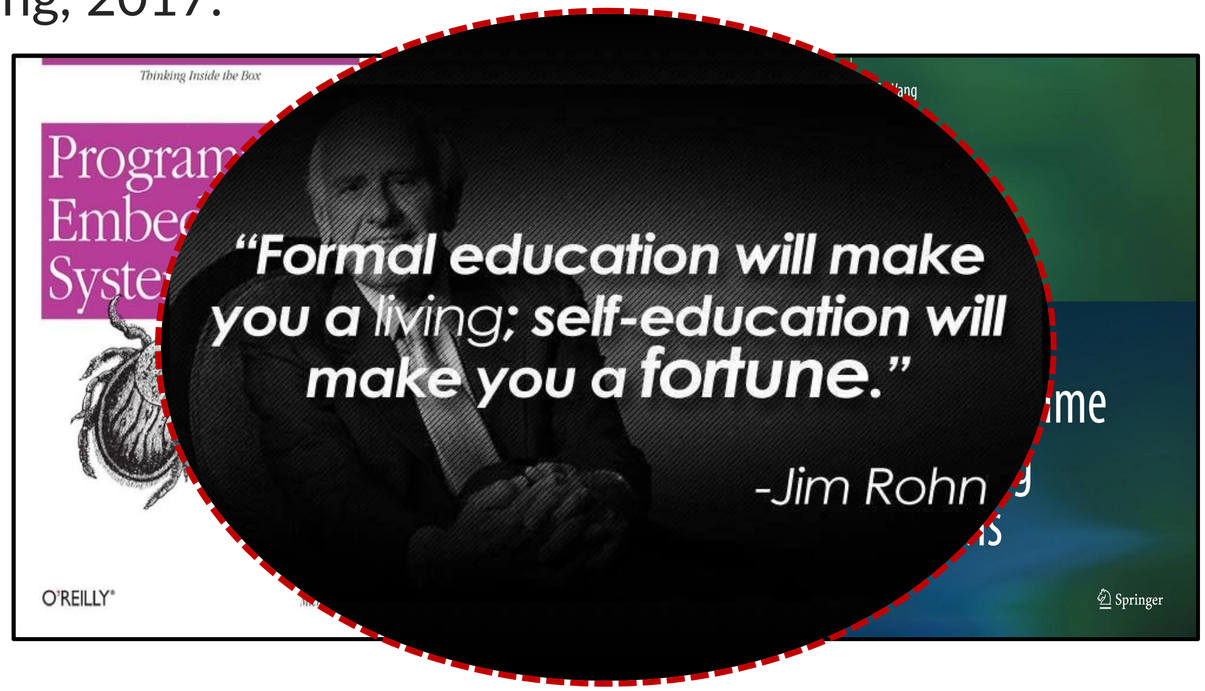
  Barr, Michael. *Programming embedded systems in C and C++*. " O'Reilly Media, Inc.", 1999.

  Wang, Jiacun. *Real-time embedded systems*. John Wiley & Sons, 2017.

  Wang, K. C., and K. C. Wang. *Embedded real-time operating systems*. Springer International Publishing, 2017.

- Lectures notes,
- Tutorials/Labs notes, and
- Any extra posted materials (if any).

Self-education!!



Learning Outcomes

By the end of the course, students should be able to:

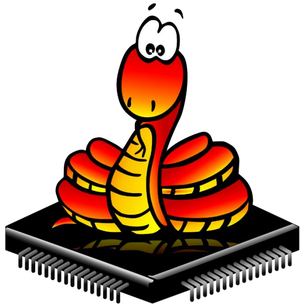
Full grasp of the "*big ideas*" in embedded systems

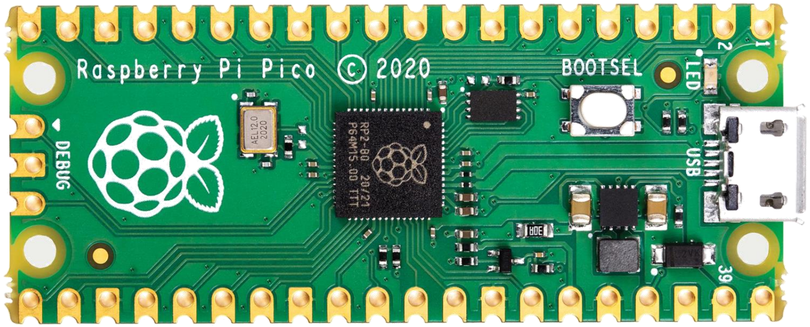
- Understand the **fundamental principles of embedded systems design**.
- Understand, and be able to discuss and communicate intelligently about
  - **Embedded processor** architecture and programming,
  - **I/O interfaces** to embedded processors with the sensors and actuators,
  - **Real-time systems** with OS primitives for concurrency, timeouts, scheduling, and synchronization,
  - **Troubleshoot** and **debug** embedded software and hardware.
- Obtain direct **hands-on experience** on both ***hardware and software elements***.

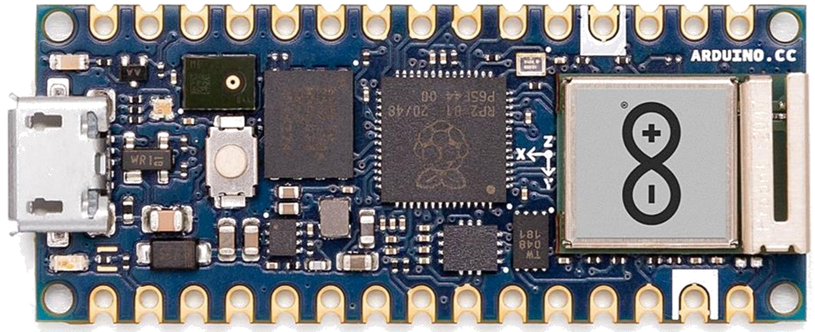
Learning Tools

To completely understand the course deliverables, the following tools are followed:

- ***Programming Languages:*** C/C++, MicroPython
- ***Programs:*** Visual Studio, FreeRTOS
- ***Microcontrollers:*** Arduino Nano RP2040, Raspberry Pi Pico
- ***Reporting:*** Presentation + 6-page Latex report







Extra-Curricula Events

During the course, you will get the opportunity to attend:

Guest Speakers from Industry/Academia

Location: GUC

Time: During the Lectures, Throughout the semester (TBD)

Presenters: Will be announced soon ☺

The 2023 Embedded Systems Fair

Location: GUC

Time: The end of the Semester (TBD)

Presenters:

YOU ☺

Course Assessment

The grades of this course are divided as follows:

- **40%** Final Exam
- **25%** Midterm Exam
- **35%** Course Work

- Course Work will be divided into:
  - **10%** Quizzes
  - **25%** Project

For Further Inquiries, Please send an email

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Catherine.elias@ieee.org

And now, let's Start....☺