UVIC
UNIVERSITAT DE VIC
UNIVERSITAT CENTRAL
DE CATALUNYA

Integrated Projects II

Course 2020-2021

Project proposals.

21st of Genuary 2021

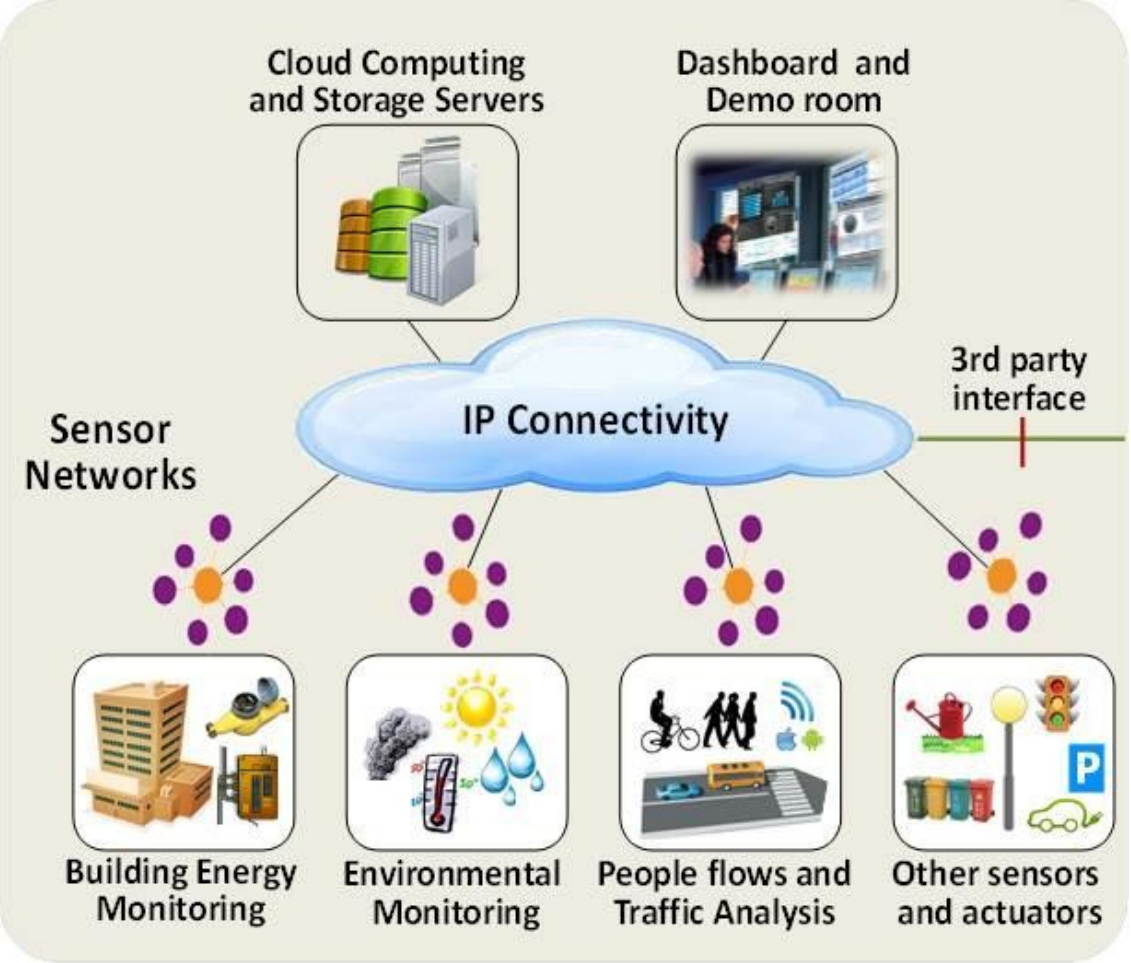
Proposals overview

- The objective of the projects is to develop:
  - Technical skills: Mechanical, Electronic and Software
  - Management skills: Time management, Project management
  - Interpersonal skills: Work in group, Prepare documentation and presentations
- The projects will be developed in 4 groups:
  - There are 18 students enrolled in the course
  - We will have:
    - 2 groups of 4 students
    - 2 groups of 5 students
  - Different projects have different difficult levels and skills requirements, so it is important that groups are balanced

Proposal 1: Campus monitoring

- Objectives
  - Develop system that is able to monitor environmental parameters (i.e., temperature, humidity, occupancy, etc.) in a distributed fashion
- Competences
  - Basic mechanical competences (i.e., design and build a case for the sensors)
  - Intermediate electronic competences (i.e., interconnect sensors with electronics and perform calibration)
  - Intermediate software competences (i.e., program in C/C++ for the Arduino and Python for Raspberry Pi)
- Equipment
  - Sensors, Arduino MKR1x00 & Raspberry Pi
- Example: https://www.youtube.com/watch?v=L06Btv0SXcI

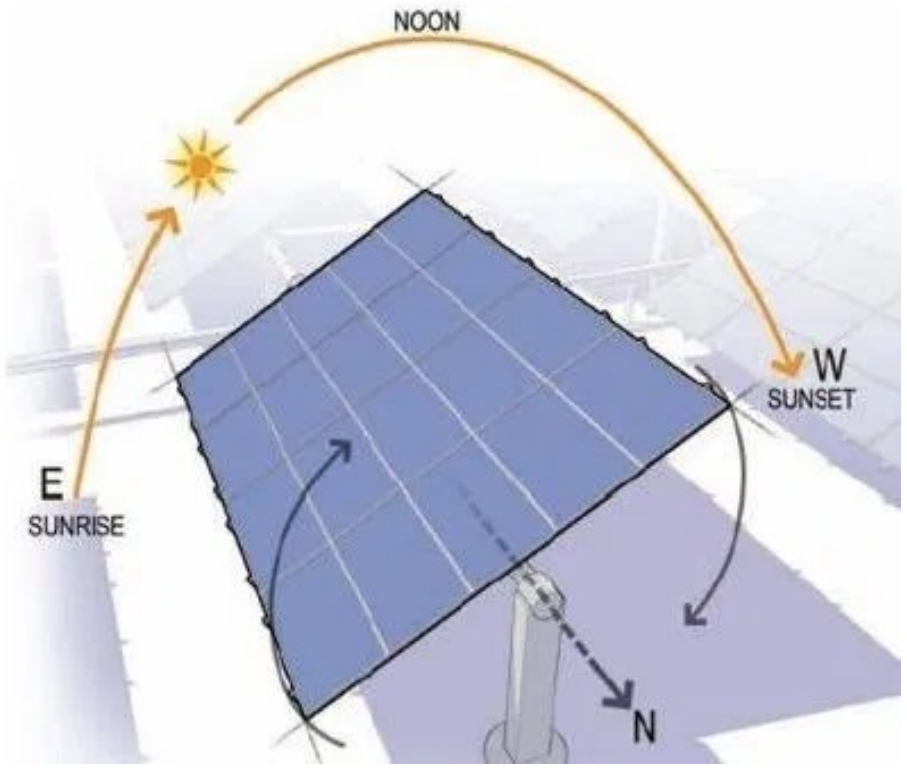
Proposal 1: Campus monitoring

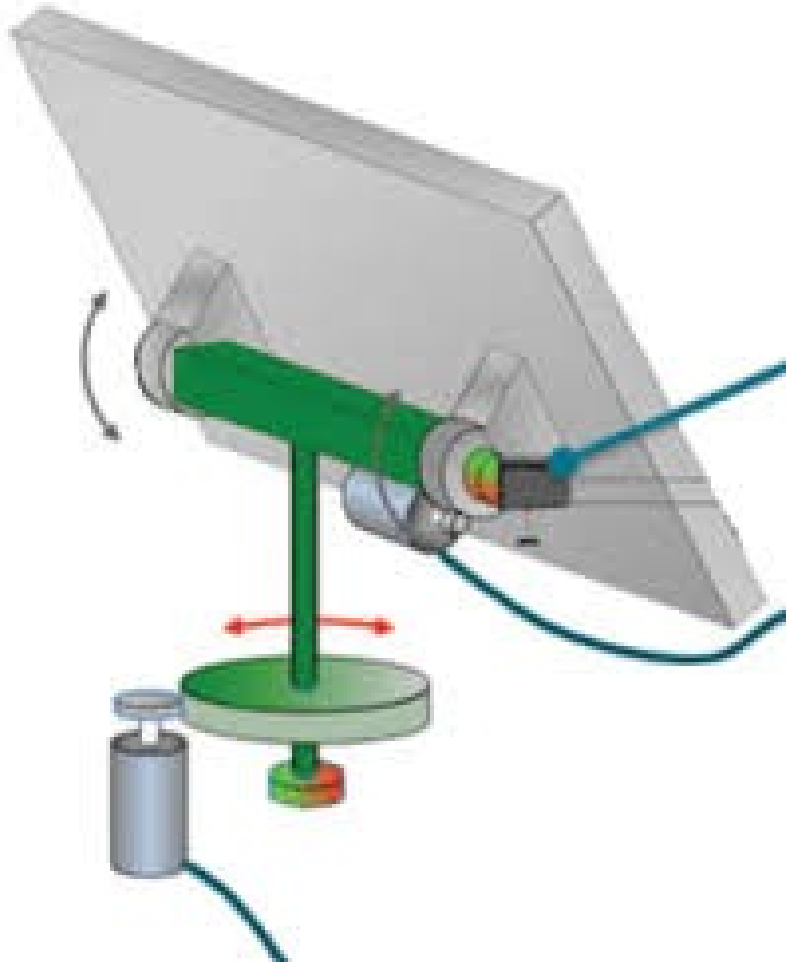


Proposal 2: Sun-tracking system for PV

- Objective:
  - Design a sun-tracker system that ensures that a small-size photovoltaic panel is always perpendicular to the sunlight. This maximizes energy harvesting.
- Competences
  - Intermediate mechanical competences (i.e.,designstructure to hold the physical components)
  - Intermediate electronic competences (i.e.,interconnect sensors with electronics and perform calibration)
  - Intermediate software competences (i.e., programming in C/C++ for data acquisition, processing and analysis)
- Equipment
  - Sensors, motors, arduino.

Proposal 2: Sun-tracking system for PV





Proposal 3: Intelligent COVID-19 kiosks

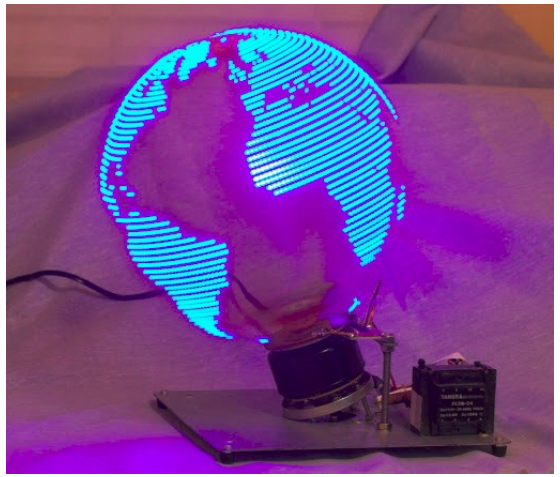
- Objective:
  - Develop a COVID-19 screening kiosk that checks temperature **safely** and incorporate other features such as, for instance, facemask checking, gel dispensing, identification, etc...
- Competences:
  - Intermediate mechanical competences (i.e.,designstructure to hold the physical components)
  - Intermediate electronic competences (i.e.,interconnect sensors with electronics and perform calibration)
  - high software competences (i.e., programming in C/C++ or Python for data acquisition, processing and analysis, image analysis for facemask detection)
- Equipment:
  - Sensors, actuators, thermal camera, image processing, arduino & raspberry pi.

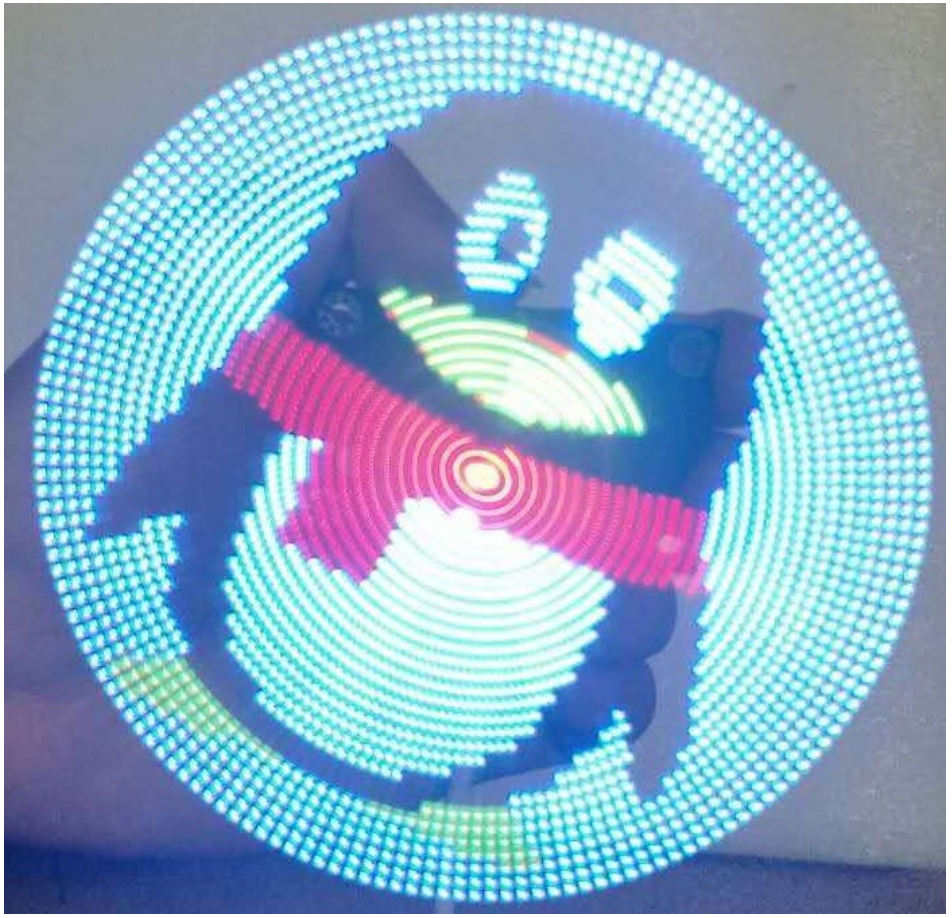
Proposal 3: Intelligent COVID-19 kiosks

Proposal 4: Spinning LED display

- Objective:
  - Develop a spinning LED display able to display text or simple images. Example of additional/advanced features: higher resolution, colour display, motion graphics, ¿!pong game?!
- Competences:
  - Intermediate mechanical competences (i.e., design structure to hold the physical components, moving parts)
  - Intermediate electronic competences (i.e., interconnect sensors and LEDs with electronics and perform calibration, motor speed control)
  - high software competences (i.e., programming in C/C++ for data acquisition, processing and analysis, precise timing)
- Equipment:
  - Sensors, motor, LEDs, arduino (better Teensy for advances features).
- Example: https://www.youtube.com/watch?v=JrcKJOdjQN8

Proposal 4: Spinning LED display



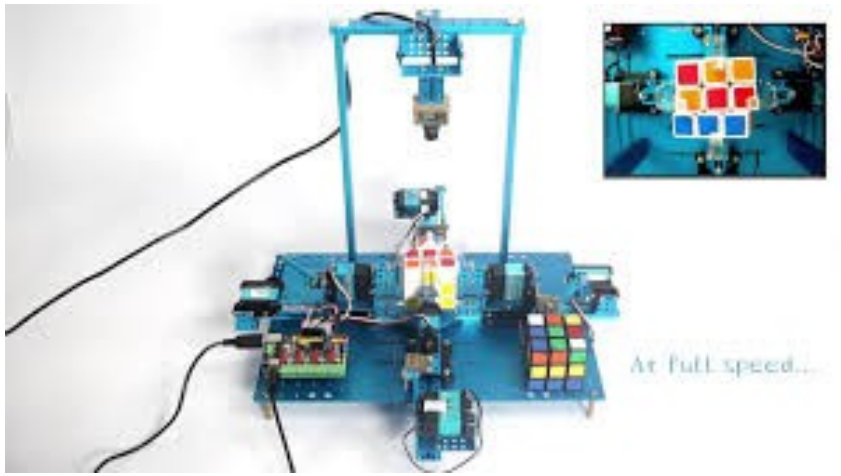


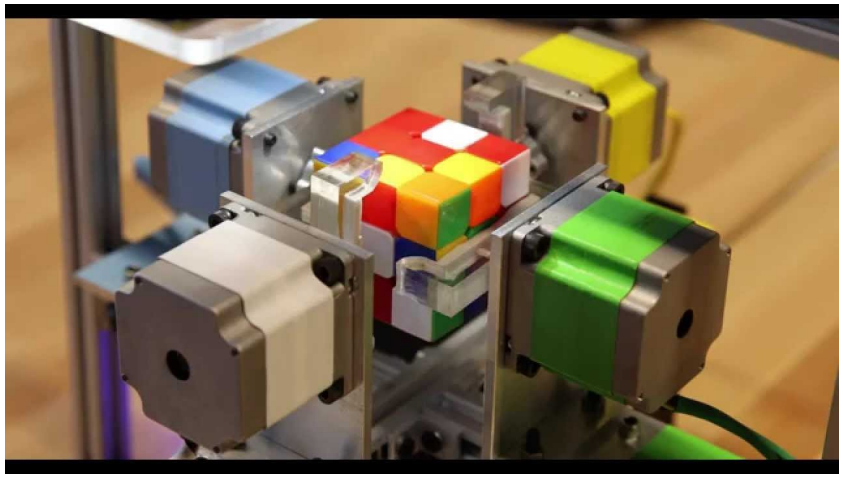
Proposal 5: Rubik's cube scrambler/solver

- Objective:
  - Develop a machine able to scramble a Rubik's cube (optionally solve it).
- Competences:
  - Advanced mechanical competences (i.e., design structure to hold the physical components, many complex moving parts)
  - Advanced electronic competences (i.e., interconnect sensors and actuators with electronics, precise motor interfacing)
  - Advanced competences (i.e., programming in C/C++ for data acquisition, processing and analysis, realtime motor control)
- Equipment:

  motors, arduino, raspberry pi
- Example: https://www.youtube.com/watch?v=3c3i0LgJrCc

Proposal 5: Rubik's cube scrambler/solver





Proposal 6: Power glove

- Objective:
  - Develop a glove based controller, e.g. for VR or controlling a robotic arm. Advanced features: haptic feeling, show position of hand on screen (3D model).
- Competences:
  - basic mechanical competences (i.e., design structure to hold the physical components)
  - Advanced electronic competences (i.e., interconnect sensors and actuators with electronics, many types of sensors)
  - Advanced competences (i.e., programming in C/C++ for data acquisition, processing and analysis in realtime)
- Equipment:

  sensors, arduino (or Teensy), raspberry pi
- Example:

Proposal 6: Power glove