
Continental
The Future in Motion
SUMMER PRACTICE - PROJECTS 2023
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# THE SELECTION PROCESS

### 1. APPLICATION

Fill out the application form available here. Please include your top 3 projects (available in this brochure) to which you would like to contribute during the summer internship.

### 2. TECHNICAL DISCUSSION

According to the top 3 projects selected in your application, you will be invited to a technical discussion based on the "knowledge must have" and "knowledge nice to have" sections, included in the project descriptions.

### 3. HR DISCUSSION

Following the technical discussion and depending on the feedback, you may be invited to a meeting with our HR colleagues, to get to know each other and further discuss the next steps.

***>> The projects included in this brochure require different times to be implemented and may involve the student's availability from 4 to 8 hours/ day, 5 days/week. Thus, the required time and availability will be established individually for each project, during the HR discussion.***



# THE TIMELINE

| WHEN? | WHAT? |
|---|---|
| February 27th, 2023 | Launching Summer Practice projects |
| February 27th, 2023 – March 31st, 2023 | Open Applications* |
| April 03rd, 2023 – April 07th, 2023 | Validation & Project Allocation** |
| April 10th, 2023 – May 26th, 2023 | Technical & HR discussions |
| May 29th, 2023 – June 30th, 2023 | Final results & Contract Signing |
| July 2023 – September 2023 | Summer Practice 2023 |

* Students in second year or higher can apply.

** Places are limited. If the number of applicants will exceed the number of allocated spots, a pre-selection will be made based on grades in the previous study year.


PROJECTS

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## SOFTWARE DEVELOPMENT



## SYSTEM TESTING







## SYSTEM ENGINEERING



## HARDWARE ENGINEERING

CONTENTS

## MECHANICAL ENGINEERING


SOFTWARE

## AUTOMATION OF RECORDING HOURS

### PROJECT DESCRIPTION
Extend the existent Recording Hours to automate the process of marking the work hours (besides the vacations)

### MAIN RESPONSIBILITIES
- Understand and develop plugins of Recording Hours tool
- Automatization of takeover the allocation of members in projects, trainings and other activities to Recording Hours tool

### KNOWLEDGE MUST HAVE
- Python / Java programming

### KNOWLEDGE NICE TO HAVE
- Java
- Algorithms



## MOTOR CONTROL FOR PMSM

### PROJECT DESCRIPTION
Ensure motor control for PMSM motor for optimal use in various applications

### MAIN RESPONSIBILITIES
- prepare hardware - wiring of the control board
- design and implementation of User Interface, Basic SW, and Inverter Module
- provide documentation for application
- use V Cycle Flow
- make sure the application can be integrated in other applications

### KNOWLEDGE MUST HAVE
- Mechanical basic knowledge
- Analogic and digital electronics basic knowledge

### KNOWLEDGE NICE TO HAVE
- Electrical machines (DC motors, BLDC, construction, and operating principle)
- Control theory (scalar control) and signal processing

# ADAS ROAD OBJECT FUSION SYSTEM USING ETH PROTOCOL

## PROJECT DESCRIPTION

The project requires the development of a system that is fusioning environmental objects (static or moving) detected by sensors placed on a car that is moving on the road. Each sensor will be represented by an ETH client that will send predefined data to a central node (server) that will do the fusion. The project needs to be robust against of lost frames, different sensor cyclicities, robust error handling, satisfy a subset of ISO26262 FSM requests etc. The layout for the ETH messages is free of choice, but limited to a certain bandwidth size

## MAIN RESPONSIBILITIES

- Design principles - SOLID and AUTOSAR
- Develop the project following AGILE framework by using the System Lifecycle Process Vee model (requirements, design, implementation, verification); the stakeholder requirements (the expected result) will be given as input
- Develop extra features (based on time availability): system states, high availability, distributed computing across multiple servers, security

## KNOWLEDGE MUST HAVE

- Ethernet TCP/UDP
- C/C++
- GIT

## KNOWLEDGE NICE TO HAVE

- Distributed computing
- ADAS knowledge
- Design patterns
- AGILE framework
- SOLID principle



# CONSOLE COMMANDS GENERATOR

## PROJECT DESCRIPTION

Parsing XML files and generate console commands

## MAIN RESPONSIBILITIES

- Create a Python script for XML parsing
- Use it to create lists of data extracted from XML or console commands based on a defined template

## KNOWLEDGE MUST HAVE

- Python
- XML

## KNOWLEDGE NICE TO HAVE

- Advanced knowledge in Python
- Advanced knowledge in XML

## INTEGRATION TEST GENERATOR

### PROJECT DESCRIPTION
Rewrite/update a tool to check the connection between multiple C/C++ files

### MAIN RESPONSIBILITIES
Update a specification generator for testing interfaces between components in a project. Add the number of tests to be created, ranges of values for tests, types of checks, testing of structures sent between files. Configuration file needs to be added. Optional: Create a graphical interface for using the tool

### KNOWLEDGE MUST HAVE
- Java

### KNOWLEDGE NICE TO HAVE
-- Advanced knowledge in Java



## TRACEABILITY BETWEEN CODE AND REQUIREMENTS

### PROJECT DESCRIPTION
Create a report generator based on the description of the functions in the selected files showing which specifications are implemented and in which functions or files

### MAIN RESPONSIBILITIES
- Create a more complex module with uses of functions related to Excel
- Create workbooks, tables, charts
- Add a list of values, multiple populating of identical values in an Excel file
- Create charts
- Parse text files and create the Excel file with the functions described above

### KNOWLEDGE MUST HAVE
- Python
- Excel

### KNOWLEDGE NICE TO HAVE
- Advanced knowledge in Python

## AUTOMATED GITHUB RELEASE MANAGER

### PROJECT DESCRIPTION
Create a module that can be called with various functionalities to create a release in GitHub

### MAIN RESPONSIBILITIES
- Create a module that can be called locally or from Jenkins to create a release and to do everything necessary to create a release
- Configure it based on a .json file with various commands in it (ex."move_file": {"from": "folder_name", "to":"folder_name"}, run commands in the console, delete files, release name, tag)

### KNOWLEDGE MUST HAVE
- Python
- Git
- Bash

### KNOWLEDGE NICE TO HAVE
- Advanced knowledge in Python, Git and Bash



## SALEAE EXTENSION FOR DRIVERS' COMMUNICATION

### PROJECT DESCRIPTION
Saleae decoder of messages for different drivers (LED, LMM, Motor Drivers)

### MAIN RESPONSIBILITIES
- Provide an option using a .json file to decode messages in a desired way

### KNOWLEDGE MUST HAVE
- Python
- JavaScript

### KNOWLEDGE NICE TO HAVE
- Advanced knowledge in Python
- Advanced knowledge in JavaScript

# BACKEND SERVER FOR EMERGENCY CALLS (ECALLS)

## PROJECT DESCRIPTION

When a car has an accident, the car will initiate an automatic eCall to an emergency number. At the same time, it will send a set of data from the car (number of passengers, fuel type, car position and so on) that will help emergency authorities to make better decisions and arrive faster at the crash location. In this context, we need to create a test backend to validate eCall data transmission.

## MAIN RESPONSIBILITIES

- Create a backend server that will be able to send/receive commands in MQTT/HTTPS/SMS format
- Test different IVS (In Vehicle Systems) that needs to communicate with a backend
- Create rules for commands in JSON format

## KNOWLEDGE MUST HAVE

-- C++
- C#
- Basic knowledge on how a backend works

## KNOWLEDGE NICE TO HAVE

- Advanced knowledge in C++
- Advanced knowledge in C#



# ACTIVITY TRACKER

## PROJECT DESCRIPTION

Windows based Client - Server App which handles direct user input and centralizes database information. The app should be able to generate stats and reports and to catch pattern-based marks from the available data. After consistent data collection, app should provide on its own usage improvement suggestions. The program is meant to track certain internal activities

## MAIN RESPONSIBILITIES

- Run Windows App anywhere inside Intranet
- Handle backend interactions from Windows clients
- Centralize client information inside database
- Implement friendly GUI for clients
- Generate reports, statistics and exports requested by employees
- Identify working patterns and submit improvement hints (ML / AI)
- Predict working behavior and raise awareness (ML / AI)

## KNOWLEDGE MUST HAVE

- SQL and C#
- .NET - MS WPF / MS WFA / MS UWP
- Client - server paradigm
- Basic networking communications

## KNOWLEDGE NICE TO HAVE

- Other database related frameworks and solutions (MongoDB, PostgreSQL, Microsoft SQL Server, SQLite, MySQL, Oracle)
- Other programming languages + development frameworks (e.g. Java + Swing; Node.js + Electron Js)
- Chat GPT or other free AI modules knowledge and interaction experience
- Machine Learning / Artificial Intelligence algorithms

## COLLISION DETECTION

### PROJECT DESCRIPTION
Implement an environment model for the vehicle surroundings and use it to detect collisions with surrounding objects

### MAIN RESPONSIBILITIES
- Develop an understand Python
- Implement collision detection between 2 arbitrary polygons
- Implement the environment model

### KNOWLEDGE MUST HAVE
- Medium programming knowledge
- Medium algorithms knowledge
- Cartesian geometry

### KNOWLEDGE NICE TO HAVE
- Python
- Git
- Advanced programming /algorithms knowledge



## CAR STATE MONITORING VIA MOBILE APP

### PROJECT DESCRIPTION
Create an Android Mobile Application connected to the car. When the car is in Parking Mode and Locked, the application should receive alerts if the cameras detect a proximity breach. User can select to view the live images of the camera. The car is equipped with two or more cameras (and proximity sensors) that can provide images from inside the car or from outside the car. This feature is useful in case someone damages your car or tries to break into it. The infrastructure to interact with the car through the Mobile Application is already provided. Extra: The application should be able to stream audio from mobile directly to the car

### MAIN RESPONSIBILITIES
- Planning
- Concept development
- Develop hardware/application
- Testing and functionality

### KNOWLEDGE MUST HAVE
- Backend: Node.Js
- Frontend: Android

### KNOWLEDGE NICE TO HAVE
- Backend: Golang
- Frontend: Kotlin or Flutter

## TOKEN AUTHORIZATION SYSTEM

### PROJECT DESCRIPTION
Windows application which will authorize clients for sensitive resource usage.

### MAIN RESPONSIBILITIES
- Run Windows App anywhere inside Intranet
- Implement friendly GUI for clients
- Establish security pattern and authorization mechanism
- Store failed attempts, and discourage brute force methods

### KNOWLEDGE MUST HAVE
- C#
- Basic Security Methodology
- Encrypted communication flow
- .NET - MS WPF / MS WFA / Basic SQL / DB Handling

### KNOWLEDGE NICE TO HAVE
- Data Encryption Algorithms (AES, RSA, 3DES, MD5, etc.)
- Encryption Models - Cryptography; Steganography
- Security & Privacy Testing Techniques



## SELF-DRIVING TOY CAR USING JETSON NANO

### PROJECT DESCRIPTION
Self-driving toy car using Jetson Nano and Arduino. Car will be able to map the surrounding space to find requested objects and return to starting point

### MAIN RESPONSIBILITIES
- Build the system
- Program Jetson Nano and Arduino
- Train the Jetson Nano to avoid obstacles and to detect requested objects

### KNOWLEDGE MUST HAVE
- C
- Programing in Arduino

### KNOWLEDGE NICE TO HAVE
- Advanced knowledge in C#

# INTERFACE OF REAL HW DRIVER WITH VIRTUALISED ENVIRONMENT

## PROJECT DESCRIPTION

Build a virtual environment for generic driver development, based on Elektrobit framework and FT2232 Libraries

## MAIN RESPONSIBILITIES

- Understand the driver development process
- Contribute to the development of Virtualisation concept
- Integrate the Celsius driver in the virtualised environment
- Create the HW Test Environment (interface between FT2232 and HW Driver)
- Understand the FT2232 framework
- Interaction of SW driver with Virtual framework
- Create various test scenarios based on requirements

## KNOWLEDGE MUST HAVE

- Basic electronics knowledge
- Embedded C Programming
- Good analytical thinking and problem solving

## KNOWLEDGE NICE TO HAVE

- Python
- Git



# SOFTWARE COMPONENT MANAGER

## PROJECT DESCRIPTION

Develop an advanced package manager that manages components and their dependencies used in a project and previews/visualizes the impact of updates. Such a tool is needed when projects reuse generic components that have dependencies between them.

## MAIN RESPONSIBILITIES

- Develop the core logic mechanism
- Interact with a remote package database/git repo or file server
- Visualize the valid/compatible update versions for components
- Develop a notification mechanism on component updates
- Deploy components in the build environment

## KNOWLEDGE MUST HAVE

- Python
- JavaScript/Typescript

## KNOWLEDGE NICE TO HAVE

- Git
- Web technologies
- Shell scripting
- SQL

## OBJECT RECOGNITION SYSTEM

### PROJECT DESCRIPTION
Develop an object recognition system using AI and RPi

### MAIN RESPONSIBILITIES
- get acquainted with ML (Machine Learning) & CV (Computer Vision) topics
- analyze and compare different object detection neural networks
- develop the image acquisition program
- gather data & train a neural network for object recognition
- integrate the trained neural network into the image acquisition program

### KNOWLEDGE MUST HAVE
- Advanced Python programming skills
- Basic knowledge about LINUX
- Basic electronics knowledge
- BProficient in English

### KNOWLEDGE NICE TO HAVE
- Basic image processing knowledge
- Previous experience with working on a development board



## DC MOTOR CONTROL WITH PWM

### PROJECT DESCRIPTION
Control a DC motor with an Arduino board. Serial communication will be used to communicate with Arduino and will be able to receive commands (motor start in direction, motor stop). For starting/stopping the motor, the software will offer the possibility to configurate a PWM ramp up/down with multiple points. The maximum PWM will also be configurable

### MAIN RESPONSIBILITIES
- Prepare hardware - wire the control board
- Design and implement the software

### KNOWLEDGE MUST HAVE
- Basic knowledge about electronic components
- C programming

### KNOWLEDGE NICE TO HAVE
- Arduino programming

## DC MOTOR SPEED CONTROL USING ROTARY ENCODER

### PROJECT DESCRIPTION
A rotary encoder will be built using optical sensor and carboard. This encoder will be attached to a DC motor. Using an Arduino board, the motor will be speed controlled with the help of the encoder. A display will be used to display the number of counts or rotations from start. Also, the direction will be detected.

### MAIN RESPONSIBILITIES
- Prepare the mechanic - rotary encoder
- Prepare hardware – wire the control board
- Design and implement the software

### KNOWLEDGE MUST HAVE
- Basic knowledge about electronic components
- C programming

### KNOWLEDGE NICE TO HAVE
- Arduino programming



## DBC – DEVELOPMENT BUILD CREATOR

### PROJECT DESCRIPTION
Create “one click” build environment to facilitate development processes via automatic steps

### MAIN RESPONSIBILITIES
- Understand Continental processes phases like: requirements analyze, architecture, design description, implementation, and testing
- Implement solution with other Summer Practice colleagues
- Work in Agile processes with latest environments

### KNOWLEDGE MUST HAVE
- Good analytical thinking in problem solving
- Good knowledge of OOP (C/C++)
- Linux scripting

### KNOWLEDGE NICE TO HAVE
- C# or Python language
- Docker
- Database

## SIMULATION TEST CASES CATALOGUE

### PROJECT DESCRIPTION
Create scenarios of a predetermined route according to the ASAM and Pegasus formats. Create simulations for these scenarios in a simulation program. Create a catalog of scenarios stored in a HTML website.

### MAIN RESPONSIBILITIES
- Safety analysis
- Create scenarios according to the system requirements
- Create 3D modeling simulation
- Determine simulation parameters
- Teamwork using GitHub
- Analysis assumptions

### KNOWLEDGE MUST HAVE
- Basic knowledge about programming
- Creativity

### KNOWLEDGE NICE TO HAVE
- Python/C++/Java
- HTML/Markdown/rST/CSS
- Knowledge of simulation
- Driving license



## IMAGE BLENDER

### PROJECT DESCRIPTION
Create a Qt GUI application which can receive video data from a distributed communication layer. Received images should be overlapped within the application. In the end, display the result of overlapping

### MAIN RESPONSIBILITIES
- Receive images via eCAL (one from camera, one is segmented)
- Display them using Qt framework (& CMake based project)
- Blend them using OpenCV functionality
- Display the blended image
- Have a cursor which can control the alpha channel
- The segmented image has several class colors – check if we could enable/ disable each of them for the final blended image

### KNOWLEDGE MUST HAVE
- Good knowledge of C++ language
- OOP

### KNOWLEDGE NICE TO HAVE
- Computer Vision
- OpenCV

## MCAL DEVELOPMENT

### PROJECT DESCRIPTION
Develop an MCAL source code using generated and manual code, based on a V-cycle implementation

### MAIN RESPONSIBILITIES
- Develop a MCAL source code based on given requirements
- Develop the software detailed design
- Create a MCAL configuration in Tresos and integrate the generated code into the project
- Configure components like MCU, GPIO, ADC, Timers
- Write code to fully implement the requirements
- Create test cases and test implementation
- Debug and fix the software if needed
- Develop the application on an automotive microcontroller (Infineon - Aurix)
- Introduction in Autosar standard
- Handle generated and manual code based on a V-cycle implementation
- Get familiar with tools used in Continental (Tresos, Trace32, Catch)

### KNOWLEDGE MUST HAVE
- C programming
- Microcontrollers

### KNOWLEDGE NICE TO HAVE
- Electrical knowledge
- Electronical knowledge



## AUTOMATED TEST MANAGEMENT TOOL 2.0

### PROJECT DESCRIPTION
Extend a web app for reporting the most important automated tests for our clients. The tool will be used on multiple projects with big car manufacturers (Mercedes- Benz, PSA Group, Suzuki, and Subaru)

### MAIN RESPONSIBILITIES
- Establish the need of the clients together with the coordinator and projects
- Scale the tool adopting best long term solution
- Implement the tool using the chosen programming language
- Choose the best technical solution for the challenge at hand

### KNOWLEDGE MUST HAVE
- Basic programming in Python or C++ or JS

### KNOWLEDGE NICE TO HAVE
- Python, Django, Databases, JS

## AUTOMATED LOGS PROCESSOR

### PROJECT DESCRIPTION

Logs/traces are the main input for bugs analysis, and we receive them in multiple formats archives, text or specific formats, and sometimes even encrypted. We plan to extend the existing Log processing tool, to use it for multiple clients and multiple use cases

### MAIN RESPONSIBILITIES

- Establish the need of the clients together with the coordinator and projects
- Scale the tool adopting best long term solution
- Implement the tool using the chosen programming language
- Choose the best technical solution for the challenge at hand

### KNOWLEDGE MUST HAVE

- Basic programming in Python or C++ or JS

### KNOWLEDGE NICE TO HAVE

- Python, Django, Databases, JS



## RC CAR (EMBEDDED + OOP)

### PROJECT DESCRIPTION

Develop a functional Embedded Car using Atmega328 microcontroller and a Raspberry Pi 4. The goal is to program the uC, using the datasheet and C programming language, and to program the Raspberry using Python

### MAIN RESPONSIBILITIES

- Project documentation
- Setup design
- Create the application code
- Testing the functionality

### KNOWLEDGE MUST HAVE

- Medium knowledge of  C programming language  OR medium knowledge of Python programming language
- Medium uC knowledge
- Minimum electrical knowledge skills

### KNOWLEDGE NICE TO HAVE

- Working with Atmega328 uC

## JIRA METRICS IN POWERBI

**PROJECT DESCRIPTION**
Create a connector between Jira and PowerBI to visualize data

**MAIN RESPONSIBILITIES**
- Create the application code
- Test the functionality

**KNOWLEDGE MUST HAVE**
- Python

**KNOWLEDGE NICE TO HAVE**
- Charts (e.g. Excel)
- PowerBI



## JENKINS ADVANCED PIPELINE DEVELOPMENT

**PROJECT DESCRIPTION**
Understand, implement, and maintain new and existing Jenkins Pipelines

**MAIN RESPONSIBILITIES**
- Develop and support declarative and scripted Jenkins pipelines
- Develop and support Jenkins shared libraries and use Jenkins plug-ins as needed

**KNOWLEDGE MUST HAVE**
- Basic knowledge in Jenkins Pipelines

**KNOWLEDGE NICE TO HAVE**
- Advanced knowledge in Jenkins Pipelines

# DEVELOPMENT OF INFRASTRUCTURE FOR ADVANCED PIPELINE

## PROJECT DESCRIPTION
Understand, implement, and maintain new and existing Infrastructure elements

## MAIN RESPONSIBILITIES
- Understand Continental processes phases like: requirements analyze, architecture, design description, implementation, and testing
- Work in Agile processes with latest environments

## KNOWLEDGE MUST HAVE
- Good analytical thinking in problem solving
- Good knowledge of OOP (C/C++)

## KNOWLEDGE NICE TO HAVE
- Data Structure and Algorithm
- QT Framework



# SBA – SEARCH BASED APPLICATION

## PROJECT DESCRIPTION
Understand, implement, and maintain new and existing Infrastructure elements. Implement a Search Based Application for big files using advanced search algorithms. Currently, Continental Solution log search solution is very slow on big files. A complete rework of the search part could be done using advanced search algorithms, multithreading, and optimization.

## MAIN RESPONSIBILITIES
- Understand Continental processes phases like: requirements analyze, architecture, design description, implementation, and testing
- Work in Agile processes with latest environments

## KNOWLEDGE MUST HAVE
- Good analytical thinking in problem solving
- Good knowledge of OOP (C/C++)

## KNOWLEDGE NICE TO HAVE
- Data Structure and Algorithm
- QT Framework

# OVER THE AIR COMMUNICATION FRAMEWORK

## PROJECT DESCRIPTION

Develop a remote communication framework between a testbench and computer

## MAIN RESPONSIBILITIES

- Understand and create requirements
- Develop Python/Java web server for Test Bench
- Develop minimal software for device to test communication
- Develop desktop or web application for reading and showing data received from server

## KNOWLEDGE MUST HAVE

- Python / Java programming
- Basic C programming
- Hardware basic understanding

## KNOWLEDGE NICE TO HAVE

- Web programming
- Knowledge of Spring or Fastapi / Flask frameworks


SYSTEM TESTING

## READ MULTIPLE TEMPERATURE SENSORS THTOUGH I2C

### PROJECT DESCRIPTION
Develop a solution to interface multiple 1 wire sensor readings with a testing environment

### MAIN RESPONSIBILITIES
- Prepare a HW sample with at least 8 temperature sensors
- Create an interface to read values in a digital format
- Apply performed device in system integration testing environment

### KNOWLEDGE MUST HAVE
- Analogic and digital electronics

### KNOWLEDGE NICE TO HAVE
- C Embedded programing
- Advanced electronics



## MODELLING THE DYNAMIC BEHAVIOR OF A CAR SUSPENSION USING PYTHON

### PROJECT DESCRIPTION
Implement and understand the functionality of a car suspension model, which generally consists of coil springs or shock absorbers (dampers). The behavior of the chassis can be studied both in static position and dynamically, in order to see the effect of different factors such as speed, acceleration, car load and road conditions have over the performance of the suspension. The project will be implemented in Python using matplotlib

### MAIN RESPONSIBILITIES
- Create a model for a car suspension
- Implement it in Python

### KNOWLEDGE MUST HAVE
- Python
- Electronics

### KNOWLEDGE NICE TO HAVE
- MATLAB

# IMPLEMENTATION OF A MASTER BLDC MOTOR TO VERIFY TORQUE AND REPEATABILITY

## PROJECT DESCRIPTION

Ensure the torque sensor repeatability at different ranges of temperature and at different cases of misalignment in mechanical setup

## MAIN RESPONSIBILITIES

- Understand how a torque sensor works (electrical/mechanical)
- Create a behavior class for different environmental cases (temperature and mechanical misalignment)
- Evaluate the impact in measurement results of an torque sensor offset
- Find solutions for signal interpretation
- Implement a Master BLDC MKC2 motor to be the main reference to verify the accuracy of the torque sensor output, the expected DUT output values, and report if there is a misalignment in the mechanical setup
- Create measurement acceptance limits related to test specifications

## KNOWLEDGE MUST HAVE

- Mechanical basic knowledge
- Analogic and digital electronics basic knowledge

## KNOWLEDGE NICE TO HAVE

- Mechanical basic knowledge
- Electrical machines knowledge (DC motors, BLDC, construction, and operating principle)
- Knowledge in control theory (scalar control) and signal processing



# VOLUMETRIC FLUID LEAKAGE MEASURE AND CONTROL

## PROJECT DESCRIPTION

Create a brake fluid leakage volume control. A solenoid valve will control a leaking time and the fluid volume will be measured into a glass probe container. According to leak volume request the solenoid valve will be controlled as open or closed

## MAIN RESPONSIBILITIES

- Prepare a project plan according to requirements
- Order necessary components
- Design the Mechanical, Hardware and Software
- Test the System and adjust it
- Document the project

## KNOWLEDGE MUST HAVE

- Basic Electronics
- Basic Mechanical
- Basic Software
- Basic Microcontrollers
- Basic Microsoft PPT

## KNOWLEDGE NICE TO HAVE

- Basic Hydraulics
- Medium Electronics
- Medium Software
- Basic Testing principles

## CAR MONITORING DEVICE

### PROJECT DESCRIPTION
Create a device which can detect the movement into the car and communicate details about the car via GSM. It should be able to send data and receive commands via GSM. The application can notice the car owner about some activities in the car/ position of the car etc.

### MAIN RESPONSIBILITIES
- Create schematic and state machine for device
- Create the communication between sensors and Raspberry Pi
- Process data and perform the communication to GSM
- Test the device and create a presentation of the project

### KNOWLEDGE MUST HAVE
- Electronics - medium analog & digital data acquisition
- Software - medium Python, basic Linux
- Skills with Raspberry Pi

### KNOWLEDGE NICE TO HAVE
- Microcontrollers
- Serial communication



## DC MOTOR SPEED CONTROL AND MEASUREMENT

### PROJECT DESCRIPTION
Using as a base an Arduino, create an apparatus for variation of the speed of DC Motor using PWM and measures its RPM using optical sensor, and displays them on LCD

### MAIN RESPONSIBILITIES
- Prepare hardware - wiring of the control board
- Design and implement User Interface, basic software

### KNOWLEDGE MUST HAVE
- Electronic components - analogic and digital
- Basic knowledge of electronics

### KNOWLEDGE NICE TO HAVE
- Programing Arduino

## DISPLAY GRAPHICS FOR THE RESULTS OF THE THERMO MEASUREMENTS

### PROJECT DESCRIPTION
Create display graphics for the Thermo Test for each measurement. The measurements have signals acquired internally by the ECU and externally by high-precision equipment. Internally acquired signals must be compared with externally acquired signals and made graphic displays and all the necessary reporting files based for each test

### MAIN RESPONSIBILITIES
- Create a Python script to make a comparison between internally and externally acquired signals, and display them in a graphics display

### KNOWLEDGE MUST HAVE
- Advanced knowledge in Python
- Excel and Word
- Electronic components
- Analog & digital data acquisition

### KNOWLEDGE NICE TO HAVE
- Basic knowledge of electronics



## TEST AUTOMATION APPLICATION

### PROJECT DESCRIPTION
Create a python application (+GUI) that analyzes the measurement files created on the motor testbench, and creates all the necessary reporting files based for each test scenario

### MAIN RESPONSIBILITIES
- Understand how testing is done for every involved discipline
- Understand how requirements are defined and implemented
- Design and implement the Python application to read the measurement files, analyze them according to the requirement and create all necessary outputs
- Design and implement the GUI

### KNOWLEDGE MUST HAVE
- Good knowledge of Python programming language
- Good analytical thinking and problem solving
- Signals processing and files management

### KNOWLEDGE NICE TO HAVE
- Basic knowledge of electronics

## POWER TRAIN EBIKE / SCOOTER

### PROJECT DESCRIPTION
Develop a full performance bike/scooter with BLDC motor on the back wheel

### MAIN RESPONSIBILITIES
- Plan and develop concept
- Develop hardware/application
- Test and functionality

### KNOWLEDGE MUST HAVE
- Basic knowledge in Electronics / Mechanics
- Basic level capabilities in parts design
- Basic level knowledge in Motor Control
- Python / Arduino programming skills
- Microcontroller knowledge

### KNOWLEDGE NICE TO HAVE
- Basic knowledge in AutoCAD or similar
- Software design
- Minimum knowledge of OOP and parallel programming



## ACCESS CONTROL USING RFID TECHNOLOGY FOR LOGGING AND REPORTING

### PROJECT DESCRIPTION
Design and build a tool that controls multiple output channels based on RFID preregistered users' access. It should also allow for logging all the activity onto a removable memory (MicroSD)

### MAIN RESPONSIBILITIES
- Read and understand components datasheets and functionality
- Design a block diagram for all the system components
- Understand RFID functionality
- Develop hardware and software application

### KNOWLEDGE MUST HAVE
- Basic knowledge in  Electronics / Mechanics
- Basic capabilities in parts design
- Arduino programming skills
- Microcontroller knowledge

### KNOWLEDGE NICE TO HAVE
- Arduino
- Actuators
- RFID Technology

# DETECTION OF THE PRESENCE OF A LOW-VALUE CAPACITOR MOUNTED IN PARALLEL WITH A HIGH-VALUE ONE

## PROJECT DESCRIPTION
Detection of the presence of a low-value capacitor mounted in parallel with a high-value one.

## MAIN RESPONSIBILITIES
- Generate a Dirac pulse with a duration of 10-30 nSec of low voltage and high current (5v – 20A)
- Measure the voltage at 1-3 nS after the Dirac pulse

## KNOWLEDGE MUST HAVE
- Good electronics knowledge

## KNOWLEDGE NICE TO HAVE
- LTspice
- Multimeter
- Oscilloscope



# TEST SYSTEM CONFIGURATION CHECK

## PROJECT DESCRIPTION
Create an interface which will be able to identify and update the drivers/ versions of installed programs on Test Equipment.

## MAIN RESPONSIBILITIES
- Understand  the application used on Test Equipment
- Design and implement an interface which reads local files and installers versions, and provides the appropriate updates from a Continental Server

## KNOWLEDGE MUST HAVE
- Programming

## KNOWLEDGE NICE TO HAVE
- Python
- C

## BREAKOUT BOX

### PROJECT DESCRIPTION
Create a  BreakOut Box for Vehicle Test

### MAIN RESPONSIBILITIES
- Understand the schematic
- Prepare hardware - wiring
- Tests

### KNOWLEDGE MUST HAVE
- Basic knowledge of electronics
- Microcontroller knowledge

### KNOWLEDGE NICE TO HAVE
- Advanced knowledge of electronics



## AUTOMATED TOOL / SCRIPT FOR VEHICLE IDENTIFICATION NUMBER UNLOCK VIA DIAGNOSIS

### PROJECT DESCRIPTION
Create a tool/program which reads and loads local files, synchronizes local files for simulations and provides an infotainment system without identification locks at startup

### MAIN RESPONSIBILITIES
- Design and implement a program which reads local files
- Synchronize local files for simulations
- Provide a lock-free infotainment system

### KNOWLEDGE MUST HAVE
- C / C++ / C#

### KNOWLEDGE NICE TO HAVE
- Python
- MySQL

# SMART ELECTRIC POWERTRAIN WITH REGENERATIVE BRAKING FOR SMALL MOBILITY VEHICLES

## PROJECT DESCRIPTION

Design and build a small electric vehicle for short distance mobility. The powertrain assembly units will be modular to be used in different sized vehicles. The goal of the project is to design, develop and test an electric 12V DC powertrain system with regenerative braking. The project will consist in a theoretical analysis regarding the importance of green methods of urban mobility using a 12V DC motor controlled by a H-bridge configuration power control unit. Additionally, this project will consist in an experimental setup where a 4 wheel small tubular steel frame cart will be powered by an electric DC motor with the possibility of regenerative braking

## MAIN RESPONSIBILITIES

- Project documentation
- Setup design
- Create the application code
- Test the functionality

## KNOWLEDGE MUST HAVE

- Minimum Knowledge of programming skills (C)
- Minimum Electrical knowledge skills
- Logical thinking

## KNOWLEDGE NICE TO HAVE

- Basic knowledge of Microcontrollers
- Basic knowledge about automotive industry



# CAN TOOLS USED IN AUTOMATION – FLASH PROCESS VIA CAN BUS

## PROJECT DESCRIPTION

CANoe is a tool used widely in automotive industry that enables simulation of communication protocols (CAN/ LIN etc). The scope of the project is to develop small modules in CAPL/CVI with GUI that will facilitate easier prototyping and validation of CAN messages. Build tools that enables flashing for different type of uControllers using JTAG, CAN

## MAIN RESPONSIBILITIES

- Learn about CAN communication Bus
- Learn about uControlers flashing
- Learn CAPL - C based programming
- Learn TestStand - Sequencer used in automation
- Implement function, add documentation
- Validate the implemented modules

## KNOWLEDGE MUST HAVE

- C Programming

## KNOWLEDGE NICE TO HAVE

- Basic electronics knowledge

# DESIGN AND DEVELOP GUI FOR MEASURING DEVICES USED DURING TEST AND VALIDATION PROCESS

## PROJECT DESCRIPTION

During test and validation process, various lab equipment is being used (oscilloscopes, digital multimeters, power supplies, programmable loads). We will need to design and develop a GUI that can configure, operate, and  test these devices

## MAIN RESPONSIBILITIES

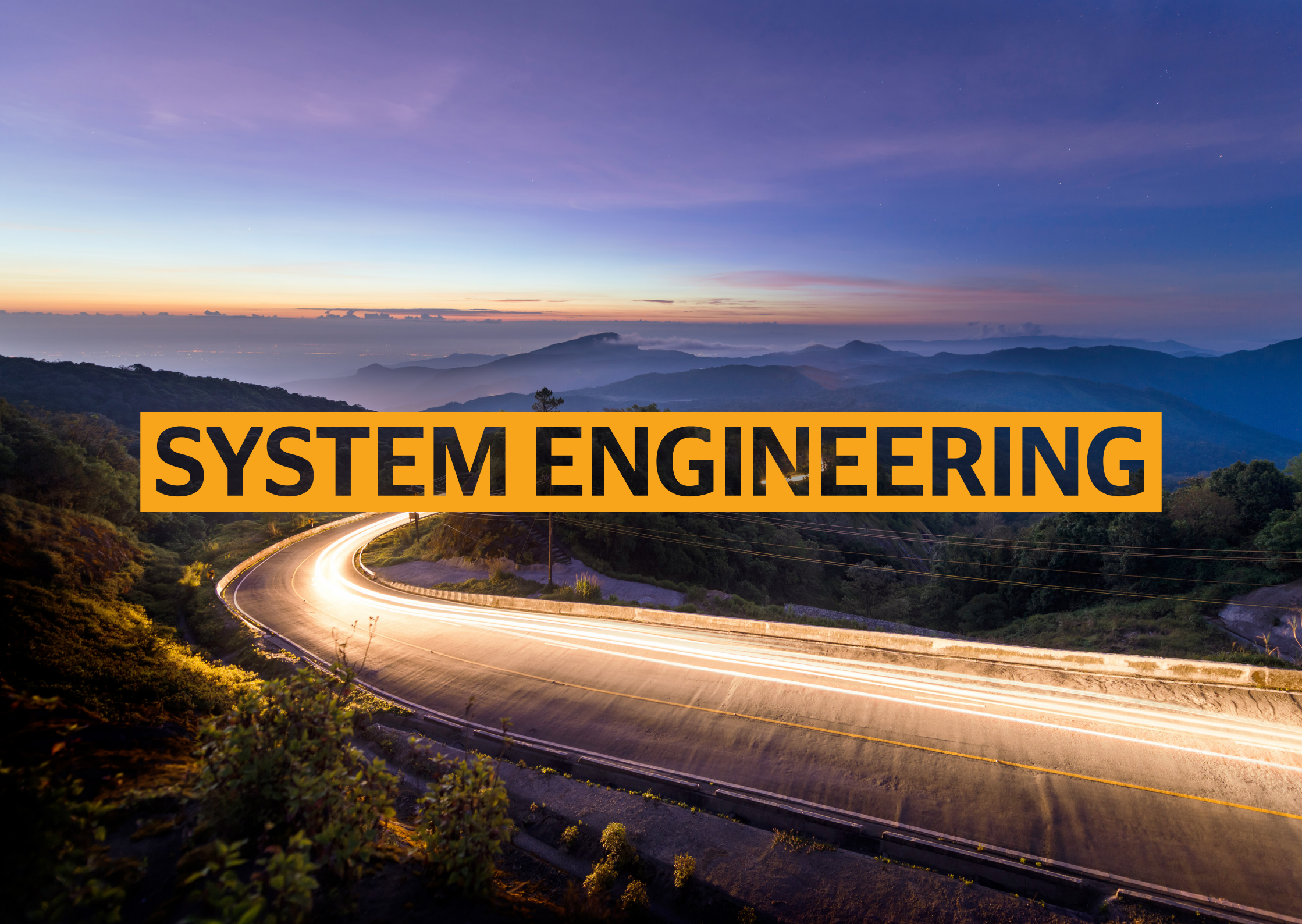
- Design and develop GUI
- Understand how lab equipment works
- Learn C/Python programming
- Read DataSheet
- Develop and debug techniques
- Learn different communication protocols (USB, RS232, GPIB, LXI, Ethernet)

## KNOWLEDGE MUST HAVE

- C Programming
- Python

## KNOWLEDGE NICE TO HAVE

- Basic electronics knowledge


SYSTEM ENGINEERING

# PRACTICAL APPLICATION WITH UML LANGUAGE

## PROJECT DESCRIPTION

Make a practical Application using UML language for smart louver to open and close depending on the weather

## MAIN RESPONSIBILITIES

- Create a model for a practical application using UML language
- Make flowchart diagram for black box view to a smart louver that open and close depending on the weather

## KNOWLEDGE MUST HAVE

- Basic knowledge of analogic and digital electronics

## KNOWLEDGE NICE TO HAVE

- Basic programming language
- Algorithms



# IMPLEMENTATION OF ROTOR POSITION SIGNAL CHAIN AND CONTROL OF BLDC ON DSP

## PROJECT DESCRIPTION

The purpose of this project is to design and implement the motor position signal chain and control strategy for a BLDC on a specific DSP using Model-Based Development methods. The expected project outcome is a prototype that will control a BLDC motor used in braking systems and will demonstrate the advantages of Model Based Design

## MAIN RESPONSIBILITIES

- Prepare hardware - wiring of the control board with the inverter
- Design and implement in Simulink the signal processing chain for rotor position and control strategy of a BLDC used in braking systems
- Provide Model-in-the-loop and Software-in-the-loop files and simulation results
- Prepare model for code generation and deployment on DSP target
- Provide test results

## KNOWLEDGE MUST HAVE

- Microcontrollers - architecture, peripherals
- MATLAB - Simulink - knowledge of signal processing and control
- Ability to use and design systems in MATLAB - Simulink
- Hardware basic understanding
- Digital & analog electronics
- Ability to apply basic analog electronics theory
- Ohm law, Kirchhoff, design first order, second order low, high pass filters
- Basic knowledge of power electronics (e.g. voltage source inverters, DCDC)

## KNOWLEDGE NICE TO HAVE

- Knowledge of PWM commutation techniques for power inverters
- Advanced knowledge of signal processing: e.g. Kalman filtering, particle filtering, etc.
- Advanced knowledge of system control: e.g. robust, adaptive, model predictive control, etc.

## BLDC POSITION/SPEED CONTROL WITH NXP

### PROJECT DESCRIPTION
Design the scalar position/speed control of a BLDC motor using the TI Motor Drive kit. Development of the control method can be done in MATLAB Simulink and code can be generated and integrated in the TI software project

### MAIN RESPONSIBILITIES
- Plan the activities
- Gather the documentation
- Install the needed applications
- Develop the control method in MATLAB Simulink
- Validate the Simulink model
- Generate code
- Integrate the code in the software project
- Run the system

### KNOWLEDGE MUST HAVE
- Electrical machines knowledge (DC motors, BLDC, BLAC, construction, and operating principle)
- Knowledge in control theory (scalar control) and signal processing
- Programming skills (C)
- MATLAB skills

### KNOWLEDGE NICE TO HAVE
- Basic electronics



## 2D POSITIONING SYSTEM

### PROJECT DESCRIPTION
Create a concept (if possible also a prototype) of a 2D positioning system that fulfills the next requirements:
- Can precisely place objects inside a test room or area
- Ideally can retract outside test area after placing the object or at least to keep a low profile or use a “cloaking device”
- Can cover an area of 20mx20m or more
- Positioning accuracy +/- 20mm
- Can carry and position an object weighting minimum 10kg
- Can be programmed to move to specific list of positions in a specified order and communicate its position

### MAIN RESPONSIBILITIES
- Work at the concept in collaboration with another colleague and the Continental team members

### KNOWLEDGE MUST HAVE
- Basic Physics
- Basic Mechanics
- Basic Automatics
- Basic Electrical Engineering

### KNOWLEDGE NICE TO HAVE
- Advanced Physics
- Advanced Mechanics
- Advanced Automatics
- Advanced Electrical Engineering

# GRAPHICAL CONCEPT FOR INPUT/OUTPUT SYSTEM DESIGNING AND TESTING WITH PYTHON

## PROJECT DESCRIPTION

Create a simple system and use it to store the Inputs and Outputs of the system into a h5 file, to test proper behavior on the relevant Outputs of the system

## MAIN RESPONSIBILITIES

- Define and create a simple System with a small number of Inputs and Outputs and implement the Algorithm in Python
- Define simple requirements for the System
- Define the needed parameters for the System and create a Parametrisation process
- Create the h5 file with the needed Inputs for the System
- Apply the Inputs to the System and register the Outputs in the same h5 file
- Create tests based on the requirements and run the tests in order to check proper behavior on the Outputs registered in the h5 file
- Analyze different scenarios where bugs can be introduced in the System (Algorithm and Parametrisation)

## KNOWLEDGE MUST HAVE

- Python

## KNOWLEDGE NICE TO HAVE

- Systems
- Algorithmics
- H5 file manipulation
- HDFView



# MATLAB SIMULINK INTEGRATION IN RATIONAL RHAPSODY ARCHITECTURE FOR DISCRETE AND CONTINOUS SIMULATION

## PROJECT DESCRIPTION

Optimization of pressure control in our system

## MAIN RESPONSIBILITIES

- Develop the mathematical model
- Implement in MATLAB Tool
- Test of Simulation

## KNOWLEDGE MUST HAVE

- Optimization technics

## KNOWLEDGE NICE TO HAVE

- MATLAB
- Basics knowledge of electronics
- Medium programming knowledge

## PERFECT DIMMING ANALYZER

### PROJECT DESCRIPTION
Develop a mathematical model that will be compiled as a dll or an executable capable of acquiring data using an oscilloscope and return information in regards WITH PWM Control

### MAIN RESPONSIBILITIES
- Understand PWM signal and LED functionality
- Develop Mathematical Algorithm in Python
- Use oscilloscope - acquire real data from a project
- Improve the mathematical algorithm based on the input from real signal
- Document and compile the code (*.dll, *.exe)
- Create tests based on the requirements and run the tests to check proper behavior on the Outputs registered in the signal acquisition file
- Analyze different scenarios where bugs can be introduced in the System (Algorithm and Parametrisation)

### KNOWLEDGE MUST HAVE
- Python

### KNOWLEDGE NICE TO HAVE
- Systems
- Algorithmics
- Python
- C++



## DUST-TAF DEVELOPMENT TEST STEPS FOR AUTOMATISATION

### PROJECT DESCRIPTION
Develop DUST-TAF test steps in python to improve automatization

### MAIN RESPONSIBILITIES
- Understand automatization process with DUST-TAF (Test Automation Framework with Python)
- Understand requirements in the project and make test coverage
- Develop TEST-STEPS functions in Python
- Perform auto testing in DUST
- Improve test steps

### KNOWLEDGE MUST HAVE
- Python
- Basic English

### KNOWLEDGE NICE TO HAVE
- Systems
- Algorithmics
- Python

# AUTONOMOUS VEHICLE ON AN AUTONOMOUS PLATFORM

## PROJECT DESCRIPTION

Developing and understanding of a system, from the perspective of a System Engineer (a vehicle that can follow a line and avoid obstacles)

## MAIN RESPONSIBILITIES

- Create a system based on Autonomous
- Write functional and non-functional requirements based on that product
- Ensure traceability between requirements
- Create a general architecture diagram for the system (SysML)

## KNOWLEDGE MUST HAVE

- Analytical thinking in problem solving
- Basic knowledge of Autonomous programming
- Basic knowledge of electronics

## KNOWLEDGE NICE TO HAVE

- Basic knowledge in mechatronics systems
- Previous experience with hobby projects



# MOTOR SENSORLESS POSITIONING (SLP) - PYTHON GRAPHICAL INTERPRETATION

## PROJECT DESCRIPTION

Using a door Window Lifter system with SLP motor, create a graphical display of motor position, motor direction, and current consumption

## MAIN RESPONSIBILITIES

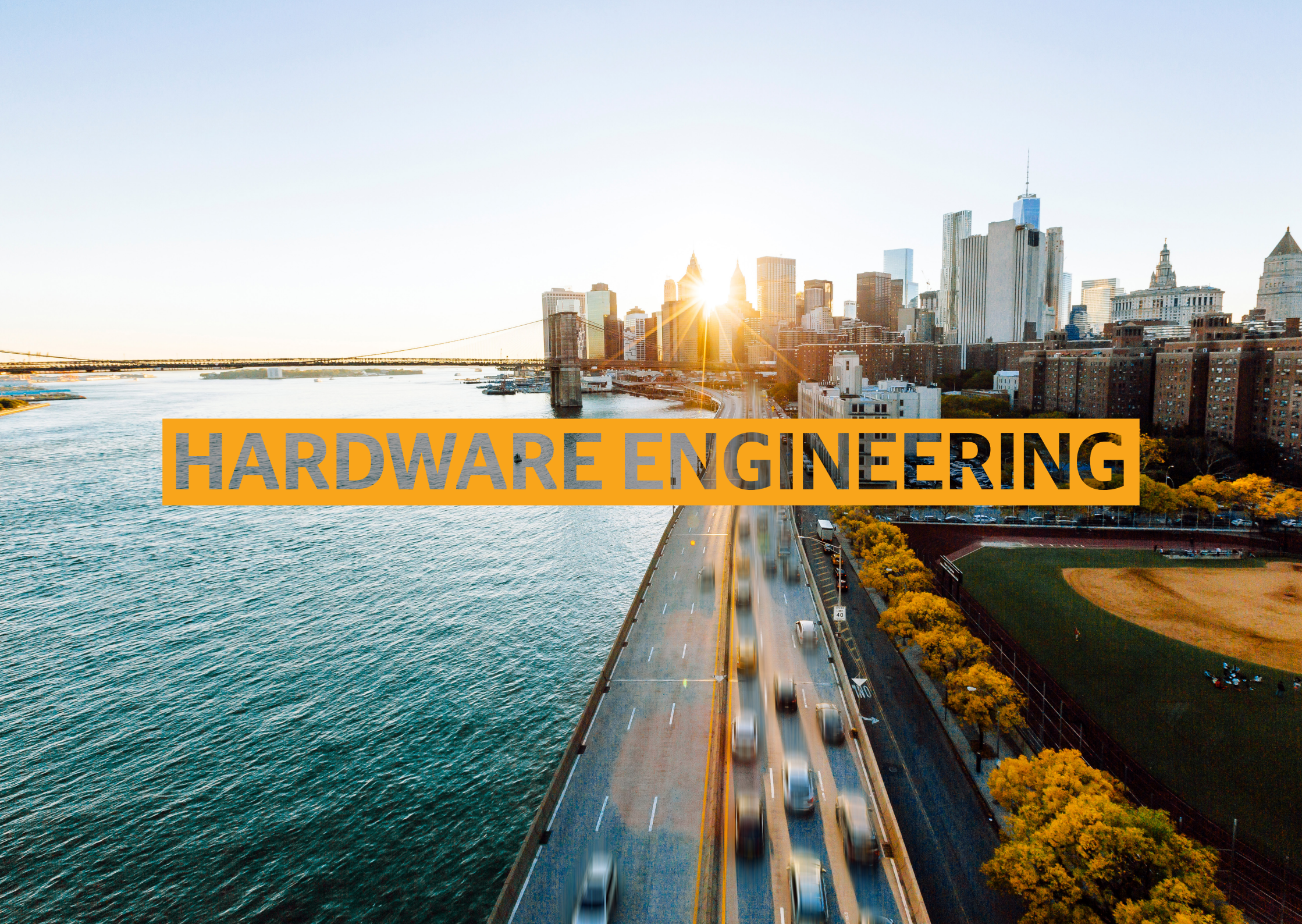
- Define system requirements (type of motor, type of door geometry, HW and SW inputs/outputs)
- Define parameters that need to be recorded
- Define and perform SLP tests
- Record the data using Continental Tools
- Using Python language to create a graphical plots interpreter of recorded parameters
- Analyze if the SLP algorithm is working correctly using an oscilloscope and a motor optical sensor
- Analyze introduced SLP bugs

## KNOWLEDGE MUST HAVE

- Python basics
- Microcontrollers - architecture, peripherals
- Hardware basic understanding - digital electronics
- Analog electronics - ability to apply basic analog electronics theory - Ohm law, Kirchhoff, design first order, second order low, high pass filters
- Basic knowledge of power electronics: e.g. voltage source inverters, DCDC
- Basic Mechanics
- Basic Physics

## KNOWLEDGE NICE TO HAVE

- Systems
- Algorithmics
- H5 file manipulation
- Basics knowledge in electronics
- Basic programming knowledge


HARDWARE ENGINEERING

## POWER METER

### PROJECT DESCRIPTION
Power meter capable to measure Active Power, Apparent Power, Cos$\Phi$, with high resolution, also on non-harmonic distortions

### MAIN RESPONSIBILITIES
- Understand requirements
- Conceive, calculate, and create the schematic
- Create the program for microcontroller

### KNOWLEDGE MUST HAVE
- Analogic and digital electronics

### KNOWLEDGE NICE TO HAVE
- Programing (e.g. Arduino)



## WIRELESS CHARGER

### PROJECT DESCRIPTION
Wireless charger - capable to charge the smartphone without a cable

### MAIN RESPONSIBILITIES
- Understand requirements
- Conceive, calculate, and create the schematic
- Create the program for microcontroller

### KNOWLEDGE MUST HAVE
- Analogic and digital electronics

### KNOWLEDGE NICE TO HAVE
- Programing (e.g. Arduino)
- Basic knowledge of electronics

## DC-DC CONVERTER

### PROJECT DESCRIPTION
Design and test a DC-DC converter

### MAIN RESPONSIBILITIES
- Create schematic
- Develop PCB
- Test the device

### KNOWLEDGE MUST HAVE
- Electronic components
- DC-DC converter topologies
- English

### KNOWLEDGE NICE TO HAVE
- Circuit simulation tools: Orcad or LTspice
- Design tools: Eagle, Altium or KiCad



## LINEAR POWER SUPPLY

### PROJECT DESCRIPTION
Create a linear power supply with fixed or variable output and protection(s)

### MAIN RESPONSIBILITIES
- Understand requirements
- Design the product
- Make a schematic and layout
- Create and test the product

### KNOWLEDGE MUST HAVE
- Basic electronics knowledge

### KNOWLEDGE NICE TO HAVE
- Medium electronics knowledge

## MINI SUMO

### PROJECT DESCRIPTION
Create a small sumo robot aiming to fight with other robots from its category, fully independent.

### MAIN RESPONSIBILITIES
- Prepare a project plan according to requirements
- Develop the main schematic for the mini sumo
- Develop the software
- Design the PCB
- Test the prototype

### KNOWLEDGE MUST HAVE
- Basic electronics
- Basic software
- Basic microcontrollers

### KNOWLEDGE NICE TO HAVE
- Basic mechanical
- PCB design
- Micro Python



## PORTABLE SOLAR PHONE AND LAPTOP CHARGER

### PROJECT DESCRIPTION
Design and test a portable solar phone and laptop charger

### MAIN RESPONSIBILITIES
- Create schematic
- Develop PCB
- Test the device

### KNOWLEDGE MUST HAVE
- Electronic components
- DC-DC converter topologies

### KNOWLEDGE NICE TO HAVE
- Circuit simulation tools: Orcad or LTspice
- Design tools: Eagle,  KiCad

## CURRENT MEASURING DEVICE

### PROJECT DESCRIPTION
Create (reproduce) a current measuring device

### MAIN RESPONSIBILITIES
- Understand requirements
- Use a schematic and layout
- Create and test the product

### KNOWLEDGE MUST HAVE
- Basic electronics knowledge

### KNOWLEDGE NICE TO HAVE
- Medium electronics knowledge



## SNAKE GAME ON FPGA WITH VGA INTERFACE

### PROJECT DESCRIPTION
Create the snake game on FPGA using VHDL / Verilog, or digital electronics. The snake shall be visible on a monitor connected directly to the FPGA development board by VGA / HDMI, and the snake is controlled using an external push button matrix connected to FPGA.

### MAIN RESPONSIBILITIES
- Develop the design using VHDL/Verilog in Vivado
- Create the snake working algorithm
- Create the VGA / HDMI interface

### KNOWLEDGE MUST HAVE
- FPGA
- VHDL

### KNOWLEDGE NICE TO HAVE
- Vivado
- Digital electronics

## DIGITAL LOGIC BOARD

### PROJECT DESCRIPTION
Create a board for learning and practicing fundamental logic circuits

### MAIN RESPONSIBILITIES
- Create schematic and layout
- Learn about the components and applications of the digital logic circuits
- test the PCB

### KNOWLEDGE MUST HAVE
- Basic analogic and digital electronics

### KNOWLEDGE NICE TO HAVE
- KiCad
- Eagle
- LTSpice



## PRACTICAL & THEORETICAL STUDY WITH DIFFERENT CONFIGURATIONS OF DC-DC CONVERTORS

### PROJECT DESCRIPTION
Simulate and measure on real circuit (boost, buck) the working points for increasing the efficiency.

### MAIN RESPONSIBILITIES
- Simulate the buck, boost circuits in LTspice
- Calculate the efficiency
- Measure signals on real circuit
- Understand boost, buck functionalities

### KNOWLEDGE MUST HAVE
- Basic knowledge of using multimeter, oscilloscope
- Basic knowledge in simulation program (LTspice)
- Basic knowledge of circuits and dimensioning calculus

### KNOWLEDGE NICE TO HAVE
- LTspice
- Multimeter
- Oscilloscope

# DIGITAL MULTIMETER

## PROJECT DESCRIPTION
Design a fully functional device capable to measure and display V, A and Ω.

## MAIN RESPONSIBILITIES
- Gather information about the topic
- Design a prototype architecture
- Validate the prototype through simulation(PSpice) and/or calculation(Mathcad) tools
- Create a layout and BOM (Bill of Material)
- Create the software
- Test and qualify the product

## KNOWLEDGE MUST HAVE
- Medium knowledge on electronic circuits
- Basic programming
- Basic electrical measurements

## KNOWLEDGE NICE TO HAVE
- PSpice
- Mathcad
- Eagle or another layout application
- Soldering skills



# MOSFET MODEL FOR SIMULINK FOR LUT

## PROJECT DESCRIPTION
Design a new model for MOSFET using a single LUT based on real measurements

## MAIN RESPONSIBILITIES
- Design a new model for MOSFET
- Use a single LUT based on real measurements

## KNOWLEDGE MUST HAVE
- Basic MATLAB & Simulink
- Medium Excel knowledge
- Basic electronics knowledge

## KNOWLEDGE NICE TO HAVE
- Medium electronics knowledge

# ARDUINO DC MOTOR CONTROL

## PROJECT DESCRIPTION
Speed / Sense control of DC motor using PWM and Arduino platform

## MAIN RESPONSIBILITIES
- Design a prototype / prepare a HW sample
- Create schematic / develop PCB / test
- Develop code for Arduino platform
- Read analog values and converse to digital format
- Generate appropriate signals to drive output transistor in H-bridge configuration

## KNOWLEDGE MUST HAVE
- Analogic and digital electronics
- Programing in Arduino

## KNOWLEDGE NICE TO HAVE
- Medium electronics knowledge



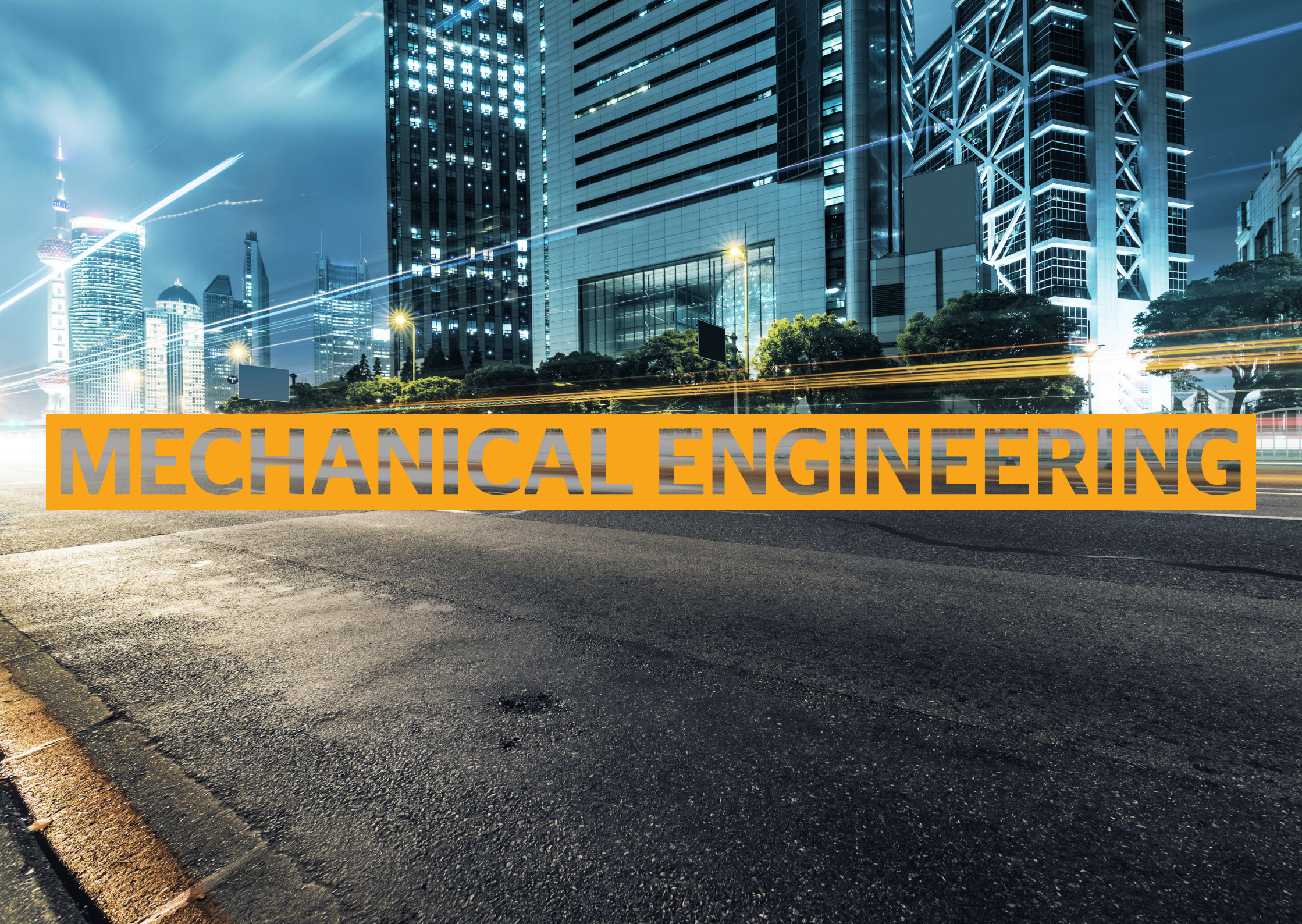
# TEMPERATURE TRANSDUCER USING MOSFET BODY DIODE

## PROJECT DESCRIPTION
MOSFETs include an intrinsic body-diode, connected between drain and source, the body-drain voltage (VBD) can be considered, varying almost linearly with temperature when this body-Diodeis forward biased with a proper DC current. We must obtain temperature value of device used in Hbridge by handling VBD during freewell of Lo Side MOSFET

## MAIN RESPONSIBILITIES
- Define project architecture
- Digital specification, algorithm, platform (Raspberry, MSP, Arduino)
- Analog specification, schematic EE
- HwSw specification
- Omplementation (HW sample / SW application)
- Tests

## KNOWLEDGE MUST HAVE
- Basic knowledge of electronic circuits
- Programming knowledge
- Electrical measurements knowledge

## KNOWLEDGE NICE TO HAVE
- Medium electronics knowledge


MECHANICAL ENGINEERING

# MECHANICAL PROPERTIES MATERIAL DATA BASE

## PROJECT DESCRIPTION
Stress - strain diagrams for most used materials used on MK Cx projects

## MAIN RESPONSIBILITIES
- Understand the testing procedures needed for creating a material model needed for FEA simulations in ANSYS
- Develop specific adaptors for Zwick machine
- Perform tensile, volumetric compression, biaxial, pure shear tests according to standards

## KNOWLEDGE MUST HAVE
- Strength of materials
- 3D modeling basics
- English

## KNOWLEDGE NICE TO HAVE
- Technical drawing and GD&T
- FEM simulations
- Strain gauge



# DESIGN OF MEASUREMENT FIXTURE USED FOR OPTICAL MEASUREMENT PROCESS

## PROJECT DESCRIPTION
Create a fixture which is intended to be used for an optical measurement device Micro Vu 341EU

## MAIN RESPONSIBILITIES
- Learn and understand how the measurements are done with an optical measurement device
- Create fixtures for different measurement scenarios

## KNOWLEDGE MUST HAVE
- Technical drawing
- GD&T
- 3D modeling
- English

## KNOWLEDGE NICE TO HAVE
- Measurement fixture design

# DESIGN OF DISMOUNTING DEVICE USED FOR MULTIPLE ELECTRONIC CONTROL UNITS

## PROJECT DESCRIPTION
Create multi tool device used for Electronic Control Units dismounting

## MAIN RESPONSIBILITIES
- Learn how the Electronic Control Units are assembled
- Build dismounting devices for different fastening methods (Snapping/Screwing)

## KNOWLEDGE MUST HAVE
- Materials
- Technical drawing
- GD&T
- 3D modeling
- English

## KNOWLEDGE NICE TO HAVE
- Fastening types used in Electronic Control Units



# UPGRADE THE MKC1 PRESENTATION BENCH

## PROJECT DESCRIPTION
Upgrade the MKC1 Presentation Bench with more than one feedback simulator. The upgrade is to add a distributor to test more than one simulator without replacing by assembling other simulators for every test. The final upgraded stand will have 4 different feel simulators assembled that can be tested. Another upgrade will be the implementation of a light system to show what simulator is activated at a given time

## MAIN RESPONSIBILITIES
- 3D modeling of routing between the MKC1 unit and the distributor
- 3D modeling of the routing between the distributor and feedback simulators
- Create the electrical scheme for the light system

## KNOWLEDGE MUST HAVE
- 3D modeling basics
- Technical drawing
- GD&T
- English

## KNOWLEDGE NICE TO HAVE
- Basic mechanical engineering

# MKCX HYDRAULIC DIAGRAM IMPLEMENTATION

## PROJECT DESCRIPTION

Create a dummy Brake-by-wire unit accordingly to the MKCx hydraulic diagram. This unit will consist of the existing functional parts assembled on a transparent hydraulic block. The unit will highlight the main functions of the MKCx product

## MAIN RESPONSIBILITIES

- Read and understand the functioning of the MKCx unit
- Design a valve block according to the hydraulic diagram and using standard interfaces in CATIA
- Prepare the 2D drawings for the new parts using GD&T knowledge
- Design, order and assembly a functional presenting stand for the unit

## KNOWLEDGE MUST HAVE

- 3D modeling basics
- Technical drawing
- GD&T
- 3D modeling
- Basic English

## KNOWLEDGE NICE TO HAVE

- Basic knowledge of manufacturing processes
- CATIA V5 environment (3D and 2D)



# SCREW FRICTION TEST BENCH CALIBRATION METHOD IMPROVEMENT

## PROJECT DESCRIPTION

Screw friction test bench has an axial bearing. The friction coefficient of this bearing is used in the screw friction calculation. Knowing the friction coefficient value and tolerance is crucial for measurement accuracy. Current method is not accurate enough. New method and adaptor design need to be created to achieve sufficient measurement accuracy.

## MAIN RESPONSIBILITIES

- Understand screw friction test bench working principle
- Understand calibration procedure
- Take part in finding of a solution for improved calibration procedure
- Create 3D model of the solution and drawings necessary for manufacturing adaptors
- Make a to do list and keep track of implementation of new procedure
- Mount created components, and perform necessary tests to prove the design feasibility
- Document the process from beginning to end

## KNOWLEDGE MUST HAVE

- Basic Knowledge of CATIA and drawings set up

## KNOWLEDGE NICE TO HAVE

- Tribology and special mathematics

# BOOSTER / MKCX PEDAL FEEL DIFFERENCES

## PROJECT DESCRIPTION
Make a comparison between the pedal feels of Booster / MKCx brakes

## MAIN RESPONSIBILITIES
- Read and understand the functioning of the Booster / MKCx unit
- Design the PAU components according to the hydraulic diagram and using standard interfaces in CATIA
- Prepare the 2D drawings for the new parts using GD&T knowledge
- Design, order, and assembly a functional presenting stand for the unit
- Understand the test procedures for PAU development

## KNOWLEDGE MUST HAVE
- Materials
- Technical drawing
- GD&T
- 3D modeling
- English

## KNOWLEDGE NICE TO HAVE
- Basic mechanical engineering



# CNC FOR PCB PROTOTYPING - MD

## PROJECT DESCRIPTION
Create a CNC machine to be used for fast prototyping of custom PCB. The hardware part is already available and will be integrated into the project. Some of the mechanical parts are also available and require some modifications/redesign. At the end of the project, the CNC will be ready to create unique PCB, based on the imported files in the application.

## MAIN RESPONSIBILITIES
- Design and create mechanical components
- Adapt or redesign the existing mechanical components
- Assemble mechanical and hardware components
- Support in integration between mechanical, hardware and software

## KNOWLEDGE MUST HAVE
- Good knowledge of mechanical design and operation
- Basic understanding of software operation and design

## KNOWLEDGE NICE TO HAVE
- Advanced knowledge of mechanical design and operation
- Experience with CAD design
- Good understanding of software operation and design
- Good understanding of electronics operation and design
- Good understanding of embedded systems
- Programming skills (Python)

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