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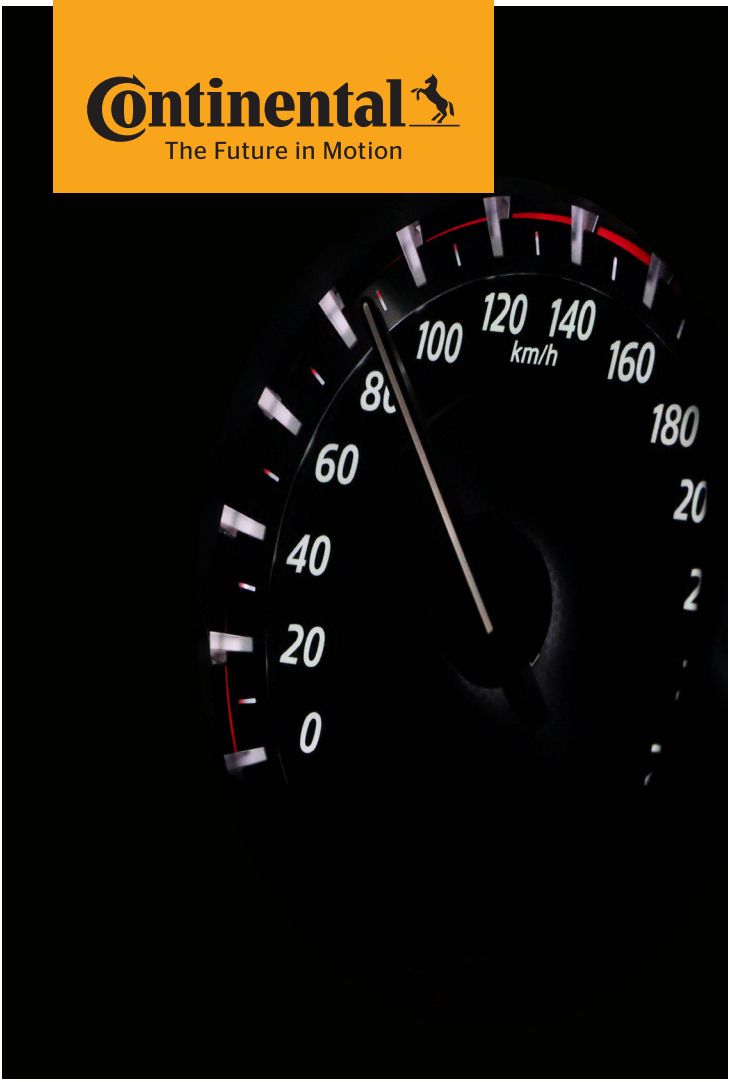

Diploma & Master Projects 2018

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Tomorrow's Engineers

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Accelerate your career through your Summer Practice!

Choose your project and apply here.

Choose one of our 19 projects detailed in the following pages.

Real time object recognition system

Knowledge requirements

- Hardware
- Linux OS
- C
- Artificial Intelligence

Knowledge acquired by the student at the end of the project

- Ability to design a complex system
- Software architecture knowledge
- Artificial Intelligence knowledge

Goal of project

Embedded System that will be able to recognise an object and will be able to determine its exact position and distance from it.

Student responsabilites

Creation of a system, code writing, system testing and documentation creation.

Expected results

- A hardware component which will contain a camera and a powerful computation controller
- A Linux platform software for the camera - controller connection and control
- Image processing application that use artificial intelligence algorithms for object detection and position/distance calculation

Car Data Sharing - BCM

Knowledge requirements

- Basic embedded programming
- Basic algorithm

Knowledge acquired by the student at the end of the project

- Understand automotive specific analysis of requirements and constraints (system, SW, HW
- Structured knowledge on standard requirements and constraints in definition
- Clear structured view of system requirements specific aspects (topic, strategy of grouping,rioritization, segregation per discipline)
- Clear view of end-to-end prototype process (elicitation, reconciliation with customer view, reconciling between HW-SW constraints and functional requirements)
- Have a grasp of all implications of how a specific function (the chosen one) are interacting with other components
- Exposure to the latest trends of industry's trends and the view of customer;s needs
- Ability to analyse efficiently and formulate specifications for the implementation of function

Goal of project

A complete set of requirements for setting a communication between cars.

Focus on BCM functions:

- Autonomous driving (automatic cruise control, etc
- Lights (brake, hazard, fog lights, etc)
- Diagnosis (car and driver diagnosis)

Student responsabilites

Research and write specifications for communication and function systems between cars.
For any of the themes chosen, the student should:

- Document at least one important aspect (security, communication car-to-car, vulnerabilities of technology to be considered, specific technical limitations, specific technical innovation proposals)
- Structure the documented topics in a set of SYSTEM requirements (to be derived in software, hardware, safety relevant or not requirements)
- Set-up a set of test cases to be considered mainly on system testing level
- Design a sample ECU (2 ECUs for demonstrating car-to-car communication) which should cover (hw and/or software) the topic documented
- Assistance from continental team will be provided in documentation process, hw design and sw implementation for sample
- Software – to be implemented on Autosar with embedded C
- Software can be also modelled in Mathlab (assistance from Continental team)

Note: One diploma project can concentrate only on partial set of aspects from the functions listed (security only, communication only, limitations of implementation, vulnerabilities) and can choose to handle only one of the functions listed.

Expected results

80-90% coverage of goal

Car Data Sharing

Knowledge requirements

- Basic embedded programming
- Basic algorithm

Knowledge acquired by the student at the end of the project

- Understand automotive specific analysis of requirements and constraints (system, SW, HW
- Structured knowledge on standard requirements and constraints in definition
- Clear structured view of system requirements specific aspects (topic, strategy of grouping, prioritization, segregation per discipline)
- Clear view of end-to-end prototype process (elicitation, reconciliation with customer view, reconciling between HW-SW constraints and functional requirements)
- Have a grasp of all implications of how a specific function (the chosen one) are interacting with other components
- Exposure to the latest trends of industry's trends and the view of customer's needs
- Ability to analyse efficiently and formulate specifications for the implementation of function

Goal of project

A complete set of system requirements for setting a communication between cars.
Focus on BCM function gateway:

- centralize data collection and spread to other cars
- interface with other modules: infotainment, (telematics, multimedia, navigation), engine control, etc

Student responsabilites

Research and write specifications for communication and function systems between cars.
For any of the themes chosen, the student should:

- Document at least one important aspect (security, communication car-to-car, vulnerabilities of technology to be considered, specific technical limitations, specific technical innovation proposals)
- -Structure the documented topics in a set of SYSTEM requirements (to be derived in software, hardware, safety relevant or not requirements)
- Set-up a set of test cases to be considered mainly on system testing level
- Design a sample ECU (2 ECUs for demonstrating car-to-car communication) which should cover (hw and/or software) the topic documented
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Note: One diploma project can concentrate only on partial set of aspects from the functions listed (security only, communication only, limitations of implementation, vulnerabilities) and can choose to handle only one of the functions listed.

Expected results

Create embedded system that allows to simulate fault conditions in complex non-linear loads like Xenon lamps or motors (overload, in-rush current, motor blocked, ignition phase and so on). Load profiles are easily created/loaded as files in RbPI.

Running hard real time functionalities in Linux

Knowledge requirements

- C language
- CAN
- Basic Linux
- Basic HW
- Multithreading

Knowledge acquired by the student at the end of the project

- CAN PRotocol
- Multitasking programming in Linux
- Automotive functionalities
- Hardware knowledge

Goal of project

The project aim is to have a single powerful ECU (Raspberry PI) that runs the non time critical part of all apps

Student responsabilites

- Write a simple driver for MCP2515 (stand alone CAN controller with SPI) for Raspberry PI. It is not necessary to be a true Linux driver.
- Working CAN communication between main ECU and slaves
- Each app run in a separate process in master Note:
- Students can propose any other embedded
- Linux board that allow CAN communication (directly or with external CAN controllers)

Expected results

In automotive exists applications that have time ritical parts. The project will demonstrate that the time critical part of each app can be distributed to simple slave ECUs. Each app will run in RbPI in separate processes to achieve freedom of interference. RbPI has a CAN where all slave ECUs are chained. Example of apps are smart fuse, lightning, any motor control app. All apps will be greatly simplified.

Smart watch – detecting and preventing conditions of sleep and heart attacks

Knowledge requirements

- Good C knowledg
- Embedded Systems
- Basics of electronics

Knowledge acquired by the student at the end of the project

- Able to develop a project based on more than one processor
- Aquire new knowledge on C language, uC
- Gain problem solving skills and debugging skills

Goal of project

Develop a standalone embedded system that will be able to prevent common accidents when the driver falls asleep or has an heart attack.

Student responsabilites

- The acquisition and processing of the heart rate monitor data. (Also some hardware modifications to an already existing smartwatch or designing a new model)
- The communication between the smart watch and a device placed on the car
- To define and implement the safety measures used to prevent those situations

Expected result

Develop “smart watch” that will monitor your heart rate to detect anomalies or low rates of your pulse. The monitoring of the pulse rate can be used to detect if the person will fall asleep or can predetermine heart attacks.

Matlab/Simulink – TargetLink model for door obstacles detection and automatic door closing

Knowledge acquired by the student at the end of the project

- Complete development process for Embedded Systems
- SW Architecture and SW Detailed design knowledge
- Modeling with Matlab/Simulink advanced knowledge
- Enhanced knowledge for signal processing for embedded systems
- Generation code with dSPACE TargetLink knowledge
- Integration of the generated code into complete embedded system software

Goal of project

Develop a Matlab/Simulink – TargetLink model for detection of obstacles when opening the door. This model should represent a new functionality for the future DCUs (door control units).
The model will take the input signals and commands from a motor, most likely a servomotor, also from a sensor responsible with the detection of obstacles.
The information from the sensor will be received either via CAN from an external module, or directly from out HW. Based on the information received from those two devices, the model will implement the needed algorithms for controlling the motor, processing of signals and the required logic according to the available specification. In addition, the software will close the door when it remains open. This functionality should be integrated in a complete software system for Door Control Units for all install positions.

Student responsabilites

- Get introduction in architecture of the new functionality
- Implement algorithms for signal processing and requirements as Matlab/Simulink Models
- Configure Models in order to generate code out of Models using dSPACE TargetLink
- Integrate the generated code into complete Door Control System software and test the integration

Expected results

- Functionality available and able to be configurable
- Functionality will be integrated into DCU software
- Accuracy of calculation and filtering
- Integration tests available

Universal System for parameter monitoring

Knowledge acquired by the student at the end of the project

- Complete development process for Embedded Systems
- Software Architecture and SW Detailed design knowledge
- Enhanced knowledge for signal processing for embedded systems.
- Communications protocol used in automotive industry
- Android development know-how

Expected results

- remote functions, with server PHP
- editable list of monitored sites (add, delete, modify)
- display sites and alarms in the table / map
- history parameter values, graphics, statistics tables
- automatic transmission to an email address, or SMS message, in case of upper limit X2 exceed, or fall under lower limit X3, or in case of loss of communication with a remote site. In case of intermittent alarms, the information will not be sent by e-mail / SMS more often than a given time value T3.

Goal of project

- Local centralization (with microcontroller) and transmission of measured parameters to a PHP server, via SNMP Trap protocol (UDP 162). The MIB will have a single, 256-character OID text type
- Measured parameters can be: temperature, humidity, pressure, power supply, various contact alarms
- In total we can have up to 5 analog parameters (note A1.. A5) and up to 5 digital parameters (note D1..D5)
- Assign the A1..A5 and D1..D5 parameters to the physical ports should be flexible. Thus, when a port is damaged, it is not necessary to replace the module, or rewrite the softwar
- Transmission will not be done more often than T1 interval (eg 1 minute), and not less than T2 interval (eg 60 minutes)
- Transmission will be done at an unexpected change of a parameter (with a minimum of +/- X1 from the previous value), or when a critical value exceeds X2 limit, or falls below a critical value limit X3
- For each measured parameter, the microcontroller scaling to the desired unit of measurement by an value X4 scaling factor (according to the A/D conversion scheme)
- In the case of sensors based on non-linear conversion functions, to save ""CPU time"", an X5 conversion table with pre-calculated values of the function will be saved. If an input value is not in the table, approximation will be made to a near or interpolation value
- For each parameter, the values X1, X2, X3, X4, X5, T1, T2, the names A1..A5, D1..D5, will be stored in the local NVRAM
- For each parameter, values X1, X2, X3, X4, X5, T1, T2 and A1, A5, D1..D5 names can be changed remotely from the PHP server
- The SNMP Trap data field has error correction code, capable to corect 1 error and detect 2 errors
- The SNMP Trap data field must be a text of up to 255 characters (including the error correction code)
- The names for A1..A5 and D1..D5 should appear in the text field, along with the measured values, to decode the significance of the parameters at the PHP server. Thus, the order of parameters in the text field does not matter
- The default IP address is 192.168.1.20, the default IP_GW address is 192.168.1.1. These addresses can be changed locally, for example by implementing a local mini server or a mini serial console
- The board should allow return to the default values, for example by connecting a digital input pin to the ground

Employee project allocation

Knowledge requirements

- html
- css,
- java
- SQL or Oracle

Knowledge acquired by the student at the end of the project

- client-server application
- working with a deadline
- understanding requirments
- delivering a complete application

Goal of project

Implement a client-server web application which contains the allocation of Continental Employees taking into account the Business Unit, Department, Project, demand and the fact that a person cannot be overallocated as a resource.

Student responsabilites

The end result of the project will be a web application that allows Employee allocation, reporting on project and location level and complex validations.

Expected results

A functional application that meets requirments

Internal UBER for Continental Iasi Employees

Knowledge requirements

- OOP
- Basic knowledge about working with maps and libraries
- Basic SW development for mobile applications

Knowledge acquired by the student at the end of the project

- Android software development
- IOS software development
- Knowledge about calculation of distances and times using maps

Goal of project

Goal is to develop a mobile application for Android, IOS to allow Continental Employees to track the colleagues with a car and ask for a ride and the colleagues with a car to see request for rides from other pedestrian colleagues.

Student responsabilites

- To develop application for mobile devices
- To develop user recognition based on ID
- To develop algoritm of seeing the drivers nearby
- To develop algoritm to see the pedestrians nearby
- To develop algorithm for receiving and place order for a driver

Expected results

A functioning application for many OS, that will perform as an UBER but only for Continental Employees in Iasi.

Biometric Acess Control System

Knowledge requirements

- Database SQL
- Embedded programming
- Basic electronics

Knowledge acquired by the student at the end of the project

- Wireless communication with an embedded system
- Database management over the internet
- Embedded systems development

Goal of project

The goal of the project is to implement a system that would allow the electronic unlocking of a door by using a fingerprint reader or a typed code.

Student responsabilites

- Develop the SYS architecture and define the needed components of the system
- Implement and application on a microcontroller that would validate the fingerprints and the typed codes and would command the electronic lock
- Implementa PC application that will function as a database for the codes and fingerprints. The PC applciation should allow the management of the database (delete accounts, modify, etc)
- Access logging shall be a feature of the product

Expected results

The expected result is to have the system build and functional.

Gas Concentration Monitoring Station

Knowledge requirements

- Embedded programming
- Basic electronics

Knowledge acquired by the student at the end of the project

- SYS design
- Microcontrollers architecture and programming
- Web server site building

Goal of project

Goal is to develop a product that is able to monitor gases concentration and depending on defined rules and threshold to notify via internet some users.

Student responsabilites

- Develop a SYS architecture with the needed components
- Design the system with all the needed interfaces
- Write a software application that will control the hardware
- Build a web server that is able to disply information acquired from the gas monitoring station and to send notifications

Expected results

The expected result is to have the system build and functional.

Obstacle Mapping and Navigation using Lego Mindstorms Robot

Knowledge requirements

- Modelling
- Matlab Programming

Knowledge acquired by the student at the end of the project

- Modelling
- Matlab Programming
- Algorithms

Goal of project

The goal of this project: is to design a robot with the ability to roam around an area and create a map of where there are obstacles and where it is free to travel. The robot has the ability to travel to a defined position on this created map. After creating the map, the robot would be able to travel to any area of open space and can execute different commands.

Student responsabilites

- Desing the robot based on the Lego Mindstorms kit
- Develop a Matlab based application that will be flashed in the microcontroller integrated in the Kit
- Implement the algorithms that would allow the robot to fullfil the requirements

Expected results

The expected result is to have the system build and functional.

Spirograph Robot using Lego Mindstorms Kit

Knowledge requirements

- Modelling
- Matlab Programming
- Geometry

Knowledge acquired by the student at the end of the project

- Modelling
- Matlab Programming
- Algorithms

Goal of project

Design a robot with the ability to draw mathematical roulette curves of the variety technically known as hypotrochoids and epitrochoids.

Student responsabilites

- Desing the robot based on the Lego Mindstorms kit
- Develop a Matlab based application that will be flashed in the microcontroller integrated in the Kit
- Implement the algorithms that would allow the robot to fullfil the requirements

Expected results

The expected result is to have the system build and functional.

Mini-Rover controlled via Wi-Fi/Bluetooth

Knowledge requirements

- C/C++ programming
- Motor control (basic)
- Communication protocols

Knowledge acquired by the student at the end of the project

- Android development tools
- Motor control principles
- Ability to develop a system from design to implementation
- C/C++ Programming Skills

Goal of project

The goal is to control a Mini-Rover by using Bluetooth or Wi-Fi.

Student responsabilites

- analyze rquirements and plan the implementation phases
- understand SW architecture
- understand the micro controller specific peripherals
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype;
- prototype redesign based on tests
- earn about system and software design
- learn basics about hardware architecture
- support project team developping the necessary documentation

Expected results

The student should be able to develop a complete system which allows the user to control the speed and direction of a vehicle remotely.

Communication protocol router

Knowledge requirements

- C/C++ Programming

Knowledge acquired by the student at the end of the project

- Automotive communication protocols knowledge
- Software Design principles

Goal of project

The behavior should be similar to a gateway.
A message should come with a certain ID, but should be sent on a different ID. The idea behind is to create a routing table which would allow the tool to know on which ID the data should be routed on.

Student responsabilites

- analyze rquirements and plan the implementation phases
- understand SW architecture
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype
- support project team developping the necessary documentation

Expected results

Desktop Application which should be able to read the CAN bus and based on the routing table should be able to route the CAN message on a different ID.

Reverse Pendulum

Knowledge requirements

- C

Knowledge acquired by the student at the end of the project

- Control algorithms
- Software design
- Microcontroller peripheral know-how

Goal of project

Develop a two wheel robot,controlled based on a phone's accelerometer which keeps its balance while moving. The communication with the smartphone should be done via bluetooth or wi-fi.

Student responsabilites

- analyze rquirements and plan the implementation phase
- understand software architecture
- understand the micro controller specific peripherals
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype
- prototype redesign based on tests
- earn about system and software design
- learn basics about hardware architecture
- support project team developping the necessary documentation

Expected results

A self-balancing robot which is able to move but still keep its balance through a control algorithm which is implemented.

XLS to XML converter

Knowledge requirements

- C/C++

Knowledge acquired by the student at the end of the project

- Software Design Principles
- Automotive file standards
- Automotive tooling knowledge

Goal of project

The goal is to create an app which is able to place the content from an excel file into a xml predefined template.

Student responsabilites

- analyze rquirements and plan the implementation phases
- understand software architecture
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype;
- support project team developping the necessary documentation

Expected results

A tool which is able to convert from xls to a format used in Automotive projects.

Integrate a CAN enhancement into a reprogramming tool

Knowledge requirements

- C/C++
- Communication protocols
- Microcontrollers

Knowledge acquired by the student at the end of the project

- Automotive communication protocols knowledge
- Software design principles
- Flash memory handling

Goal of project

CAN-FD is an improvement of the CAN standard. Such improvement is needed in reprogramming tools.

This feature is used mostly by the customer when reprogramming a product.

Student responsabilites

- analyze rquirements and plan the implementation phases
- understand software architecture
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype
- support project team developping the necessary documentation

Expected results

Integration of 3rd party libraries. Offer the possibility to switch the GUI from normal CAN to CAN FD.

Universal calibration protocol for reprogramming tools

Knowledge requirements

- C/C++
- Communication protocols

Knowledge acquired by the student at the end of the project

- Automotive communication protocols knowledge
- Software design principles
- Flash memory handling

Goal of project

Enhance the possibility to reprogram a car electronic unit via universal calibration protocol used for high-speed and big data load.

Student responsabilites

- analyze rquirements and plan the implementation phases
- understand software architecture
- understand the micro controller specific peripherals
- make implementation on the designed platform
- make tests and validate the implementation
- deliver an working solution
- support for testing and validation of prototype
- prototype redesign based on tests
- earn about system and software design
- learn basics about hardware architecture
- support project team developping the necessary documentation

Expected results

A tool which is able to interpret the data sent via CAN according to the protocol implementation.

Continental Automotive Romania SRL
6 Poitiers Boulevard, 700671 Iasi, Romania
www.continental-corporation.ro
www.facebook.com/RomaniaContinental

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