The University of Western Australia
School of Engineering
Prof. Thomas Bräunl

Digital & Embedded Systems

ENSC3020 / ELEC3020 / ELEC4403

Semester Group Project	**GPS Vehicle**	**weeks 6-12**

GROUPS: Form groups of 4 students

EQUIPMENT: Purchase your own equipment,
up to $50 will be reimbursed (receipts required)

GET STARTED

- Form a group of **4** students
- Register your group members with your lab demonstrator, who will give you a **group number**.

IMPLEMENTATION

- Use a microcontroller (Arduino Nano or similar) and interface to a model car, actuating steering and drive system.
- Note: this works best for a model car with dedicated servo for steering and separate motor controller. However, you can also reverse-engineer combined control electronics, which is often encountered in cheaper model cars: https://robotics.ee.uwa.edu.au/eyebot5/doc/robots/model.html

TASK

(1) Connect your embedded controller to the selected model car.
(2) Implement “drive-by-wire” from the controller for steering and drive system
(3) Connect a GPS sensors to the model car
(4) Implement a program to drive the car to a location given by GPS-coordinates and then come back to the start.

Note: You need to include a simple way to set the desired location, e.g. as a constant in your C program.

We will test this by letting each car autonomously drive outdoors (e.g. on James Oval) to a desired location. There will be no obstacles along the way, but we will mark the goal coordinates with a cone or similar. Hitting the cone will be a bonus, not a penalty.

PRESENTATION

Videos will be viewed and marked on Mon. of week 12

DEMONSTRATION

All groups will show the practical performance of their vehicles on Thu. of week 12. This includes answering questions from the lab demonstrators.

SUBMISSION

1. One-minute video of your project journey
   To be submitted no later than **Mon. 9am of week 12.**

2. Documentation to be submitted on **Thu. 12noon of week 12** as a *single PDF document* via LMS + **printed copy** with cover sheet signed by all group members:
   2.1. Project design report, which includes:
   - Report on which team member did what
   - Hardware circuit diagram with explanations
   - Software design description and diagram
   - Include photos, screenshots, etc.
   - Include page numbers
   - Max 10 pages including title page

   Do not include:
   - Program code
   - Table of contents, etc.
   - Half-empty pages

   2.2. Project budget with "bill of material" in Excel format:
   - Part numbers and names
   - Part quantity
   - Price per part
   - Source (where purchased)

   2.3. User Manual:
   - As if it was sold to a customer
   - Max. 3 pages, no separate title page

   2.4. Marketing and sales document:
   - 1 page incl. photo and brief system description as if selling it on *eBay*

MARKING

10% Video
60% Functional Performance
15% Project Design Report
5% User Manual
5% Budget
5% Marketing Documents

GROUP NO: _____

Name1 _____ Name2 _____

Name3 _____ Name4 _____

LAB DEMONSTRATOR **SIGN OFF** Design (wk7): _____