IDP General information and deliverables

General information:

Group: L105

Assessor: Prof Fumiya Lida - http://www.eng.cam.ac.uk/profiles/fi224
Mentor/Tech advisor: Tim Love - http://www2.eng.cam.ac.uk/~tpl/

Schedule and deadlines:

Project Week	**Day**	**Activity**
Week 1	Thursday	**9:00:** Introduction Session, *Online livestreamed with Q&A* *(Note there is no 'lab' session 9-11)* **14:00:** Project Management Lecture, *Online livestreamed*
	Monday	
	Tuesday pm	**First Presentation,** via Teams timetable here
	Wednesday	
Week 2	Thursday	**16:00 First Report Due,** submit on Moodle
	Monday	
	Tuesday pm	**Progress Meeting with Academic** ,via Teams timetable here
	Wednesday	
Week 3	Thursday	
	Monday	
	Tuesday pm	**Progress Meeting with Academic** , via Teams timetable here
	Wednesday	
Week 4	Thursday	**9:00: First Competition.**
	Monday	
	Tuesday pm	**9:00: Final Presentation.** via Teams timetable here
	Wednesday	**14:00: Final Competition.**
Week 5	Monday	**16:00 Final Report and Documentation Deadline.** Submit on Moodle.

Specific guidance: Milestone basis:

1. First presentation:

- 10 mins + 5-10 for q+a
- think of it like a pitch
- all members attend
- max 10 slides
    - team name, management structure and organisation
    - approach for solving the problem
    - robot concept and diagram
        - prototype
        - hand-drawn diagrams
        - CAD models

        - System block diagram
        - Exploration, navigation and planning algos
        - Anticipated risks/challenges
        - Gantt chart
            - Resource/time allocation
            - Key dependancies
            - Critical path
    - All must provide a 'professional contribution'

2. First report

- Presented as a group
- More detailed reflection of the planned system
- Reflect on feedback given in (1)
- Max 6 pages of text (Does not cad, diagrams, sketches etc)
- Same content as given in (1) – more in depth
- Contains:
    - Coversheet:
        - Team identifier (L105)
        - Team name
        - Robot name
        - Name, lab group, college etc of every member
    - Approach(es) to solving the problem
        - Sketches of the concepts you have considered
        - Evaluation of each approach/concept
    - Robot concept and diagram
        - Hand drawn
        - CAD models
        - System level diagram
        - Any other format?
        - Details of how the hardware and software interact
    - Electronics and sensing
        - List of sensors/circuits
        - Any/all circuit and block diagrams
        - Evaluation of pros/cons of doing some hardware based processing
            - Given example: adc
    - Software
        - Any/all algos
        - Hardware software interfaces/integration
    - Risks/challenges evaluation
    - Gantt chart
- Submitted on moodle, 1 per team

3. Progress meetings:

- Two meetings – see schedule above
- Approx. 20 – 30 mins

- No formal presentations required – (would be preferred though!)
    - Discuss with mentor how they would like the info presented
    - Gantt chart sent before both meetings
    - Electronics
        - Details of approach
        - Up to date schematics
    - CAD
        - assembly showing all major parts
    - Software
        - Flow chart - Representation of overall strategy
    - Tasks to solve and plans to solve them
        - Plans and responsibilities for next week
- Teams are expected to keep updated
    - circuit diagrams
    - layouts
    - CAD
    - Software flow charts
    - Strategy diagrams/Gantt
- All members must participate
    - marking on both team and individual level
- Better to be upfront about issues.

4. As above (3)

5. Competitions:

- Very little room for delays
- 2 members operate the robot – competition can be livestreamed to monitor progress
- at least two official markers
- LED indicator location

6. Final presentation:

- 10 mins
- Max 8 slides
    - review of overall design strategy
        - software
        - electronics
        - hardware
        - overall strategy
            - try to sell you innovative appraoch to your assesors
    - Physical implementation:
        - How?
        - Problems encountered and subsequent major changes
    - Review of programme management:
        - Timescale discrepancies

        - Key lessons learnt – what would you do differently
    - Brief overview of first competition
        - Following changes
        - Performance prediction for final competition

7. As above (5)

8. Final documentation:

- Must be sufficient to allow someone else to build it
- Professional standard!
- Must ensure good matches between simulated and designed robot
- Software/overall
    - Overall system diagram
    - Details of algos and strategy
        - Pictorial/flow-chart etc
    - Software approach (1 A4 page)
        - Overall approach – top level algos
        - Flow of information at a high level of abstraction
    - Code structure and algos (1 A4 page)
        - Key algos – show in diagram?
        - UML (unified modelling language) not required (although would be nice!)
        - Structure of code
    - Git link
- Electrical
    - Circuit diagrams:
        - Covers all electronics and interfaces between arduino
            - Pin numbers
            - Part numbers
            - Power lines
            - All parts
            - Digital/analogue considerations
        - Think about indicator LEDs, pots etc for ease of development
        - Are there any analogue inputs which would be better suited as digital?
    - Layout diagrams
        - Higher level diagrams showing flow of info
        - Layout of PCB and veroboard
            - All connectors
            - Power rails
            - Location of all headers
            - Location of all parts
            - Location of tracks to be cut
            - Location of any jumper wires
        - Think about practical construction
            - Component placement

        - Thermal considerations
        - Noise
    - Good examples: https://jaehughes.github.io/IDPDocs/ElectricalDA.pdf
- Mechanical:
    - CAD diagrams allow for easily understood construction
    - Must also include materials used
    - Overall CAD assembly
        - As close as possible to the final design
        - Sensors, mounts, electronics etc
        - Overall assembly showing the final structure
        - 3D views and plan/side views
        - labels of every part
    - 2D drawing of parts/subsystems:
        - 2D drawings of every part
        - sufficiently dimensioned
        - Threads of holes
        - Do not mix laser cut and 3D printed drawings for example
    - Good/Bad examples: https://www.vle.cam.ac.uk/mod/resource/view.php?id=14097261

9. Final report:

- Individual
- Max of 2 pages:
    - Summary of systems developed
        - Major decisions
        - Strategies used
    - Summary of contributions
        - Details of what aspects you worked on
        - Review of performance
    - Team management aspects of the project:
        - Evaluation of the management structure
    - Discussion of final performance
        - Review of final simulation
        - Extent to which the spec was met
    - Discussion of the validity of simulation
        - How well does it work to de-risk the robot?
        - Phsical tests which might be performed to reduce risk
        - Impact of real world considerations on final design