

CSCI444 / CSCI944

Perception and Planning

Week 1

Subject Information

(Online Delivery)

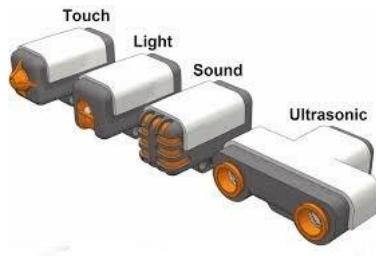
What is this subject about?

- This subject explains the perception & planning systems needed to build automomous machines like:
 - self-driving vehicles,
 - humanoid robots,
 - crop picking robots,
 - Drones , etc.
(unmanned aerial vehicle)



What is this subject about?

- This usually involves combining data from a variety of sensors to create, or update, **a model of the robot's environment**.
- This model is then used to infer the consequences of proposed actions.
- This subject will cover the use of internal sensors such as odometry and location sensors; and external sensors including touch, vision and range finding sensors.



What are the objectives?

- Describe the sensors used for navigation of a mobile robot.
- Understand the process of perception for robot sensing and navigation.
- Design a software architecture for a specific application using sensors, behaviours, maps, models or learning techniques.
- Select appropriate data structures and algorithms for path planning.

My contact details:

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If you email, to make it easier include the subject and topic in the subject line: e.g.: CSCI944: A1.

- This makes it easier (and quicker) to identify who the email is from and what it is about - so that I can respond more quickly.
- Please use your university email preferably.
- Encourage using QQ or Wechat to send me messages.

Subject contact hours

- This subject is worth 6 credit points.
- According to UOW policy, 1 credit point is equivalent to 2 hours of work, including class attendance, per week.
- So you should be doing about 12 hours of work per week on this subject which includes watching lecture and tut videos, etc. and doing the assignments.

Lectures notes and resources

- The lectures and tuts will involve power point presentations, videos and demonstrations, and will be available online.
- You will be able to find all the material for this subject on the subject's Moodle website which is available via SOLS is at:

<http://www.uow.edu.au/student/>

Lectures and Labs

Times:

- Lecture: Thursday--16:05-18:05
 - Labs: Tue--14:00-16:00
16:05-18:05
-
- Labs commence in week-2 and end in week-12.
 - **Make sure you have Labview installed on your PC or Mac before the week-2 lab class.**
 - Consult with Tutors on details on how to do this .

Labs and assignments

- There are 4 assignments.
 - Details of the assignments will be released on Moodle at the times scheduled on the outline.
 - Late assignment submission will receive a deduction of 25% for each day (or part of it) late.
 - Please start your assignments early so that you will finish on time.

Labs and assignments

- This year, all assignments are Labview assignments to be done on your own PC or Mac.
- When assignments are released, a tut will also be provided to explain the assignment and to help you to get started.
- More information on the assignments will also be provided in the Resources folder and in the Q/A

Labs and assignments

- Assignments are to be submitted via Moodle.
- **Information on the submission of each assignments will be provided on the assignment specification.**

Labs and assignments

- Assignments 3 and 4 are group assignments.
- You should join a group of 3-4 people by **week-5**. More info on this will be given in week-4.
- If you are not in a group by week 6 (e.g. don't know anyone), don't worry, you will be assigned to a group arbitrarily and notified by email.
- Group assignments should be done collaboratively using conferencing tools like Zoom, WebEx, etc.

Labs and assignments

- Students can schedule their own group meetings.

Labs and assignments

- If you have any questions on the assignments feel free to email tutor anytime.
- Any questions and answers that might be of **interest to the class will be posted on the Q/A** forum on Moodle by Tutor for all to read.
- Everybody is subscribed to the Announcements and the Q/A forums on Moodle.
- Email me if you have any feedbacks.

The Moodle website

- Check the Moodle website regularly!
 - Any change to the subject or assignments will be announced on the Moodle site.
 - Any information posted to the Moodle site is deemed to have been notified to all students.
 - Messages posted to the forums on Moodle will be emailed to everyone in CSCI944/444.

How do you pass this subject?

- Assessment in this subject is distributed as follows:
 - 4 Assignments (60% = 10%+15%+15%+20%)
(Assignment 3 and 4 are group assignments.)
 - Final examination (40%)
(During the examination period. Technical Fail if < 16 marks!)

Assignment Schedule:

Assignment & task	Marks	Due week
A1 - Labview exercises	10% (individual)	Week 3
A2 - Labview application	15% (individual)	Week 5
A3 – Labview application	15% (group)	Week 8
A4 – Labview vision processing	20% (group)	Week 12
Exam	40% (individual)	Exam period

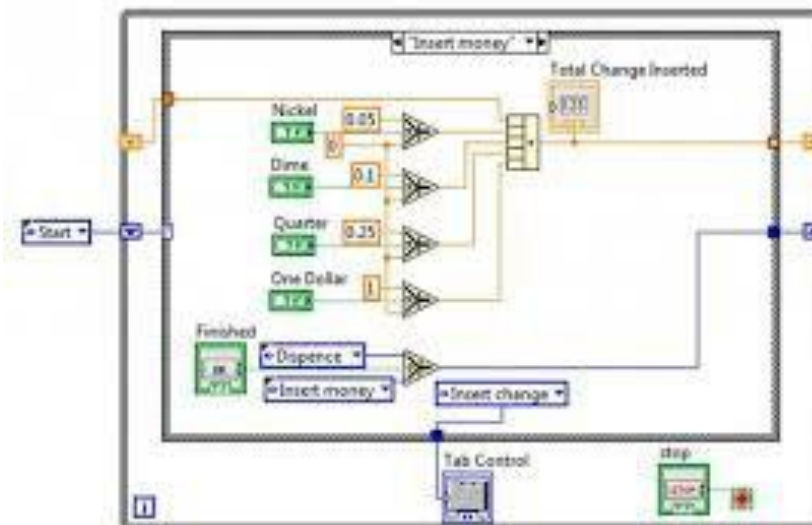
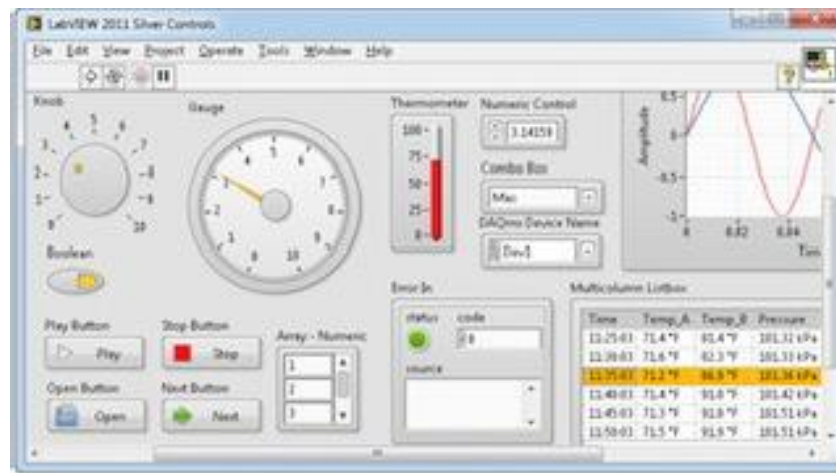
Note: Assignment are due at 11:59pm Friday on the above weeks.

About assignments

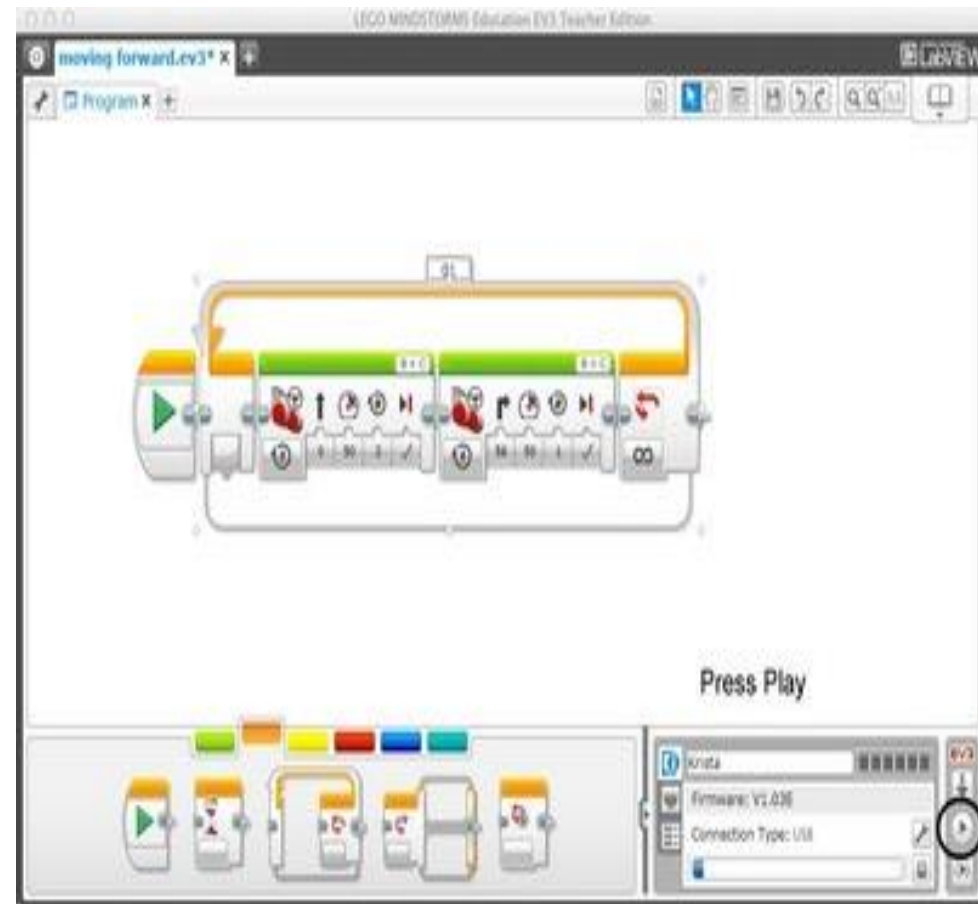
- Assignments will involve programming tasks in Labview and will include writing a report on the work. (No prior knowledge of Labview is required.)
- The assignments are indirectly related to the material covered in lectures. For example, the lectures might explain how visual perception works, and the assignment might involve machine vision with Labview.
- Marks may be deducted for lazy untidy work such as poorly laid out diagrams or reports that are hard to comprehend or fail to mention important points.

About Labview. . .

Labview is a graphical programming language used mainly by Engineers to build control panels.



EV3 is a programming languages for LEGO Mindstorms robots. (EV3 will not be used this year)



Attendance and Minimum Marks

- Full attendance of Lectures, Lab tuts, etc. is considered necessary for a successful outcome in this subject.
- Links to more Labview tuts on youtube are provided in the resource folder (or you can google).
- You need to get at least 40% (16/40) in the exam otherwise you may be awarded a Technical Fail (TF).

Extensions etc.

- Late assignments, without a granted Student Academic Consideration, will be penalized by 25% of the total assignment mark for each/part day late.
- If you are sick and require additional time to complete an assignment, you should submit an application for an extension electronically via SOLS, ***before the DUE date.***
- You *may* be granted an extension *if* your circumstances warrant it.
- Of course, if you are in hospital for the last week or similar and cannot contact us, we will understand.

<http://www.uow.edu.au/students/sols>

Topics covered and due dates

Week Beginning	Lecture Topics	Tutorial/Workshop/Laboratory/Demonstration/Field Work	Readings/Other subject information	Task Due
Week 1 26 Jul 2021 (Monday)	Introduction	None	Week 1 lecture slides and Lab resources	
Week 2 02 Aug 2021 (Monday)	Sensor types and limitations	Assignment 1	Week 2 lecture slides and Lab resources	
Week 3 09 Aug 2021 (Monday)	Visual perception and processing	Assignment 1	Week 3 lecture slides and Lab resources	Assignment 1
Week 4 16 Aug 2021 (Monday)	Perception based models	Assignment 2	Week 4 lecture slides and Lab resources	
Week 5 23 Aug 2021 (Monday)	Autonomous navigation techniques	Assignment 2	Week 5 lecture slides and Lab resources	Assignment 2
Week 6 30 Aug 2021 (Monday)	Motion control and programming	Assignment 3	Week 6 lecture slides and Lab resources	
Week 7 06 Sep 2021 (Monday)	Behavioural architectures	Assignment 3	Week 7 lecture slides and Lab resources	
Week 8 13 Sep 2021 (Monday)	Perception and behaviour learning	Assignment 3	Week 8 lecture slides and Lab resources	Assignment 3
Week 9 20 Sep 2021 (Monday)	Autonomous vehicles	Assignment 4	Week 9 lecture slides and Lab resources	
27 Sep 2021	Mid-Session Recess			
Week 10 04 Oct 2021 (Monday)	Humanoid robots and bionics	Assignment 4	Week 10 lecture slides and Lab resources	
Week 11 11 Oct 2021 (Monday)	Nano robots and molecular machines	Assignment 4	Week 11 lecture slides and Lab resources	
Week 12 18 Oct 2021 (Monday)	VR and evolutionary robotics	Assignment 4	Week 12 lecture slides and Lab resources	Assignment 4
Week 13 25 Oct 2021 (Monday)	Revision	No lab	Week 13 lecture slides and revision material	
01 Nov 2021	Study Recess			
08 Nov 2021	Examinations			

Recommended Reading

- Subject material will be placed on the Moodle site on a weekly basis, usually before the lecture. This should be adequate for learning the subject matter, particularly if you attend (or view) the lectures.
- There are (optional) textbooks for this subject:
 - Introduction to Robotics / Phillip John McKerrow McKerrow, Phillip, Addison-Wesley, Electronic Systems Engineering Series, Wokingham, ISBN 0 201 18240 8
 - Springer Handbook of Robotics / Editors B. Siciliano, O. Khatib Berlin ; London : Springer, 2008, ISBN 978-3-540-23957-4
- These books provide a good reference guide on robotics and sensing, however, they contains many topics not covered in this subject. They should be in the library .

Questions?

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Good Luck!