

# The System Design Project



# Purpose

Barbara





# Aim: to design a system

The **System Design Project** is an Informatics institution - in fact it pre-dates the School of Informatics.

The system to be designed in the project has varied over the years:

- Robot shopping
- Mars lander
- Robot mine clearance
- Robot football
- This year...



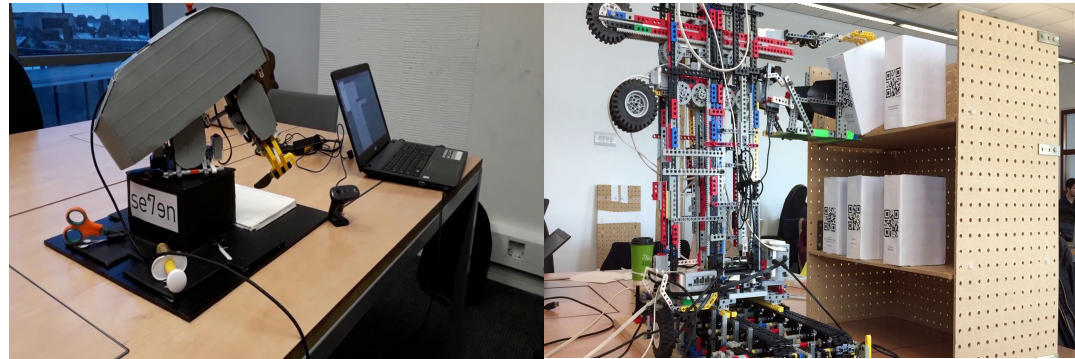


# Aim: to design a system

The **System Design Project** is something of an Informatics institution - in fact it pre-dates the School of Informatics.

The system to be designed in the project has varied over the years:

- Robot shopping
- Mars lander
- Robot mine clearance
- Robot football
- This year... Assistive robotics (more about this later)



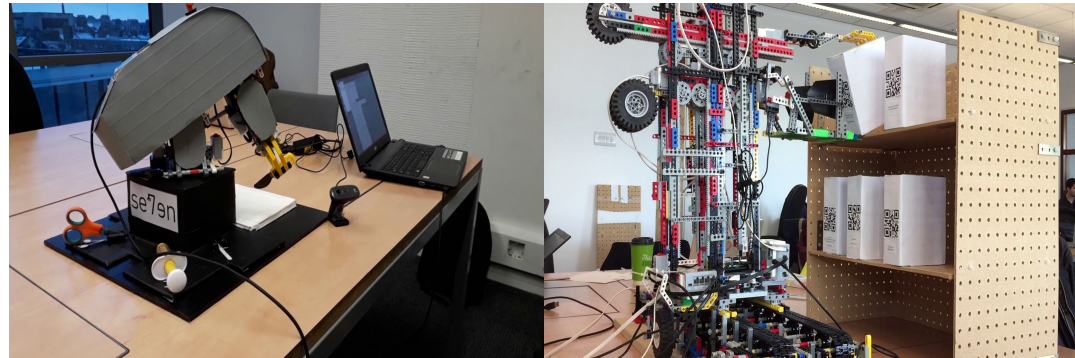


# Aim: to design a system

The **System Design Project** is something of an Informatics institution - in fact it pre-dates the School of Informatics.

The system to be designed in the project has varied over the years:

- Robot shopping
- Mars lander
- Robot mine clearance
- Robot football
- This year... Assistive robotics (more about this later)



But the **goal of the course remains the same**



# In summary

The System Design Project is intended to give students practical experience of:

- (a) building a large scale system
- (b) working as members of a team
- (c) documentation and presentation of a project.

We expect you to take a professional approach to all these elements.





# Learning outcomes

On completion of this course, the student will be able to:

1. Work as a member of a team in designing and implementing a complex and multi-faceted system
2. Plan and monitor the effort of a project to meet milestones and deadlines, within a limited time scale
3. Draw together knowledge and understanding of wide areas of software and hardware systems
4. Demonstrate and present the outcome from a practical project
5. Document the feasibility, design and development of a potential product





# 1) Work as a member of a team

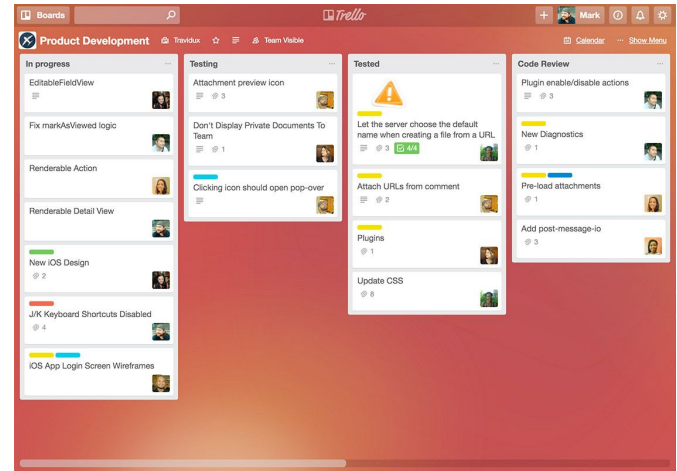
- In previous courses you have perhaps worked in groups of two or three, but for SDP you are in groups of 8 or 9, which is a very different experience.
- Your best individual strategy to get a good mark is to help your team to get good marks.
- Remember the key factor for good teamwork is effective communication. Patience and understanding is also important!





## 2) Plan and monitor the effort

- The amount of work requires division into subtasks and subteams, but also work on integration.
- Your initial time (and some time along the way) should be spent in planning, so that you have a good idea of what needs to be done when.
- Once you have a plan you are able to monitor progress and adjust how you are working (or the plan!) if necessary.
- We expect you to use project tools such as Trello, Github and Slack





### 3) Draw together knowledge

- Ideally, your team is more than the sum of its members, so you should take time to identify your complementary experiences and strengths.
- You are encouraged to use (with attribution) existing codebases and designs, and should spend time exploring resources.
- This should also be a chance to put into practice much that you have learnt on your degree up till now (including Professional Issues topics).



## 4) Demonstrate the outcome

- On the final day representatives from a number of companies join the course organisers to judge the presentations and demonstrations of your systems.
- In the past companies represented have included Accenture, Google, Amazon, KAL and IBM.
- The representatives will be judging whether they would invest in your system and/or your team.

**accenture**

**Google**

**amazon**



**IBM**



## 5) Document the design

- You will submit three group reports:
  - A **proposal**, submitted week 2, describing what you propose to do, including how you are organising yourselves and managing the project.
  - A **user guide**, submitted shortly before the demo day, documenting how your system works.
  - A **technical report**, submitted shortly after the demo day, giving details of the design and implementation of your system.
- There will also be an **individual report** (submitted with the technical report) reflecting on your own contribution.



# Questions so far...?

# Timetable

Calum







# Planning Week

Week	Content
1	Planning Week
2	Workshop/Proposal Hand-in
3	Workshop
4	Demo 1
5	Workshop
-	FCL
6	Demo 2
7	Workshop
8	Demo 3
9	Workshop/User Guide Hand-in
10	Workshop
11	Delivery Week
12	Final Hand-ins

- Focused SDP work
- Outlining a project plan



# Report Hand-ins

Week	Content
1	Planning Week
2	Workshop/Proposal Hand-in
3	Workshop
4	Demo 1
5	Workshop
-	FCL
6	Demo 2
7	Workshop
8	Demo 3
9	Workshop/User Guide Hand-in
10	Workshop
11	Delivery Week
12	Final Hand-ins

- 3 Group reports (15% each)
  - Proposal
  - User Guide
  - Technical
- Individual process reflection (10%)



# SDP Workshops

Week	Content
1	Planning Week
2	Workshop/Proposal Hand-in
3	Workshop
4	Demo 1
5	Workshop
-	FCL
6	Demo 2
7	Workshop
8	Demo 3
9	Workshop/User Guide Hand-in
10	Workshop
11	Delivery Week
12	Final Hand-ins

Wednesday mornings:

- Robot building
- Project management
- Quantitative analysis
- Commercialisation
- Usability
- Technical report writing
- SDP in careers



# Demo days

Week	Content
1	Planning Week
2	Workshop/Proposal Hand-in
3	Workshop
4	Demo 1
5	Workshop
-	FCL
6	Demo 2
7	Workshop
8	Demo 3
9	Workshop/User Guide Hand-in
10	Workshop
11	Delivery Week
12	Final Hand-ins

Wednesday mornings:

- Self-determined milestones
- Present progress
- Questions from postgrad experts
- Next demo day plans



# Delivery Week

Week	Content
1	Planning Week
2	Workshop/Proposal Hand-in
3	Workshop
4	Demo 1
5	Workshop
-	FCL
6	Demo 2
7	Workshop
8	Demo 3
9	Workshop/User Guide Hand-in
10	Workshop
11	Delivery Week
12	Final Hand-ins

- Two all-day events
- Specifics tbc
- Wednesday: Technical Focus
  - Final demos
- Friday: Marketing Focus
  - Industry “investors”
  - Product sales demos
- Prizes!

# Domain

Chris





# Assistive Robotics

- A robotic appliance that helps the human user in some capacity where they have difficulty to complete the task themselves
- A very open domain, all that is needed is for you to identify a problem, and design a prototype solution







# Internal Transport: MiR100

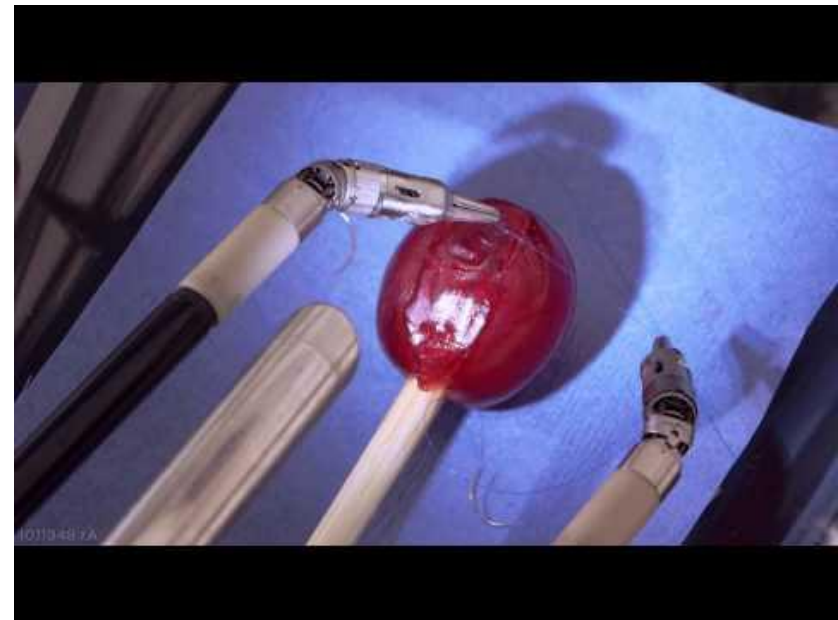
- Problem: A considerable amount of staff resources are dedicated to transporting goods within a factory
- Solution: A low cost, easy to use robotic platform





# Body Extension: Da Vinci

- Problem: The human hand needs to perform delicate tasks consistently well, which may not be possible due to impairment and/or time
- Solution: Extend the hand with a robotic agent that does not tire





# Care: MiRo

- Problem: Elderly care is not keeping up with the demand that is drastically needed
- Solution: Create an autonomous agent that can monitor in a safe and comforting manner



# Resources

Chris

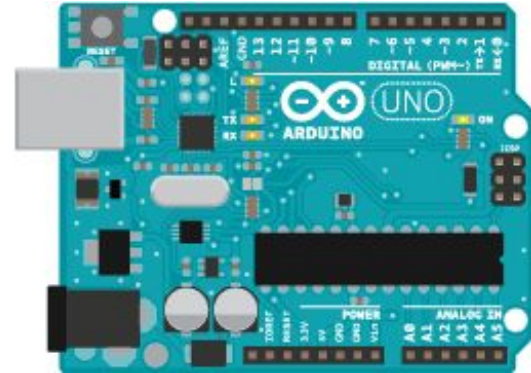
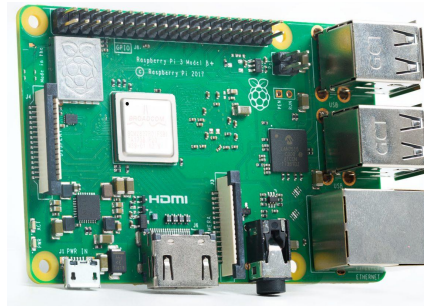




# Equipment

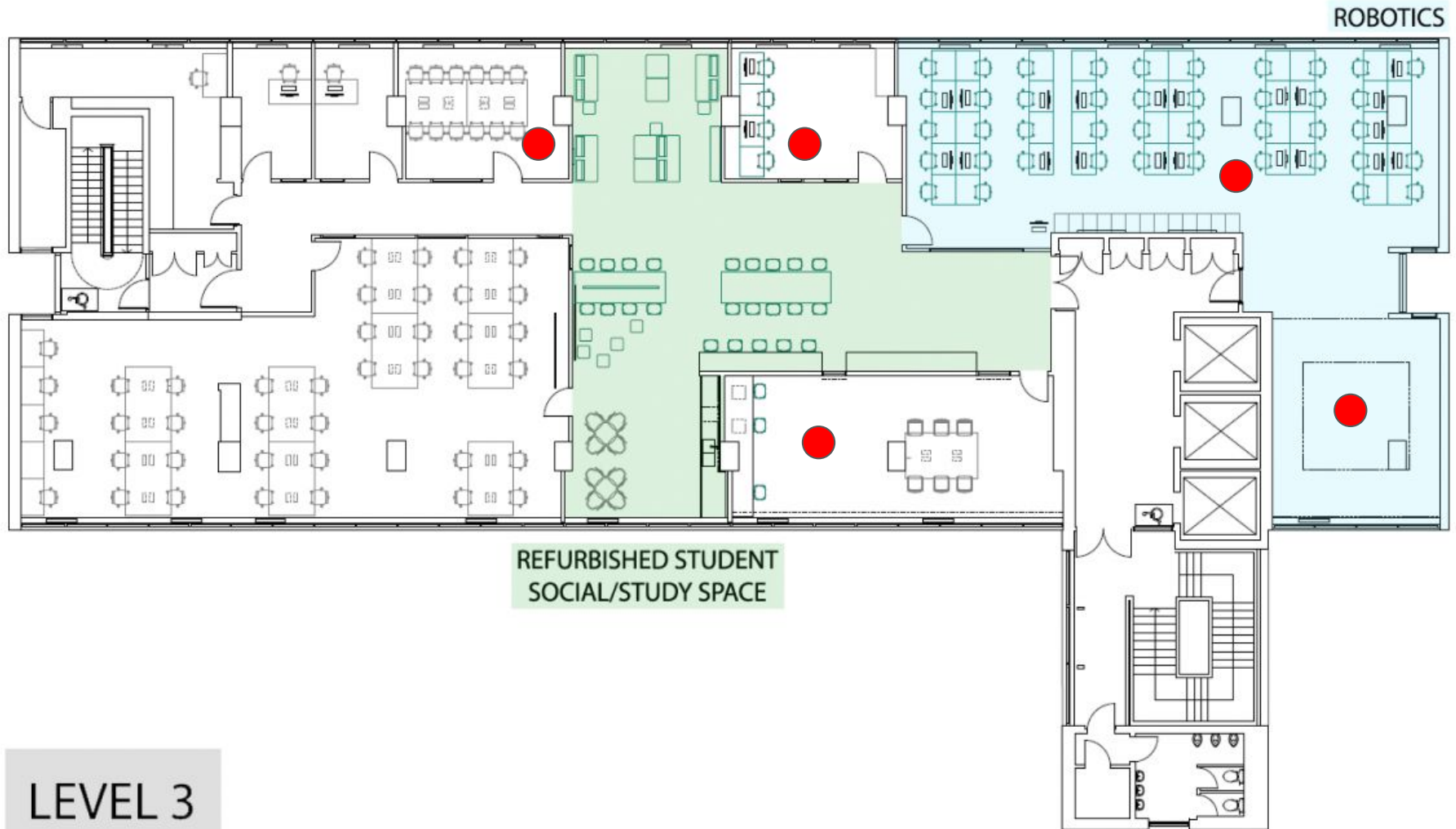
Each group will have access to:

- Raspberry Pi
- Lego EV3 brick
- Arduino board
- A personal desktop
- Near infinite supply of Lego
- £200 starting budget per group





# Demonstration space







# The SDP team



Barbara Webb  
Course Organiser



Garry Ellard  
Technician



Calum Imrie  
T.A.



Christopher McGreavy  
T.A.





# Mentors & Experts

## Mentors

- Your group guide
- Will monitor your progress
- Management advice
- Project advice
- No technical guidance

## Experts

- Group of specialists
- Office hours at AT
- Different areas of expertise
- Accessible by all teams
- Give technical advice



# Your team!

1

Chen, Wanjing

El Houcheimi, Sarah

Macleod, Cameron

Onuonga, Edwin

Patterson, Daniel

Pogosyan, Derenik

Scott, Jeremy

Smola, Filip

Wilson, Stewart



# Your team!

2

Banerjee-Richards, Ben  
Coneboy, Harrison  
Fernandez Ortiz, Aida  
Frost, Andrew  
Girdzius, Andrius  
Gupta, Mayank  
Jalal, Ojasvi  
Luo, Yiming  
Vanli, Sinan



# Your team!

3

Denholm, Simon

Gill, Timmy

Howley, Harry

Jin, Ming

Peixoto Colmerauer Dos Santos, Yanna

Sanz Maroto, Jorge

Song, Cj

Wasikowska, Agnieszka

Yang, Zhenxu



# Your team!

4

Coates, Jonathan

Horsburgh, Jack

Jiao, Zihang

Kostadinov, Ventsislav

Liive, Kristjan

Ng, Jia Yong

Pollard, Dimitri

Zhang, Caesar



# Your team!

5

Drgon, Matus

Hanratty, James

Li, Jiening

Li, Xuran

Malon, Przemek

Mullan, Sean

Singh, Sophia

Stirling, Sean



# Your team!

6

Davey, Tom

Gritsevski, Daniel

Hu, Songbo

Kandwal, Hemang

Kershbaum, Benji

Masselos, Laura

Svoboda, Martin

Vu Minh, Duc

Xiong, Jiayuan





# Your team!

7

Akinola, Daniel

Bartozzi, Christina

Davies, Dewi-Tim

Kalinak, Kali

Leaver, Sophie

Luo, Zhongyao

Singh, Gursimarjit

Yuan, Moy

Zhang, Ray Zhang



# Your team!

8

Elo, Ben

Kollar, Samuel

Lape, Elena

Manas, Peter

Riddell, John

Routledge, Declan

Tseng, Yu Jo

Wang, Raymond



# Your team!

9

Anastasiou, Marios

Galit, Ilie

Jourdan, Ben

Kalligeros, Pieris

Mcdevitt, Adam

Pilavakis, Nikolas

Tang, Dominic

Walpole, Ed

Weeks, Tom



# Your team!

10

Ali, Anna

Bawden, Freddie

Cunningham, Kieran

Doherty, Claire

Dyer, Jacob

Rader, Alexander

Sen - Hasan, Oktay

Whitelaw, Zach

Yaprakov, Harry



# Your team!

11

Binti Ahmad Ghazali, Nurul Syakirah

Chen, Cuijing

Dulan, Asmita

Fitchett, Luc

Parikh, Ishan

Pham, Minh Tri

Sadiq, Nyal

Scott, Brodie

Yang, Jerry



# Your team!

12

Bruce, Alex

Cerny, Lukas

Dinardo, Keir

Du, Hanqin

Karaslavov, Ivan

Kuneva, Nikoleta

Phipps, Robert

Tangri, Iona

Wu, Felix



# Your team!

13

Elsherei, Mourad

Graiver Rapoport, Joanna

Huang, Kexin

Li, Adam

Molnar, Daniel

Rice-Gray, Zeke

Varadi, Bence

Wang, Tianyu

White, Alastair



# Your team!

14

Aamir, Raees

Bakhai, Ami

Castillo Trujillo, Julia

Hyland, Joseph

Patankar, Qais

Polit, Michal

Wilhelm, John

Yuan, Ricky





# Your team!

15

Aminoff, Christoffer

Johnson, Ciaran

Mawhinney, Gabriel

Milou, Patricia

Nae, Raluca

Pearson-Bray, Theo

Pougala, Biko

Szewczyk, Jakub

Villalobos Lemus, Guillermo



# Your team!

16

Burtoiu, Bianca

Campbell, Silver

Ditchfield, Jane

Jantunen, Luukas

Litschel, Kieran

Pearson, Finlay

Waugh, Kieran

Ye, Stephen

Zhang, Xu



# Your team!

17

Dimitriou, Vangelis

Duggan, Tony

Filippakis, Nick

Howden, Luke

Kvasnicka, Erik

Modalavalasa, Likhitha

Mooney, David

Rodger, Amy

Wang, Hao



# Your team!

18

Ap Rheinallt , Gwion  
Drennan, Luke  
Han, Guanghui  
Karim, Sameer  
McCann, Spencer  
Olausson, Theo  
Sheffield, Ben  
Wang, David



# Your team!

# 19

Bell, Elizabeth

Chen, Qinxiang

Lazarova, Mariya

Maio, Joao

Robertson, Struan

Sipeki, David

Srinivas, Sharan

Telang, Ashish

Wolter, Lasse



# Your team!

20

Fernandez Salamanca, Blanca

Fumagalli, Aristide

Goodwin, Jaydn

Hu, Tianyi

Kosciuszko, Tomasz

Kumar, Nishtha

Rechanski, Kiril

Steele, Murray

Tarazona Querol, Manuel

# Planning Week 1

Calum





# Planning Week

- Monday - **Introduction, Team Building and Meeting Mentors and Expert Introductions**
- Tuesday - Background Research, Initial Product Decision
- Wednesday - **Robot building workshop**, User Stories, Subtasks
- Thursday - **Robot platform workshop**
- Friday - Prepare and **Deliver Pitches**



# Summary

## (what makes SDP different)

Barbara





# SDP is about...

- Setting your own goals
- Dealing with a large task:
  - Not possible to do alone
  - Not broken down for you
- Dealing with the real world:
  - Planning for the unexpected
  - Planning for human fallibility
- Not just doing, but communicating what you have done.

# Questions?

