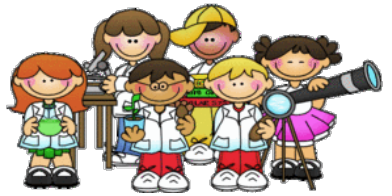

DTU

34315 – IoT application and infrastructure implementation
F24

Introduction to Project Work

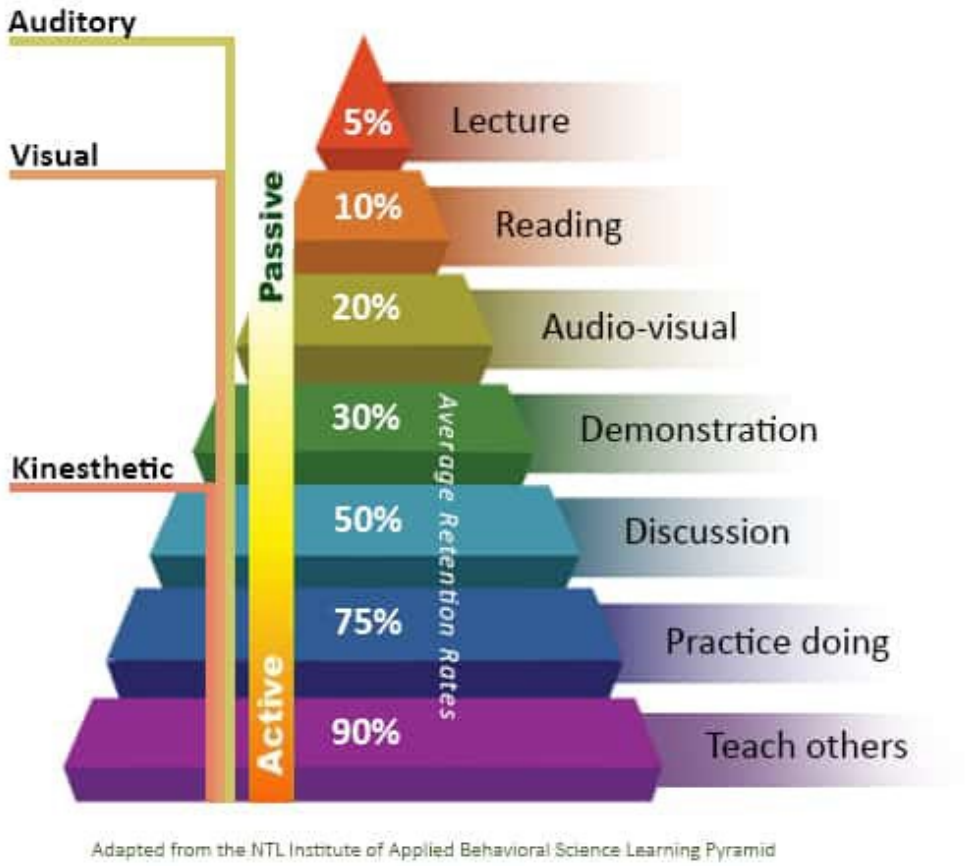
Course activities on DTU LEARN



LP-WAN communication Exercises	05	**29.02**	**Sarah** **Jimmy** **Oliver**	LP-WAN book Ch. 3, 4, 6, 7	9.15: LP-WAN communication Ex 13, **Hand-in: Ex. 13 (Sunday 3. March)**
IoT clouds Exercises	06	**07.03**	**Ming** **Sarah** **Jimmy** **Oliver**	IoT security lecture Cloud service guidelines	9.15: IoT security lecture Reading material: https://www.sciencedirect.com/science/article/pii/S2214212617302934 Ex 14, Ex 15
Telia guest lecture (tentative) Workshop Fusion	07	**14.03**	**Telia** **Anas**	Workshop guidelines	9.15: IoT at an operator 3D design workshop RFID Exercise
Introduction to project work	08	**21.03**	**Sarah** **Jimmy** **Oliver**		9.15: Project work guidelines
Easter Break		**28.03**			No teaching
Project work	09	**04.04**	**Sarah** **Jimmy** **Oliver**		Project work
Project work	10	**11.04**	**Sarah** **Jimmy** **Oliver**		Project work
Project work	11	**18.04**	**Sarah** **Jimmy** **Oliver**		Project work
Project work	12	**25.04**	**Sarah** **Jimmy** **Oliver**		Project work
Project presentation	13	**02.05**	**Sarah** **Jimmy** **Oliver**		8.00 – 13.00: **Project presentation (mandatory attendance)**
Report hand-in		**09.05**			**Hand-in of project report**

Plan may be subject to change.
Responsible teachers: Sarah Ruepp (SRRU): srru@dtu.dk

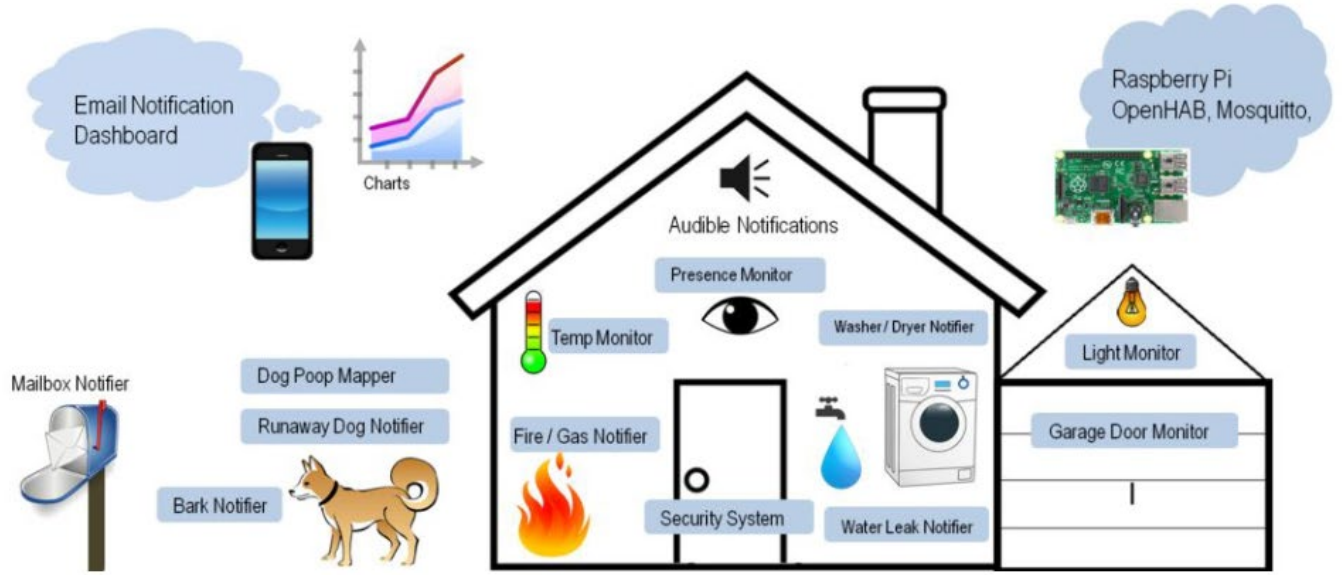
Why projectwork



Adapted from the NTL Institute of Applied Behavioral Science Learning Pyramid

Project topic: smart home and smart community

Aim: Develop a smart home or smart community IoT system capable of intelligent monitoring, adjustment and reporting.



Motivation: Make a better and more intelligent optimization of the home and urban/rural environment (temperature, alarms, light, etc..). Save time, money and the environment, prevent theft, make life easier, etc..

Project topic: rehabilitation for patients after illness

Aim: Develop a product, that can help a person with rehabilitation after illness

Motivation: Use technology to increase quality of life

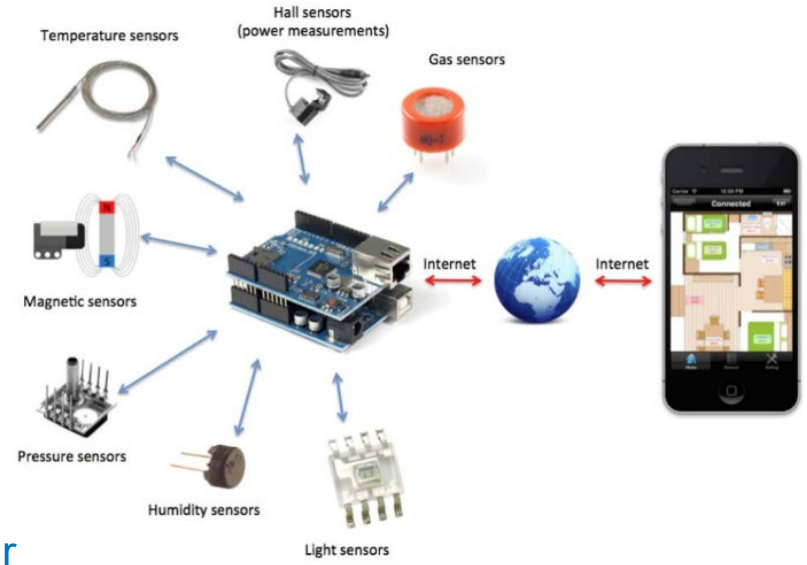
Project topic: Increase learning for kids though games

Aim: Use IoT technology to make smart games for kids that increase learning

Motivation: Make children learn more, in a more active way

Requirements

- Use of WiFi communication
- Minimum 1 analog sensor, 1 digital sensor and one form of actuation
- Backend/visualization: Minimum web server or Thingspeak, and one form of display on device
- Report: Max 10 page documentation and description (due 9. May)
- Poster pitch and demo to the class (2. May – last lecture day)



Feel free to expand with all components in the box. Be creative and play with IoT. Think of your project as a service that could be sold to customers.

Evaluation criteria

Evaluation criteria for project report:

Report quality (1-3 points per category depending on level of fulfilment)

- **Product described**
  - ✓ Purpose of the system (problem/solution)
  - ✓ Instructions for use.
- **Hardware design**
  - ✓ A description of the microcontroller
  - ✓ Clear list of all the used components
  - ✓ A circuit diagram (Fritzing, draw.io)
- **Communication technologies**
  - ✓ Description of used communication technologies, e.g. wifi (theoretical background)
  - ✓ Pros and cons
- **Software design**
  - ✓ Description of the software architecture.
  - ✓ Link to own code and third party libraries that were used.
  - ✓ All code provided, incl. linkage code to IoT platforms, app design, etc.
- **Images**
  - ✓ Picture of the complete system in its real context
  - ✓ Drawing of own figures explaining crucial concepts
  - ✓ Figures and text clearly linked
- **Testing and results**
  - ✓ What kind of testing has been executed, single or multiple tests.
  - ✓ Describe the remaining weaknesses of the system.
  - ✓ Future development ideas.
- **Reflection**
  - ✓ What were the problems the team encountered?
  - ✓ How did the team overcome these problems?
  - ✓ What did the team learn while doing the project?
  - ✓ Who did what in the team, and. logbook

Groups

- Approx 4-6 members
- Preferably with mixed competences
- May be chosen freely, BUT we reserve the right to:
  - Combine groups for adequate size
  - Add members to groups
- Each student must be involved in minimum two main activities
- Presence in class is required
- Group contract
- Log book

Presentation content and procedures

- **Poster presentation**
- Presentation in class on 2. May
- Max 10 minutes per group incl. a demo (consider video vs. live)
- Everybody must be active in the presentation in turn, and other groups will give feedback

Upload to DTU Inside by 9. May

- Presentation poster incl. video
- Report incl. appendix
- All code as a zip file

- **Report**
- 9. May
- 10 page project brief
  - Executive summary
  - Pain (what problem are we trying to solve)
  - Solution
  - Technical highlights, risks, key challenges, system design, etc
  - How to present data to the user

- Appendix:
  - Who did what (include percentage distribution)
  - Bigger figures for readability
  - Log-book

Hand-in: Project plan and group contract (due 3. April)

- Project plan (approx. 2 pages)
  - Names
  - Project title
  - Short project idea description (approx. ½ page)
  - List of required hardware (what do you have and what is missing)
  - Preliminary distribution of work areas (each student must have at least two areas)
  - Preliminary timeplan

34315 – Group contract

Responsibilities of groups and individual group members

The success of your project in 34315 will depend on how well you work together in your group. Group collaboration includes, but is not limited to:

- Participating fully (both with physical and mental presence)
- Participating professionally (i.e. being on time, being prepared, abiding by the DTU rules of academic honesty)
- Fulfilling project responsibilities (i.e. completing assigned tasks on time and to the best of your ability). If it looks like there will be a problem meeting a deadline, the person concerned should seek help from other group members in due time to avoid a delay.
- Putting in the necessary hours (5 hours per week in addition to time in class Thursday morning)
- Making sure that other group members have access to all your material. (i.e. shared Github for code, shared document for report, etc.)
- Taking the consequences of not abiding by the group's rules.
- Giving group members appropriate credit where due
- Not giving credit where it is not due

Group members must read through the document and sign in the end. Take a photo of the contract each and hand it in on LEARN.

Group rules:

1. Each group member agrees to show up to class and to outside group meetings on the agreed time. If a student is absent or late due to illness, broken down bus, etc., the group must be informed. Being "busy with work or other courses" is not a valid reason for absence.
2. Group members who fail to meet up for group sessions, fail to hand-in agreed parts, will be dismissed from the group (contact the teacher in such case).
3. If a member submits plagiarized material to the group and/or cheats, the group agrees to bring this to the teacher's attention immediately. Familiarise yourself with DTU's honour code.
4. In the appendix, where it is listed which student has contributed with which tasks to the project, presentation and the report, only factual information may be written. Being "nice" and add a person to a task is not allowed. If a task is shared, write a percentage, e.g. 3D Design of casing: Sophie (60) & Brian (40)
5. If a group member holds necessary components for the final presentation, and is unable to attend on presentation day, he/she will inform group members as soon as possible to arrange for pick-up, delivery by a friend, or similar.
6. Group member will hand in any material borrowed from the teachers, e.g. ESP8266, sensors, etc. latest on the last lecture day of the semester.
7. Other rules that the group would like to add:

Signed by:

Name	Student number	Signature

Feedback on project idea

- On 4. April, each group will present their project ideas to other groups
- Prepare a 7-8 minute presentation of your idea
- Other groups will give feedback, in order for you to improve your project
- Collect the feedback in a file, and update your project plan accordingly

How to approach your project - checklist

- ☐ Identify the problem.
- ☐ Formulate goals. Formulate technical specification, if possible, that can help define the success of the project. Be as specific as possible. Measurable metrics to the extent possible.
- ☐ Acquiring basic necessary knowledge and studying background theory.
- ☐ Survey to find out what other people have done. This can often amount to a state-of-the-art section in the report.
- ☐ Define several different possible solutions to the problem (based on theoretical studies and survey).
- ☐ Chose a solution to implement and consider limitations when choosing (time, cost, complexity, etc.). This in includes your technology-choices, for which you need solid arguments, preferably backed up by references.
- ☐ Translate original soft goal into “hard” & specific, and measurable requirements
- ☐ Now you can design your system (block diagram, interfaces between “blocks”, major functionalities). Specify requirements for each functionality block.
- ☐ Small and partial pre-tests can help to confirm uncertainties. E.g., If you are unsure about a technology choice.
- ☐ Now you can implement the design, physically.
- ☐ The implementation is often accompanied by tests to confirm block functionality.
- ☐ Then verify that the full system works according to your goals and requirements.
- ☐ Evaluate the solution (ideas for improvements, shortcomings, … conclusion). Make sure that you relate your conclusion to your project specification and research hypothesis, where relevant.

IoT Project Planning

Project name:

Group members:

Motivation: *Why are we starting this project, what is the **need**?*

	Inputs	Actions	Outputs	Outcomes
How will the need be adressed (objectives of the project)?	*Which resources are needed (equipment, budget, people, competences)? Which technologies will be used?*	*Which actions need to be taken when and by whom?*	*What will be delivered and when?*	*Who will benefit from this project? What will be achieved? How do we measure if we are succesful?*
How will the group manage the project work?				

Assumptions: *What assumptions are you making regarding objectives, need, inputs, actions, outputs, outcomes and stakeholders?*

Risks: *What are the risks of the project?*

Stakeholders/Customers: *Who are the key stakeholders and potential customers? How are they going to be involved?*