Introduction

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Goal

In a few words ...

The main goal is to give a **qualitative understanding of electronics** and **how this is related to design considerations**. By using the concepts and ideas taught in the course, the students should be able to **build basic prototypes** and **conduct a constructive discussion with an electrical engineer**.

Course web-site

Where?

- **http://www.eit.lth.se/course/ETIA06**

What?

- **Up-to-date schedule (may change during the course)**
- **Lecture slides**
- **Project related information**

Weekly lectures and exercises

- **COMPULSORY LECTURES/EXERCISES**
  - Tuesdays 13-15
  - Fridays 10-12

80% attendance required to pass

- Check the web pages for details (room etc.).
- Check the web pages for possible updates!
- **Any complications? (Study trips, fairs, etc.)**

Mini-projects in groups

- Half-way through the course we switch from traditional letures and exercises to working primarily with mini-projects:
  - Goal:
    - To get hands-on experience with using electronics to realize/illustrate/prototype an idea
  - Steps to execute:
    - Form project groups with TWO students in each
    - Each group selects a topic related to the course (together with teachers)
    - The project result is documented as a poster, a report, a video, ...
    - At the end of the course, each group will give a short presentation of their work to the class.

Active participation in a project group, executing all steps above, required to pass

Preliminary schedule

- **Tuesday, Aug 30, 13.15-15.00 (DC:243)**: Course information
- **Friday, Sep 2, 10.15-12.00 (DC:LillaHörsalen)**: Basic concepts
- **Tuesday, Sep 6, 13.15-15.00 (DC:310)**: Basic concepts (cont.)
- **Friday, Sep 9, 10.15-12.00 (DC:310)**: Hands-on exercises I
- **Tuesday, Sep 13, 13.15-15.00 (DC:StoraHörsalen)**: Electrical signals
- **Friday, Sep 16, 10.15-12.00 (DC:LillaHörsalen)**: Hands-on exercises II
- **Tuesday, Sep 20, 13.15-15.00 (DC:310)**: Sensing and controlling
- **Friday, Sep 23, 10.15-12.00 (DC:310)**: Mini-project start-up
- **Tuesday, Sep 27, 13.15-15.00 (DC:310)**: Project supervision and related theory
- **Friday, Sep 30, 10.15-12.00 (DC:310)**: Project supervision and related theory
- **Tuesday, Oct 4, 13.15-15.00 (DC:304)**: Project supervision and related theory
- **Friday, Oct 7, 10.15-12.00 (DC:310)**: Project supervision and related theory
- **Tuesday, Oct 11, 13.15-15.00 (DC:304)**: Project presentations
- **Friday, Oct 14, 10.15-12.00 (DC:310)**: Project presentations

Traditional lectures and exercises

Project focus

Remember: 80% attendance at these ...

CONTENTS OVERVIEW

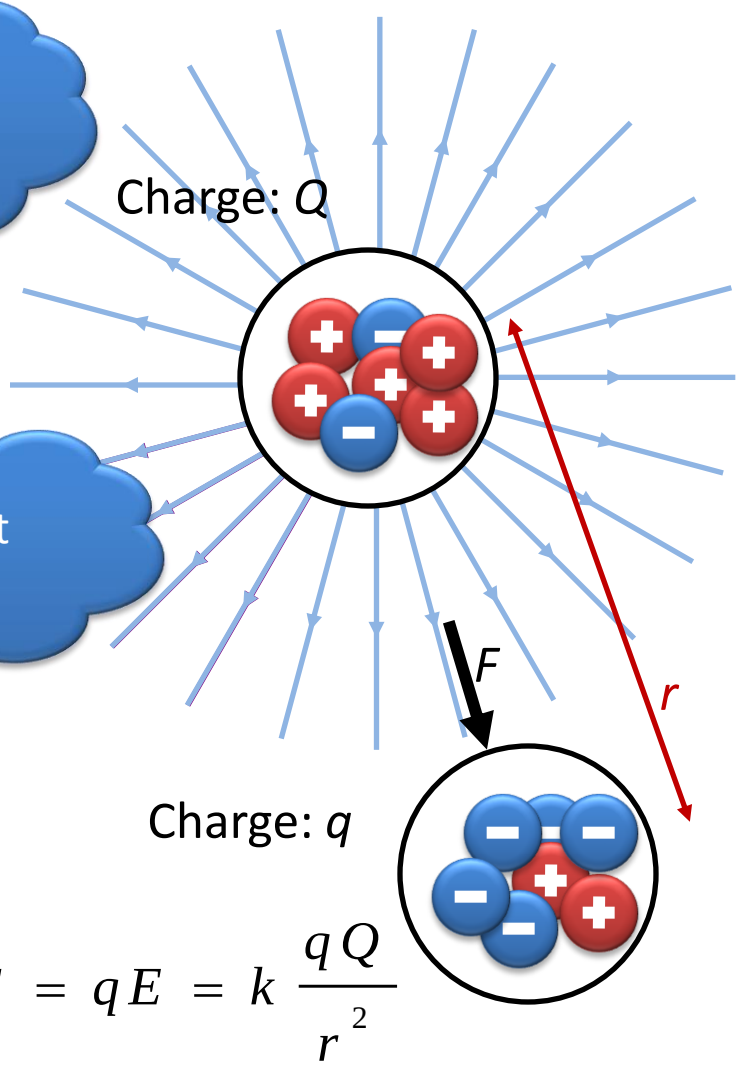
Basic concepts

Why do we use copper in conductors?

What is current and voltage?

How do we get rid of heat!

How do we get energy to power our devices?



$$F = qE = k\frac{qQ}{r^2}$$

Electrical signals

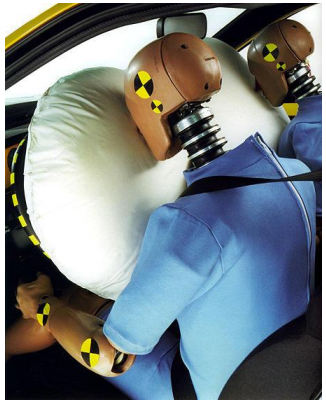
Electrical signals can be characterized in many ways.

A straight-forward representation
(voltage as a function of time)

How do we describe signals?

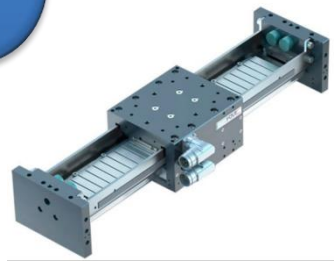
What can they be used for?

Sensing and controlling

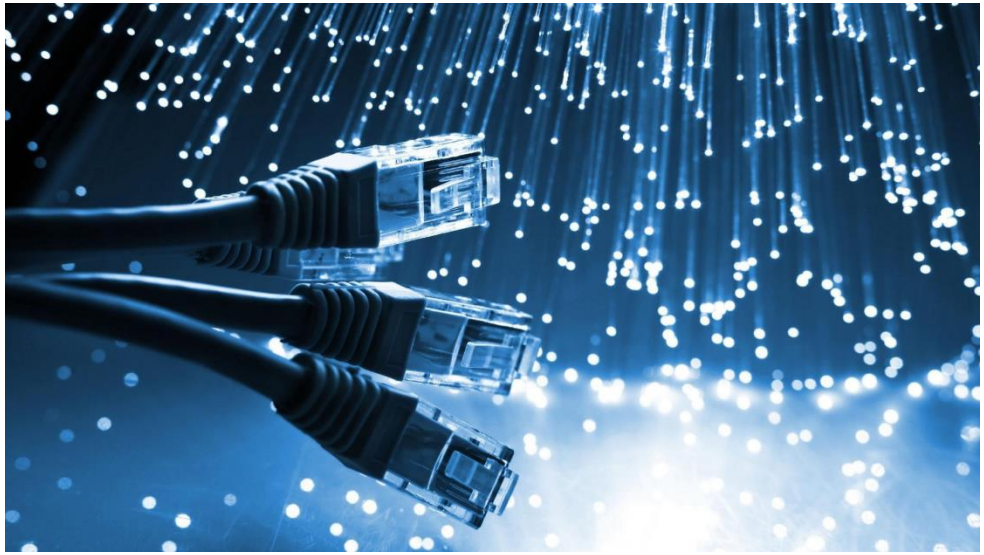


How do we change the physical reality, using e.g. **actuators**?

How do we sense the physical reality, using **sensors**?



Electronic communication

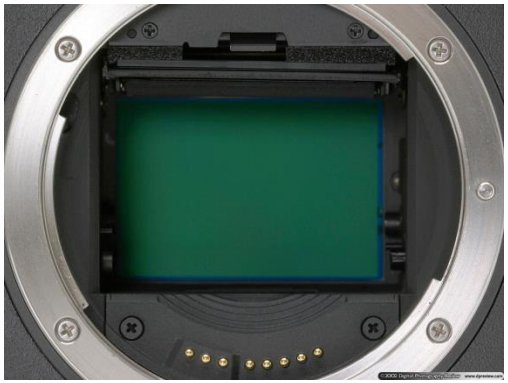


What are the general principles in electronic communication?

How small, how fast, and how reliable?

Producing/sensing light and images

What are the different ways of producing light ... and how efficient are they?



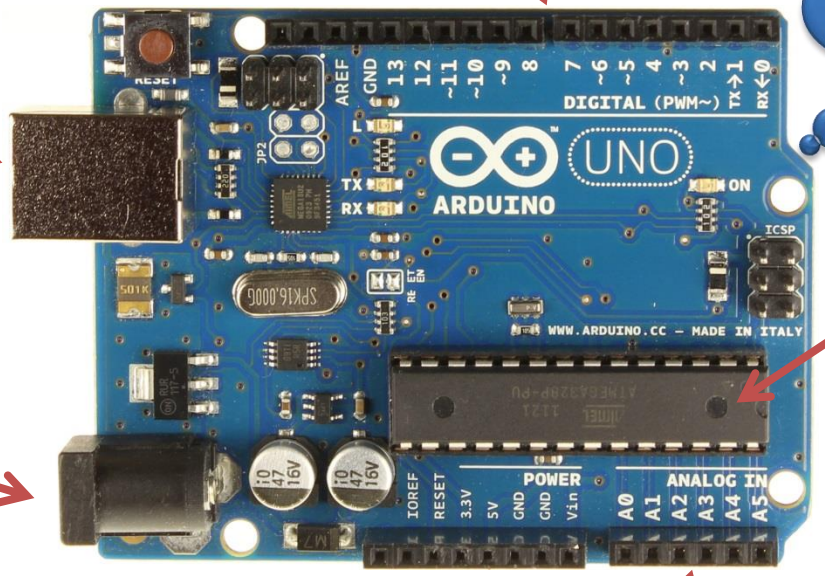
How do we sense light (and images)?

Building prototypes ... Arduino

How can you use something like this to make your project come to life?

14 digital in/out pins

USB port for communication with your computer



ATmega328 processor
8-bit CPU
16MHz clock speed
2KB SRAM
32KB flash storage

9V power in for stand-alone operation

14 analog in pins

Last but not least ...

- We’re happy to assist you with both knowledge, basic components and lab facilities for your project work.

- Please notify us about any input or questions that you may have which we can include in our lectures.
  - This will make it more interesting for both you and us.