TinyOS Exercise

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TinyOS Exercise

- Sensor network programming in a nutshell
  - Read the TinyOS tutorial
  - Solve two (simple) tasks on real hardware
  - Lab-style exercise
    - Teams of two to three students are ideal
    - One lab working place is available
    - Reservation system on the course website
  - Expected time needed for all tasks: 3-4 hours

TinyNode Platform

- **Shockfish TinyNode 584**
  - 8 MHz Texas Instruments MSP430 microcontroller
    - 10 KByte RAM, 48 KByte ROM, 512 Kbyte external flash
  - 868 MHz Xemics XE1205 ultra-low power wireless transceiver
  - Light sensor, temperature and humidity sensors (optional)

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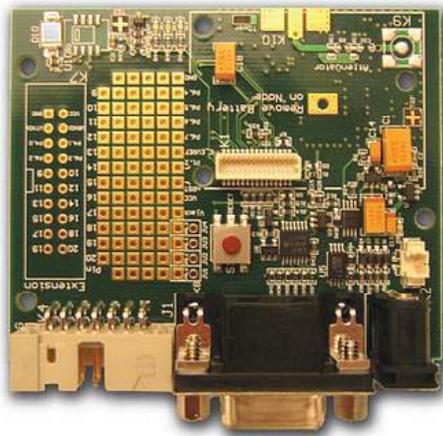
Extension Board

TinyNode 584

TinyOS Tutorial

- **Carefully** read the tutorial on the TinyOS website
    - http://docs.tinyos.net/index.php/TinyOS_Tutorials
    - The following chapters are important for the exercise:
        - Getting Started with TinyOS
        - Modules and the TinyOS Execution Model
        - Mote-mote radio communication

- The tutorial contains several exercise tasks
    - Think about them but do not write code

- We use an Eclipse plug-in to develop the applications which is not mentioned in the tutorial
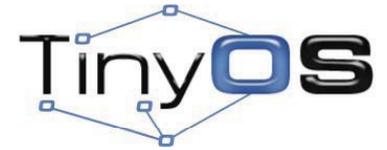
Exercise 1

- **Exchange of a sensor data**
  - Two sensor nodes are used for this task
  - One node periodically samples its light sensor and broadcasts the sensor reading over its radio
  - The other node listens for radio messages and signals if it is getting brighter or darker
    - Brighter → The green LED of the receiver is set
    - Darker → The red LED of the receiver is set
   - No significant change → The yellow LED is set
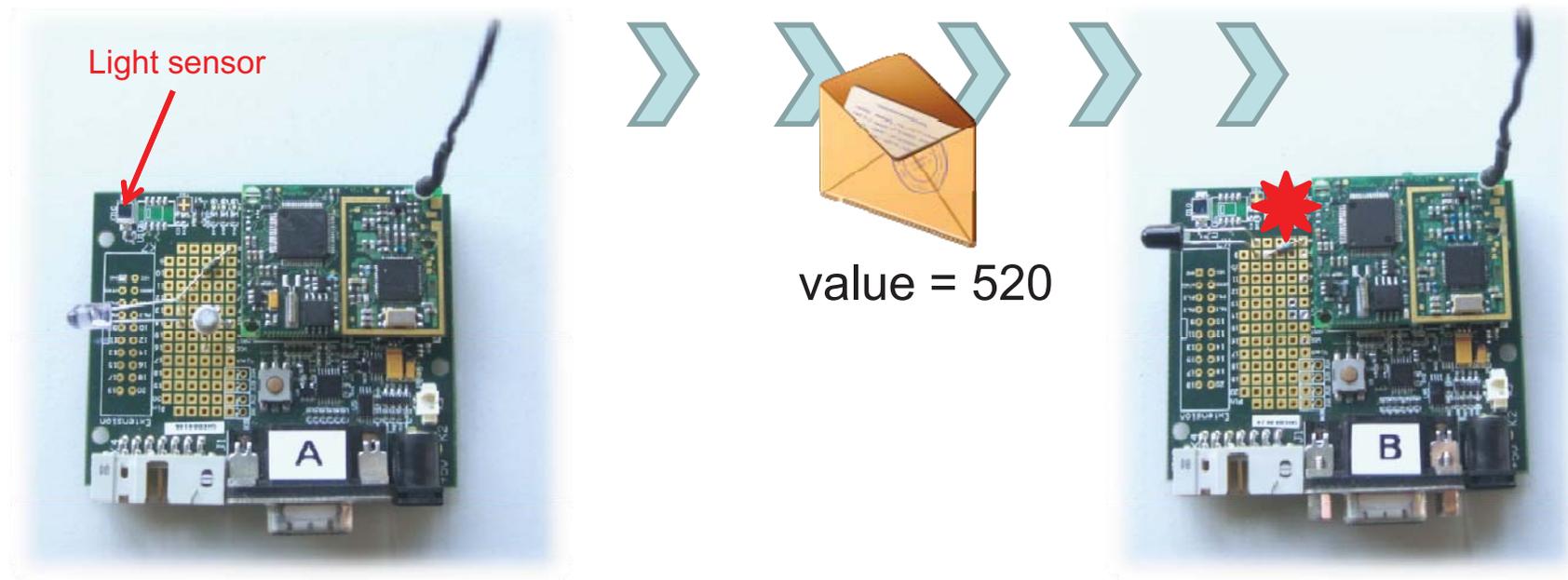
Light sensor

value = 520

Exercise 2

- **Optical Communication using Morse Codes**

on off on   off

A

Infrared LED

Infrared Photodiode

Sender

Receiver

A

A

on off on   off

A

Exercise 2

- **Optical Communication using Morse Codes**

SimpleBlinker

To do

MorseReceiver

Sender

Morser.jar

Receiver

Terminal
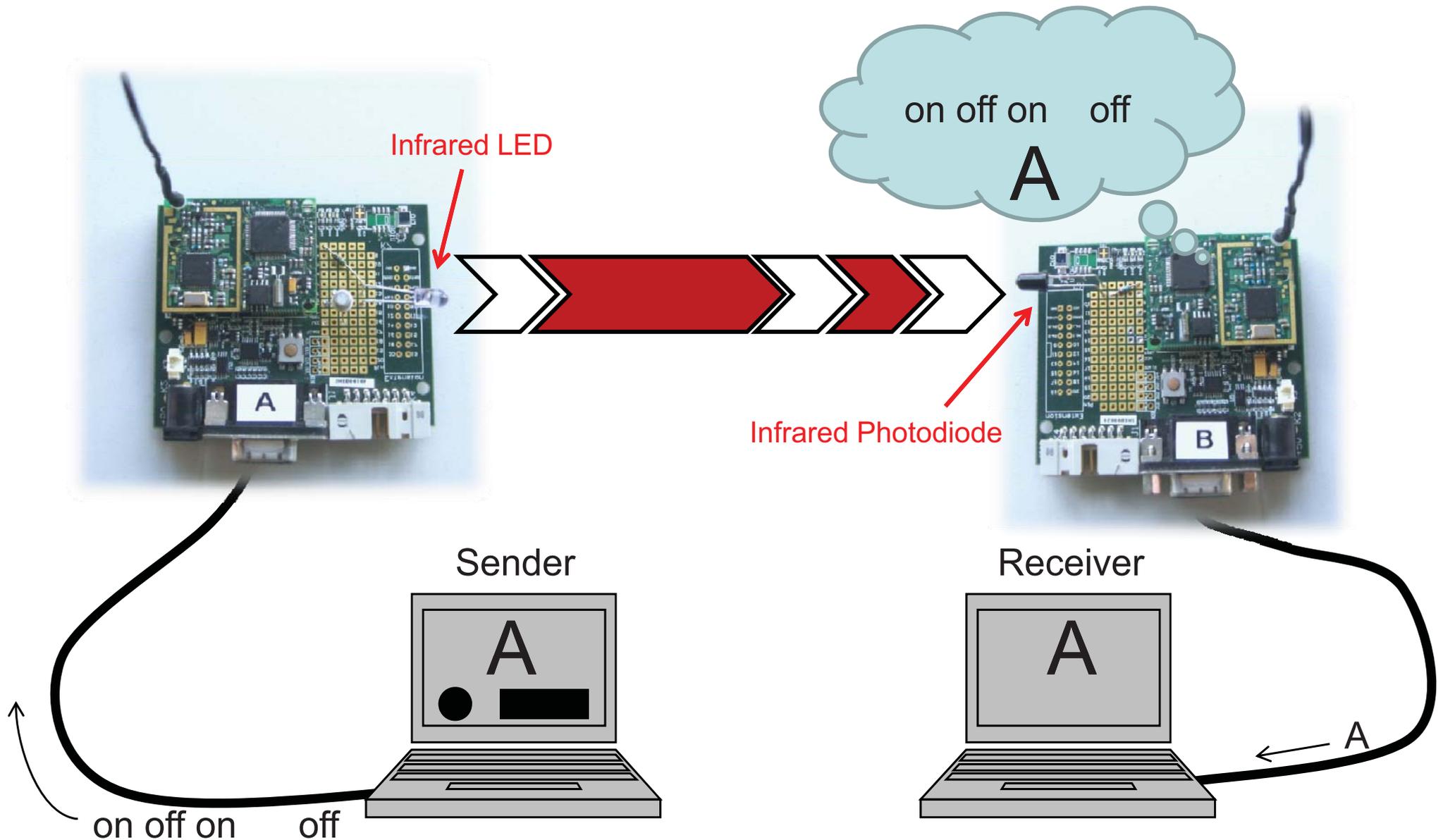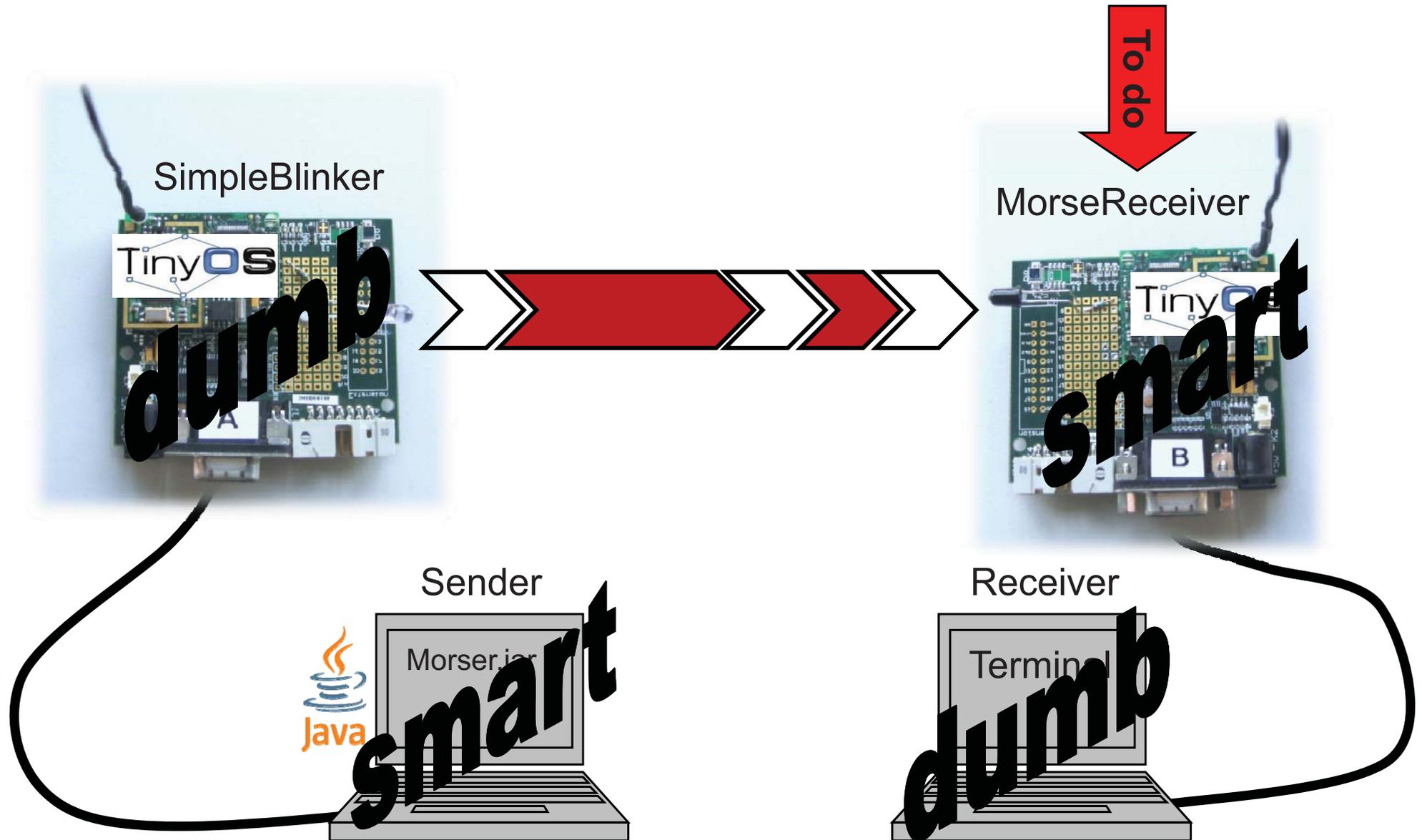
General Information

- Code Skeletons for both applications are provided
  - Exercise 1 only needs very little additional programming and should be solved by all groups
  - Exercise 2 is more challenging but is also more fun
- An Eclipse plug-in for TinyOS development is installed and configured. Check the following website for a quick start guide: http://tos-ide.ethz.ch/
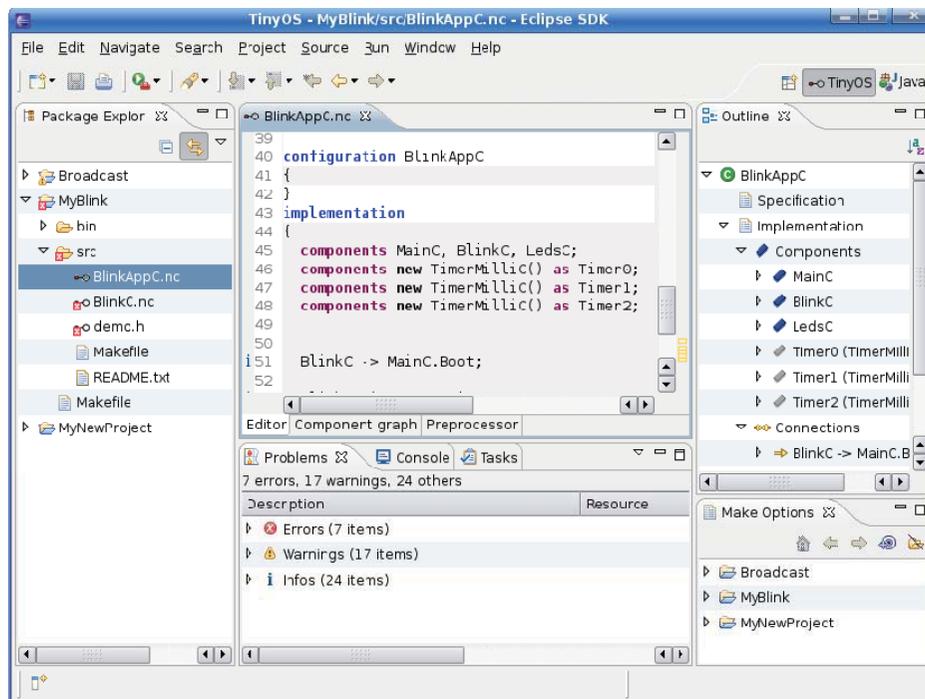
Final Remarks

- The lab is in the ETL building. Hardware and keys must be fetched in our office ETZ G64.1

- If you get stuck come back to ETZ G64.1 and ask for help
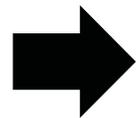
➡ Register for your lab time slot on the course website
(login with your n.ethz username)