Programming for Engineers WS15/16   Prof. Dr. Andreas Zeller

Software Engineering Chair   Teaching Assistant: Andreas Rau

Saarland University   **Assignment Sheet 1**

Deadline	**10. November 2015 - 12 p.m.**
	Send as email to your tutor
Mail Subject	$[PFE15][Assignment1]\$matriculationnumber$
Accepted Formats	PDF, txt
File Name Convention	$PFE15\_Assignment1\_\$matriculationnumber.\$format$

1 First Steps for your Arduino

To work productively the folliwing basic preparations are necessary:

1. Get in touch with your team members. You will be provided with the email addresses and names of your team members

2. Get your hands on one of our Intel®Galileo boards and a hardware kit for the exercises or buy your own Arduino Starter Set

3. In case you do not own a laptop, ask your tutor how to get an account for the CIP pools

4. To use the board, it has to be plugged in to your notebook or CIP pool computer by USB. Further information can be found in the lecture notes (lecture 1) on the course webpage

5. Install the Arduino development environment (Arduino IDE). Links and more information are on the course webpage

2 Your First Program

The following program lights up the internal LED of your board. Import this code into your IDE and execute the program on your board.

```
int led = 13;

void setup() {
  pinMode(led, OUTPUT);
}

void loop() {
  digitalWrite(led, HIGH);
  delay(1000);
  digitalWrite(led, LOW);
}
```

The program permanently enables the LED on the arduino. What changes are required to let the LED blink?

Change the program code to light up the LED in the following blinking pattern, if the proram is executed:

a. 3 seconds ON, 3 seconds OFF

b. 1 second ON, 3 seconds OFF

c. 3 seconds ON, 1 second OF

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3   Morse Code

On the webpage you will find the sketch "Morse.ino" from the first lecture on October 27th.

1. Adapt the sketch by adding and calling your own methods allowing you to morse the message "Hello World"

2. **Bonus Task:** How can you change the sketch to visualize the part "Hello" on one LED and the other part "World") on a second LED?

3. In the given sketch, there is a recursive function which allows to morse single digits of a decimal number. Analogously implement a function with the following properties:

   - a number is passed as a parameter
   - the binary representation of this number is morsed
   - 0 is morsed as *Dit* and 1 as *Dah*

4   Debugging

⚠ Never put a defect program on your Arduino. It may cause irreperable damage to the hardware.

The following programs each contain at least on error. Identify them all and answer the following questions:

a. What happens while translating the prorams?

b. Are there error messages? If yes, what do they mean?

c. If there is no error message, is the program performing correctly?

d. How can you fix the issues while keeping the program intention intact?

```
int led_Red := 12;
int led_Green := 12+1;

void setup {
  pin_mode(led_red; OUTPUT);
  pin_mode(led_green; OUTPUT);
}

void loop {
  digital_write(led_red; HIGH);
  digital_write(led_green; LOW);
}
```
Listing 1: Defect Program

```
loop() {
  digitalWrite(13, HI)
  delay(1.0s)
  digitalWrite(13, LO)
}
```
Listing 2: Another Defect Program