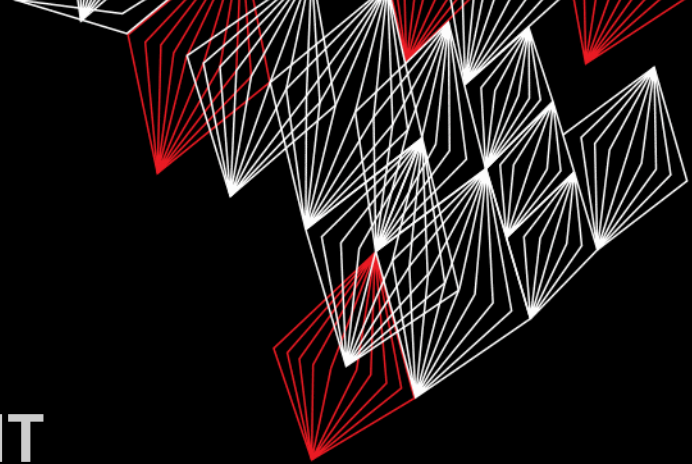


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APPLICATION DEVELOPMENT

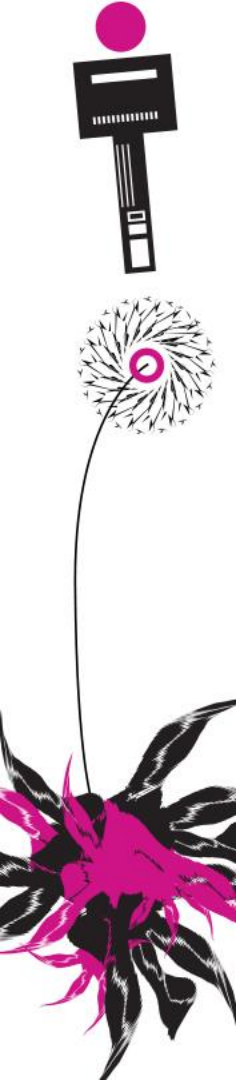
LECTURE 7: ANIMATION, TIMERS & COMMUNICATION

```
class AppDev {
```



Part of **SmartProducts**

```
}
```



INTRODUCTION

APPLICATION DEVELOPMENT



- Animation, timers
- Communication
- Assignment



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Next week: practice exam

TIMER

Used in today's assignment

- Executes method every clock tick
- Animation: Use timer to draw something while changing its position

```
import javax.swing.Timer;

// Declaration
Timer t;

// Initialization:
// timer ticks every 500 ms (=0,5 sec.)
timer = new Timer(500, (e) -> update() );
timer.start();
```

Method *update()* is called every clock tick

Example: [catch-the-ball game](#), [atm-tutorial](#), assignment 4b, 7



TIMER

```
public class DrawingPanel extends JPanel {  
  
    private Timer t;  
  
    public DrawingPanel() {  
        // initialize timer:  
        // repaint all elements at each clocktick:  
        t = new Timer(20, (e) -> repaint() );  
        t.start();  
    }  
  
    protected void paintComponent(Graphics g) {  
        for (DrawingObject o : gameElements) { // for each element...  
            o.paintComponent(g)  
        }  
    }  
  
    public void stop() {  
        timer.stop();  
    }  
}
```

Timer starts immediately

Call *repaint()* method at every clock tick

Method to stop timer

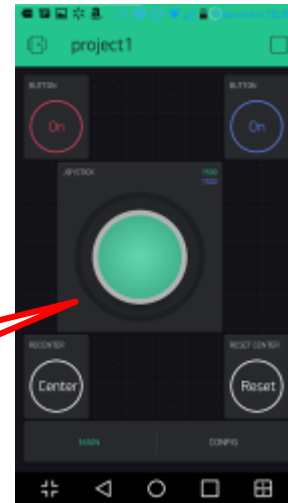


COMMUNICATION

PREVIOUS EXAMPLES

- Weatherstation app (assignment 3): get temperature data from a connected Arduino (details how to setup communication: appendix of assignment 3)
- Remote control car with phone (e.g. [Dabble](#) or [Blynk](#) App, see also [practical assignment 1](#))
- Share data via [ThingSpeak](#)
- More examples of communication:
 - [Practical assignment 3](#)
 - Blog posts on [esp](#) or [Bluetooth](#)

With Blynk, you can remote control the Arduino, and have more freedom to design the app. Example: a joystick and 4 buttons for car control



BLYNK EXAMPLES

GET COMPLETE WORKING EXAMPLE CODE QUICKLY

To get started with Blynk, go to blynk.io

The screenshot shows the Blynk website's configuration interface. It features a green header with the Blynk logo. Below the logo, there are two dropdown menus: 'Board' set to 'Arduino Uno' and 'Connection' set to 'HM10 or HC08'. A link for 'Full list of supported hardware is here' is provided. There is an 'Auth Token (optional):' input field and an 'Example:' dropdown menu currently showing 'Joystick Two Axis'.

- Go to examples.blynk.cc
- Configure Board & Connection
- Find/use example

Connection: eg. HM10 for Bluetooth module, or ESP8266 for Wifi

Many examples available

The screenshot shows the Arduino IDE Library Manager. The 'Topic' filter is set to 'Blynk'. The search results show 'Blynk by Volodymyr Shymanskyy Version 0.6.1 INSTALLED'. A red box highlights the 'INSTALLED' status. Below the library name, there is a 'More info' link and an 'Install' button.



• [Reducing memory](#)
• [Trouble getting Blynk to work with Bluetooth module?](#)
[Check out the Arduino BLE Shield \(HM-10\) Testing Sketch](#)

EVSHIELD + BLYNK

MEMORY PROBLEMS

- Combining EVShield Rover sketch (incl. touch & ultrasonic sensors)
- With HM10 Bluetooth module
- Remote control using Blynk
- How? Reduced size Rover sketch combined with HM10 Blynk example

Blynk

Board:

Connection:

Full list of supported hardware is [here](#)

Auth Token (optional):

Example:

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```
rover_with_comm_Blynk
22
23 #include <EVShield.h>
24 #include <EVs_NXTTouch.h>
25 #include <NewPing.h>
26 #include <SoftwareSerial.h>
27 SoftwareSerial SwSerial(10, 11); // RX, TX
28
29 #include <BlynkSimpleSerialBLE.h>
30 #include <SoftwareSerial.h>
31
32 // You should get Auth Token in the Blynk App.
33 // Go to the Project Settings (nut icon).
34 char auth[] = "1234";
35
36 SoftwareSerial SerialBLE(10, 11); // RX, TX
37
38 BLYNK_WRITE(V1) {
39   int x = param[0].asInt();
40   int y = param[1].asInt();
41
42   // Do something with x and y
43   Serial.print("X = ");
44   Serial.print(x);
45   Serial.print("; Y = ");
46   Serial.println(y);
47 }
48
```

Done compiling.

Sketch uses 22650 bytes (70%) of program storage space. Maximum Global variables use 1165 bytes (56%) of dynamic memory, leaving...

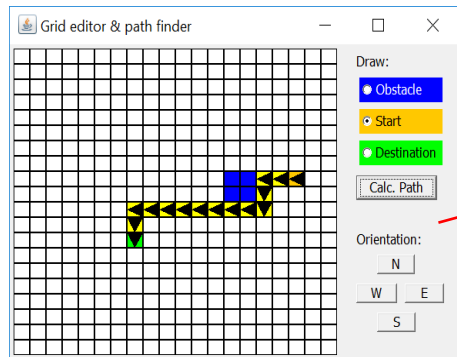
426 Arduino/Genuino Uno on COM11

COMMUNICATION

IN TODAY'S ASSIGNMENT

New [Rover example sketch](#) includes serial communication (usb) and is simplified to use (a bit) less memory

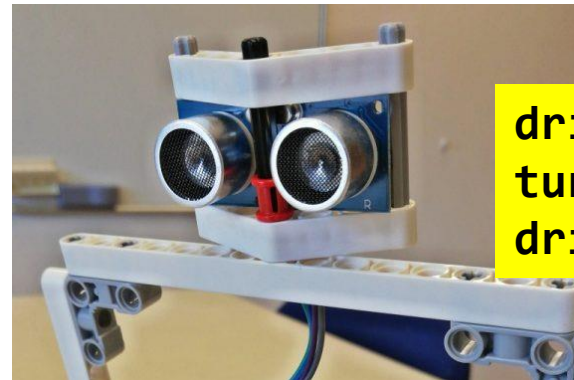
- Complete example of how to communicate via Serial Connection (USB) in appendix of assignment 7



Generate driving instructions and send them to Rover car

d180t90d240

Acknowledge



```
drive(180);  
turn(90);  
drive(240);
```

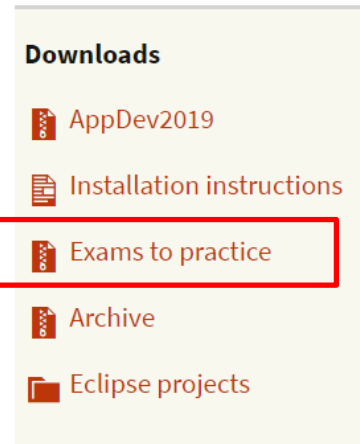

PRACTICE EXAM

Exam: Monday
July 1th 8:45

Location to be
announced (in
schedule and
rooster)

- 2 full exams of last year with answers:

downloads @ vanslooten.com/appdev



Next week: practice exam

REPORT

HAND-IN SOFTWARE

Deadline report
Juni 21th 17:00

- In report:
 - Design of software (requirements, class design, pseudo code, charts)
 - Design rationale: why...? did you use/program/make software in this way? What would be different in real product?
- Appendix (digital, as part of zip-file):
 - Source code of all software (Arduino/C++; Eclipse)
 - Source code must be documented by using comments as you learned
 - Document external parts (used from online sources/libraries etc.)

Eg. example of
mapping & class-
diagrams/UML

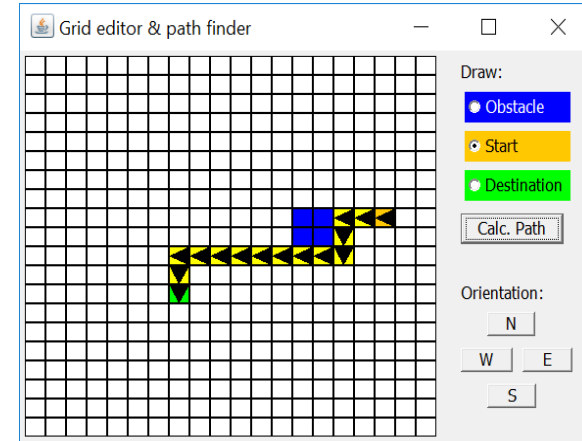
Eg. flow-charts

[How to hand-in
as zip-file is
explained here](#)

You can usually hand-in only **one** file. So you must combine all files & folders into one zip-file!

ASSIGNMENT #7

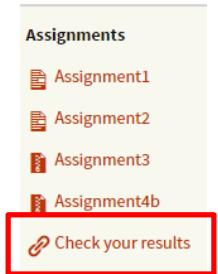
- “Expand the interactive map editor with path-finding capabilities”:
 - Include orientation
 - Generate driving instructions
 - Animate the path



- **Next week:** practice exam + assistance with assignment available in the morning
- Details about exam, **hand-in of Lego kit** etc. are in [schedule](#).



Check assignments results:



This afternoon: **projects questions get priority**, questions about assignments or checks might not be possible!