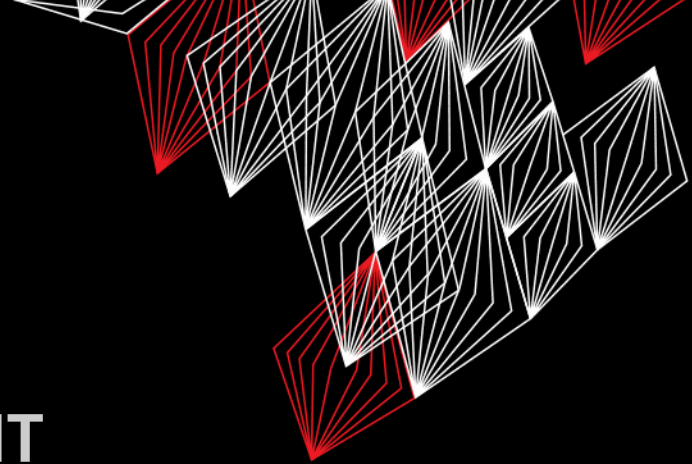


UNIVERSITY OF TWENTE.

APPLICATION DEVELOPMENT

LECTURE 8: PRACTICE EXAM

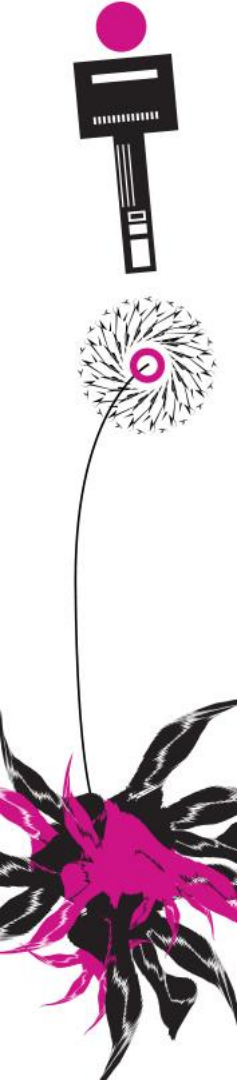


```
class AppDev {
```



Part of **SmartProducts**

```
}
```



INTRODUCTION

APPLICATION DEVELOPMENT

- Prototype, report, etc.
- Practice exam



Fjodor van Slooten
W241 (*Horst-wing West*)
f.vanslooten@utwente.nl



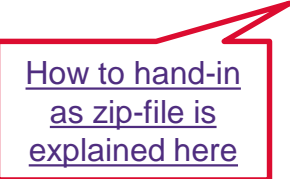
PROTOTYPE

FOR PROJECT

- When to demonstrate
 - At exam: to Tutor & Co-examiner
- All functions (not only interface)
 - Eg. delivery, taking orders etc...
 - You may simulate things, or make them simpler (Wizard of Oz)
 - Be clear/honest on this

REPORT

- See remarks in last presentation (slide 8)
 - Design, rationale, ...
- Hand-in all code as digital Appendix
 - Also hand-in Axure files (.rp), LEGO Mindstorms programs etc.!



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

HAND-IN BOXES

Hand in: Wednesday **July 4th**
12:00-13:00h at entrance Noord-
horst (in front of room **N258**)

- Break down the prototype and remove added materials (cardboard, wood, duct tape, etc.)
- You have to fill in online checklist
- Remove all extra materials (e.g. borrowed) and batteries from box, put them on top of the lid

It will be at the AppDev site on July 4th

The final grade for the project will only be registered after all the materials that are borrowed from the UT are returned.

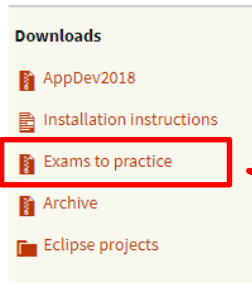


PRACTICE EXAM

Exam: Monday July 2th 8:45
Location will be in rooster soon

- 2 full exams of last year with answers:

downloads @ vanslooten.com/appdev



These practice exams do not have Arduino-questions. But there are some in this lecture!

What can be expected to be evaluated in the exam?

- Everything taught at the lectures, including the practical sessions. See [schedule](#) and [presentations](#).
- Exam will include both Java and Arduino related questions.

PRACTICE EXAM

APPENDIX

Exam: Monday July 2th 8:45

Location will be in rooster soon

Appendix: Shortened API documentation for exam of Application Development.

This documentation is based on docs.oracle.com/javase/8/docs/api

java.lang

Class Math

Field Summary

static double	E The double value that is closer than any other to e , the base of the natural logarithms.
static double	PI The double value that is closer than any other to π , the ratio of the circumference of a circle to its diameter.

Method Summary

static double	abs (double a) Returns the absolute value of a double value.
---------------	---

	Returns the natural logarithm (base e) of a double value.
static double	pow (double a, double b) Returns the value of the first argument raised to the power of the second argument.
static double	random () Returns a double value with a positive sign, greater than or equal to 0.0 and less than 1.0.
static int	round (float a) Returns the closest int to the argument.
static double	sin (double a) Returns the trigonometric sine of an angle.
static double	sqrt (double a) Returns the correctly rounded positive square root of a double value.
static double	tan (double a) Returns the trigonometric tangent of an angle.

Get the complete appendix from the zip-file with practice exams

Downloads

Appdev 018

Installation instructions

Exams to practice

Archive

Eclipse projects

PRACTICE EXAM

APPENDIX

explorer_with_comm_wait_to_drive

Explorer.cpp

Explorer.h

```
#define WHEEL_DIAM 4.96 // wheel diameter in cm
#define TRACKWIDTH 14 // track width in cm

#define TRIGGER_PIN 3 // Arduino pin tied to trigger pin on the ultrasonic
sensor.
#define ECHO_PIN 5 // Arduino pin tied to echo pin on the ultrasonic
sensor.
#define MAX_DISTANCE 300 // Maximum distance we want to ping for (in
centimeters). Maximum sensor distance is rated at 400-500cm.

#include "Arduino.h"
#include <Wire.h>
#include <EVShield.h>
#include <EVs_NXTTouch.h>

#include <NewPing.h>

/**
 * @brief This class interfaces with EVShield to create an explorer robot.
 * Setup:
 * - Two motors to drive, connected to Bank A of the EVShield
 * - One motor on which the ultrasonic sensor is mounted: M1 on Bank B
 * - Touch sensor on port BBS2 (Bank B)
 */
```

```
class Explorer {
    // class variables:
private:
    // pointers to objects created in main sketch:
    EVShield * evshield;
    NewPing * sonar;
    EVs_NXTTouch * touch;
    String instructions = "";

public:
    bool isDriving = false; // false=not driving, true=driving, starts in 'not
driving' state
    bool forward = true; // we start driving forward
    SH_Direction motor_direction = SH_Direction_Reverse; // initial motor
direction (depends on how motors are mounted)
    int speed = SH_Speed_Slow; // SH_Speed_Medium
    SH_Motor sensorMotor = SH_Motor_1; // first motor (M1) on Bank B on which
the ultrasonic sensor is mounted

    // methods:
    void init(EVShield * s, NewPing * p, EVs_NXTTouch * t);

    // driving related methods:
    void reverseDirection();
    void drive(int distance = 0);
    void stop();
    void turn(int angle);

    // sensor related methods:
    void checkSensors();
    unsigned int readDistance(); // read the distance from the ultrasonic sensor

    // extra methods:
    void reverseTurn();
    void find_a_way_out();

    // methods to process instructions:
    void readCommand(String input);
    void doCommand(unsigned int count, String number, char command);
    void setInstructions(String s);
};
```

Get Explorer.h from [this example](#)

Prepare to vote

Internet ① Go to shakeq.com

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<http://shakespeak.com/en/free-download/>.*

TXT

① Text to +316 4250 0030

② Type APP <space> your choice (e.g. APP b)

Voting is anonymous

Which are valid variable names? (more than 1 answers possible)

- A. Coca Cola
- B. c:\temp
- C. cashValue
- D. 4U
- E. U2
- F. xs4all
- G. mousebutton

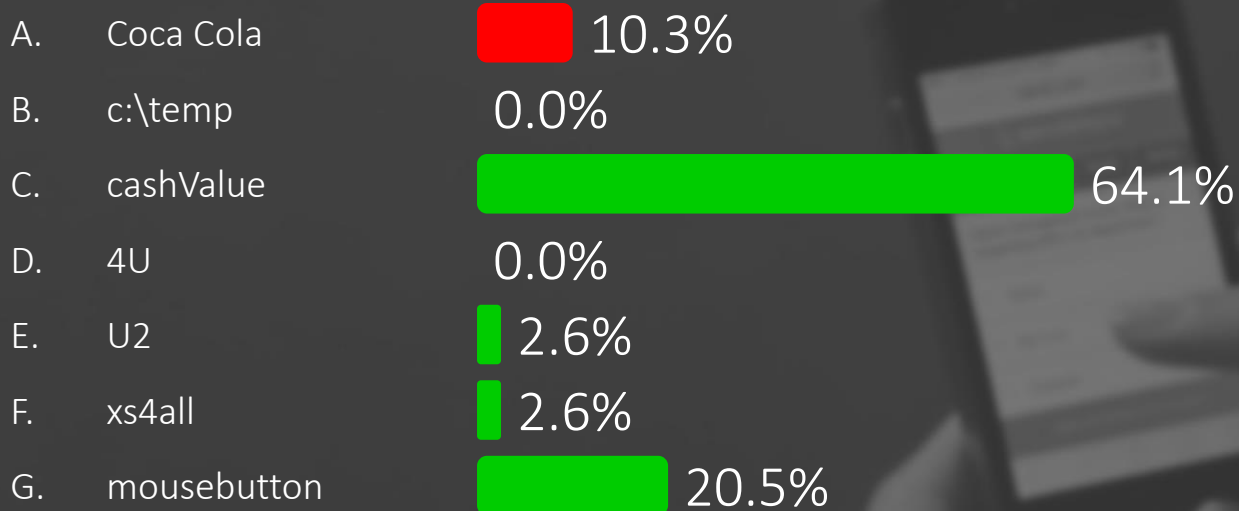
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Votes:
39

● Closed

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Which are valid variable names? (more than 1 answers possible)



● Closed

In Java, there is a common practice in terms of naming code parts. What is this part?: **readTemperature()**

- A. object
- B. method
- C. class
- D. variable

The question will open when you start your session and slideshow.

Votes:
39

● Closed

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In Java, there is a common practice in terms of naming code parts. What is this part?: readTemperature()

A. object

2.6%

B. method

89.7%

C. class

0.0%

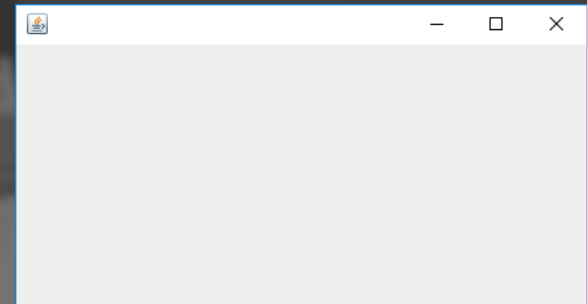
D. variable

7.7%

● Closed

What type of object do you need to create a window (border and title bar) for an application?

- A. JApp
- B. JFrame
- C. JPanel
- D. JWindow

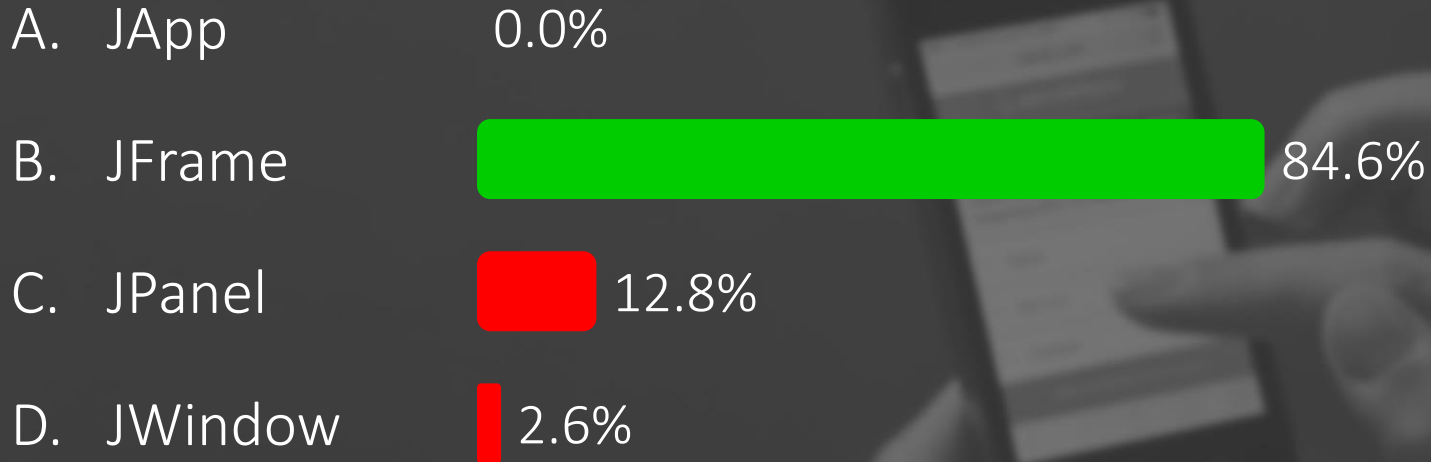


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Votes:
39 ● Closed

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What type of object do you need to create a window (border and title bar) for an application?



● Closed

In Java, if you want to display the value of length, what code should be at the dots?

- A. ""+length
- B. length.toString()
- C. length
- D. Integer.parseInt(length)

```
int length=180;  
g.drawString( ... , 100, 100 );
```


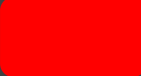
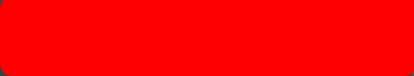
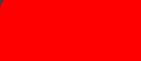
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Votes:
40

● Closed

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In Java, if you want to display the value of length, what code should be at the dots?

- A. `""+length`  15.0%
- B. `length.toString()`  17.5%
- C. `length`  50.0%
- D. `Integer.parseInt(length)`  17.5%

```
int length=180;  
g.drawString( ... , 100, 100 );
```

 Closed

What are the values of a and b after this code?

- A. a==1.5 b==6
- B. a==1.5 b==5
- C. a==1 b==6
- D. a==1 b==5

```
int a=3, b=2;  
a++;  
b = b+a;  
a = b/a;
```

The question will open when you start your session and slideshow.

Votes: 37 ● Closed

What are the values of a and b after this code?

```
int a=3, b=2;  
a++;  
b = b+a;  
a = b/a;
```

A. a==1.5 b==6

24.3%

B. a==1.5 b==5

51.4%

C. a==1 b==6

5.4%

D. a==1 b==5

18.9%

Closed

In Java, what method call can you use to convert the string "10.95" to a double?

- A. `Double.parseDouble()`
- B. `String.format()`
- C. `Integer.parseInt()`
- D. `String.parseDouble()`

The question will open when you start your session and slideshow.

Votes:
39

● Closed

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In Java, what method call can you use to convert the string "10.95" to a double?

A. `Double.parseDouble()`

 15.4%


B. `String.format()`

0.0%

C. `Integer.parseInt()`

 5.1%

D. `String.parseDouble()`

 79.5%

 Closed

It can be useful for a class to have a method **toString()**.
In Java, what should the full header of this method look like?

- A. **void toString()**
- B. **public void toString()**
- C. **String toString()**
- D. **public String toString()**

The question will open when you start your session and slideshow.

Votes:
38

● Closed

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It can be useful for a class to have a method toString(). In Java, what should the full header of this method look like?

A. void toString()



18.4%

B. public void toString()



52.6%

C. String toString()



13.2%

D. public String toString()



15.8%

● Closed

Write Java code for a class Book with properties title and number of pages as class-variables.

- A. `public class Book { String title; int pages; }`
- B. `public Book { class } title:String, pages:int`
- C. `class Book { title(); pages(); }`

A

```
public class Book {  
    String title;  
    int pages;  
}
```

B

```
public Book { class }  
    title:String,  
    pages:int
```

C

```
class Book {  
    title();  
    pages();  
}
```

The question will open when you start your session and slideshow.

Votes:

36

● Closed

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Write Java code for a class Book with properties title and number of pages as class-variables.

A. `public class Book { String title; int pages; }`



B. `public Book { class } title:String, pages:int`

0.0%

C. `class Book { title(); pages(); }`



A

```
public class Book {  
    String title;  
    int pages;  
}
```

B

```
public Book { class }  
    title:String,  
    pages:int
```

C

```
class Book {  
    title();  
    pages();  
}
```

 Closed

In Java, which method for the class Book can be used to set the title with any given value? The value is a parameter of the method.

- A. `String setTitle() { title = value; }`
- B. `setTitle(String value) { title = "value"; }`
- C. `public void setTitle(String s) { title = s; }`
- D. `public String setTitle() { title = "value"; }`

The question will open when you start your session and slideshow.

Votes:
35

● Closed

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In Java, which method for the class Book can be used to set the title with any given value? The value is a parameter of the method.

A. `String setTitle() { title = value; }`

 17.1%

B. `setTitle(String value) { title = "value";...`

 20.0%

C. `public void setTitle(String s) { title = s; }`

 25.7%

D. `public String setTitle() { title = "value"; }`

 37.1%

 Closed

Given Java code is part of a class. What is a correct header for a loop that shows the titles of all books? The code should be at the spot indicated with `//...`

- A. `while (t<10)`
- B. `for (int t=0; t<books.size(); t++)`
- C. `for (t=0; t<ArrayList.size(); t++)`
- D. `while (int t=0; books.size(); t++)`

```
ArrayList<Book> books;  
  
public void showTitles() {  
    // Display titles of all books  
    //...  
    {  
        Book b = books.get(t);  
        System.out.println(b.getTitle());  
    }  
}
```

The question will open when you start your session and slideshow.

Votes:
40

● Closed

Given Java code is part of a class. What is a correct header for a loop that shows the titles of all books? The code should be at the spot indicated with //...

A. while (t<10)

0.0%

B. for (int t=0; t<books.size(); t++)

47.5%

C. for (t=0; t<ArrayList.size(); t++)

45.0%

D. while (int t=0; books.size(); t++)

7.5%

```
ArrayList<Book> books;  
public void showTitles() {  
    // Display titles of all books  
    //...  
    {  
        Book b = books.get(t);  
        System.out.println(b.getTitle());  
    }  
}
```

Closed

What is the value of a and b after running this code?

- A. a == 2 and b == 2
- B. a == 2 and b == 3
- C. a == 3 and b == 2
- D. a == 3 and b == 3

```
int a = 2, b = 3;  
if ( a < b ) {  
    int t = a;  
    a = b;  
    b = t;  
}
```

The question will open when you start your session and slideshow.

Votes:
40

● Closed

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What is the value of a and b after running this code?

```
int a = 2, b = 3;  
if ( a < b ) {  
    int t = a;  
    a = b;  
    b = t;  
}
```

A. a == 2 and b == 2



20.0%

B. a == 2 and b == 3



7.5%

C. a == 3 and b == 2



60.0%

D. a == 3 and b == 3



12.5%

● Closed

Which function call will turn on the on-board LED of an Arduino?

- A. `pinMode(LED_BUILTIN, OUTPUT);`
- B. `digitalWrite(LED_BUILTIN, HIGH);`
- C. `digitalWrite(LED_BUILTIN, LOW);`
- D. `digitalRead(LED_BUILTIN);`

The question will open when you start your session and slideshow.

Votes:
39

● Closed

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Which function call will turn on the on-board LED of an Arduino?

A. `pinMode(LED_BUILTIN, OUTPUT);`

10.3%

B. `digitalWrite(LED_BUILTIN, HIGH);`

82.1%

C. `digitalWrite(LED_BUILTIN, LOW);`

2.6%

D. `digitalRead(LED_BUILTIN);`

5.1%

● Closed

Which function is called repetitively over and over again as long as the Arduino has power?

- A. `power()`
- B. `repeat()`
- C. `loop()`
- D. `setup()`

The question will open when you start your session and slideshow.

Votes:
44

● Closed

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Which function is called repetitively over and over again as long as the Arduino has power?

- A. `power()` 0.0%
- B. `repeat()` 20.5%
- C. `loop()` 75.0%
- D. `setup()` 4.5%

● Closed

What line of code has to be added to the setup() method to make the robot drive 100cm?

- A. `robot.drive(100);`
- B. `robot->drive(100);`
- C. `robot::drive(100);`
- D. `robot { drive(100) };`

```
Explorer robot;  
  
void setup() {  
  // start serial port output  
  Serial.begin(115200);  
  
  // initialize robot:  
  robot.init(&evshield, &sonar, &touch);  
}
```

[check Appendix: Explorer.h]

when you start your session and slideshow.





Votes:
41

● Closed

What line of code has to be added to the setup() method to make the robot drive 100cm?

```
Explorer robot;
```

```
void setup() {  
  // start serial port output  
  Serial.begin(115200);  
  
  // initialize robot:  
  robot.init(&evshield, &sonar, &touch);  
}
```

- A. robot.drive(100);  82.9%
- B. robot->drive(100);  7.3%
- C. robot::drive(100);  2.4%
- D. robot { drive(100) };  7.3%

 Closed

Which of the following line(s) of code do you need to have a robot make a point turn (turn around its own axis) with a given angle?

- A. all lines
- B. lines 1, 2 and 3
- C. lines 2, 3 and 4
- D. lines 2 and 3

```
1: double circumference = WHEEL_DIAM * PI;  
2: unsigned int degrees = abs(angle) * (TRACKWIDTH / WHEEL_DIAM);  
3: evshield->bank_a.motorRunDegrees(SH_Motor_1, SH_Direction_Forward,  
speed, degrees, SH_Completion_Dont_Wait, SH_Next_Action_Float);  
4: evshield->bank_a.motorRunDegrees(SH_Motor_2, SH_Direction_Reverse,  
speed, degrees, SH_Completion_Wait_For, SH_Next_Action_Float);
```

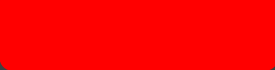



*The question will open when
you start your session and
slideshow.*

Votes:
40

● Closed

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Which of the following line(s) of code do you need to have a robot make a point turn (turn around its own axis) with a given angle?

- A. all lines  35.0%
- B. lines 1, 2 and 3  20.0%
- C. lines 2, 3 and 4  37.5%
- D. lines 2 and 3  7.5%

```
1: double circumference = WHEEL_DIAM * PI;  
2: unsigned int degrees = abs(angle) * (TRACKWIDTH / WHEEL_DIAM);  
3: evshield->bank_a.motorRunDegrees(SH_Motor_1, SH_Direction_Forward,  
speed, degrees, SH_Completion_Dont_Wait, SH_Next_Action_Float);  
4: evshield->bank_a.motorRunDegrees(SH_Motor_2, SH_Direction_Reverse,  
speed, degrees, SH_Completion_Wait_For, SH_Next_Action_Float);
```

 Closed

At the first line of the code below, how will variable `d` get the proper value of the distance from the ultrasonic sensor of the robot?

- A. `robot.getDistance();`
- B. `robot.checkSensors();`
- C. `robot.sonar->ping_cm();`
- D. `robot.readDistance();`

```
unsigned int d = ...;
if (!freeWay) {
  Serial.print("d="); Serial.println(d);
  if (d > 10 && d < 400) {
    freeWay = true;
    Serial.println("The wait is over, we can drive!");
  }
}
```

`robot` is an object of class `Explorer`.
See its declaration in Appendix: `Explorer.h`

you start your session and
slideshow.

Votes:

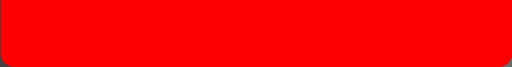


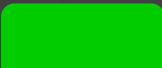
42

Closed

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At the first line of the code below, how will variable d get the proper value of the distance from the ultrasonic sensor of the robot?

- A. `robot.getDistance();`  59.5%
- B. `robot.checkSensors();`  4.8%
- C. `robot.sonar->ping_cm();`  16.7%
- D. `robot.readDistance();`  19.0%

```
unsigned int d = ...;
if (!freeWay) {
  Serial.print("d="); Serial.println(d);
  if (d > 10 && d < 400) {
    freeWay = true;
    Serial.println("The wait is over, we can drive!");
  }
}
```

 Closed

FINALIZE ASSIGNMENT 7

- Morning: help with assignment & check (or... work on project)
- Afternoon: help with project, and if you want: feedback on prototype regarding Application Development aspects

Possible next week also
(@ my office)

downloads @ vanslooten.com/appdev

Downloads

- AppDev2018
- Installation instructions
- Exams to practice
- Archive
- Eclipse projects