

Basic tools to create an educational App with MIT App Inventor

November 2016

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MIT App Inventor

MIT App Inventor WORKSHOP

Disclaimer

Disclaimer

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MIT App Inventor®



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The CONTENTS

- Introduction
- What is MIT App Inventor?
- How MIT App Inventor can assist educators as a learning tool?
- Creating an educational App: enjoy learning & learning by making
- Educational Apps with Bachelor Engineering Students
- Hands-on session: creating your first App
- More things ...
- Fluid Mechanics Apps of our Bachelor Thesis Students
- The End

The Workshop GOALS

At the end of the workshop the participant should be able to and be ready for:

- Learning a new tool for education
- Identifying the parameters of this tool applicable in their own teaching
- Finding out the main functions of App Inventor
- Managing the main menus of App Inventor Blocks
- Developing a basic application using App Inventor
- Set up the components, screen arrangement, etc. of an application
- Analysing an application for students to develop their own teaching

What is MIT App Inventor?

MIT App Inventor is an innovative beginner's introduction to programming and app creation that **transforms** the **complex language of text-based coding** into **visual, drag-and-drop building blocks**. The simple graphical interface grants even an inexperienced novice the ability to create a basic, fully functional app within an hour or less.

App Inventor code is open source

Computer Science For All

**“becoming active citizens in a technology-driven world,
instead of being just consumers”**

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What is MIT App Inventor?

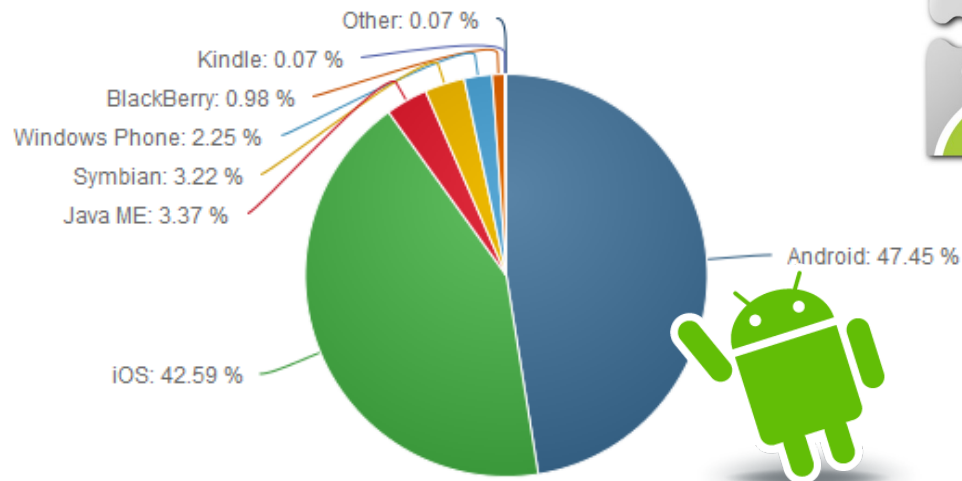
What is MIT App Inventor? Several figures ...

App Inventor empowers even beginners and non-programmers to create mobile apps. This is disruptive technology that opens up a new medium for creators-- interactive software for mobile devices-- that has until **recently been restricted to the digital elite.**

Source: MIT App Inventor

Active Users This Month: **371.3K** Active Users This Week: **184.4K**

Registered Users: **5.5M** Countries: **195** Apps Built: **18.1M**



*Web UCH (Universidad Cardenal Herrera)
Ranking de sistemas operativos mas usados 2015

Source: MIT App Inventor

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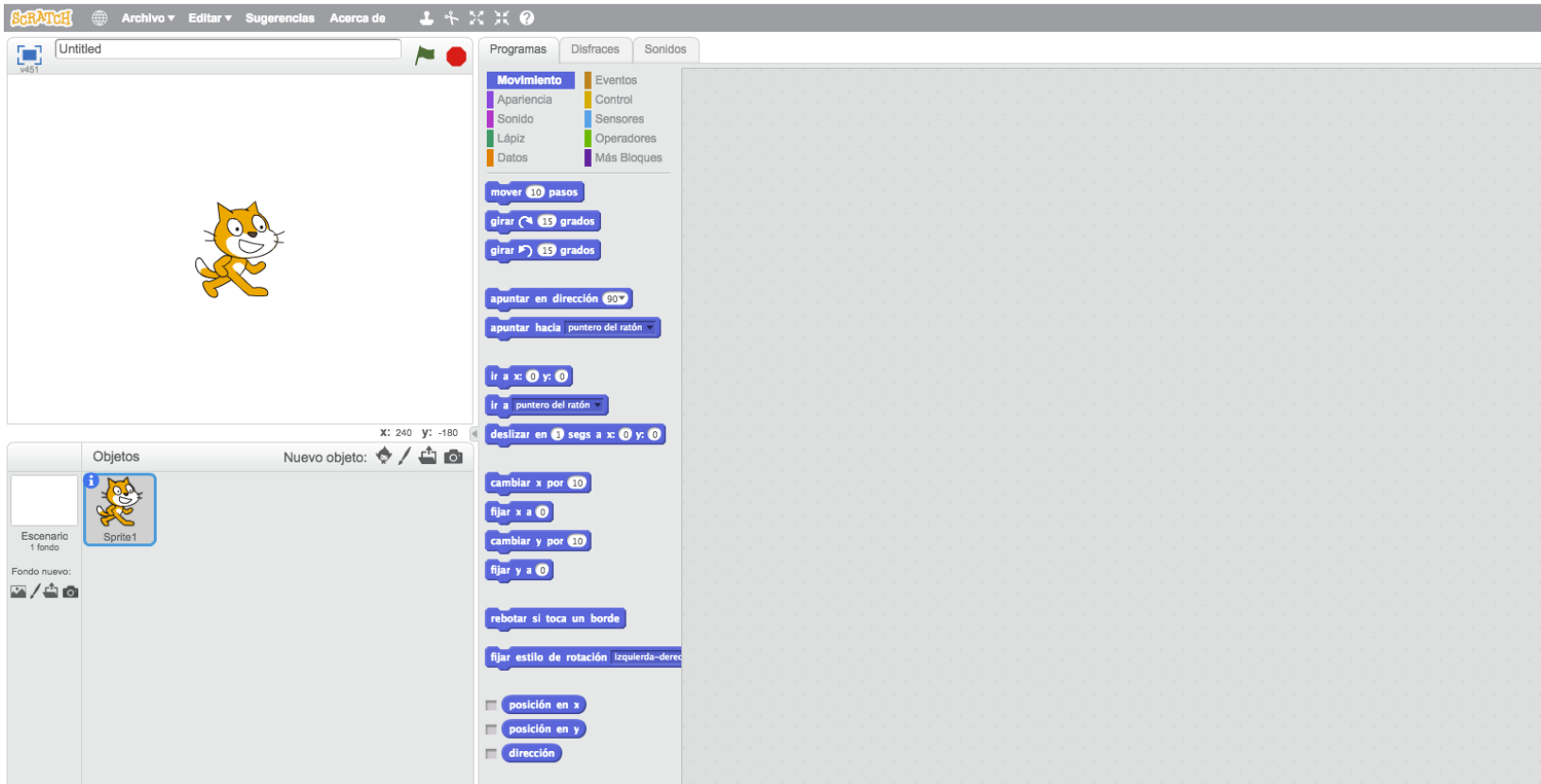
How MIT App Inventor can assist educators as a learning tool?

Scratch for Educators



<https://scratch.mit.edu/>

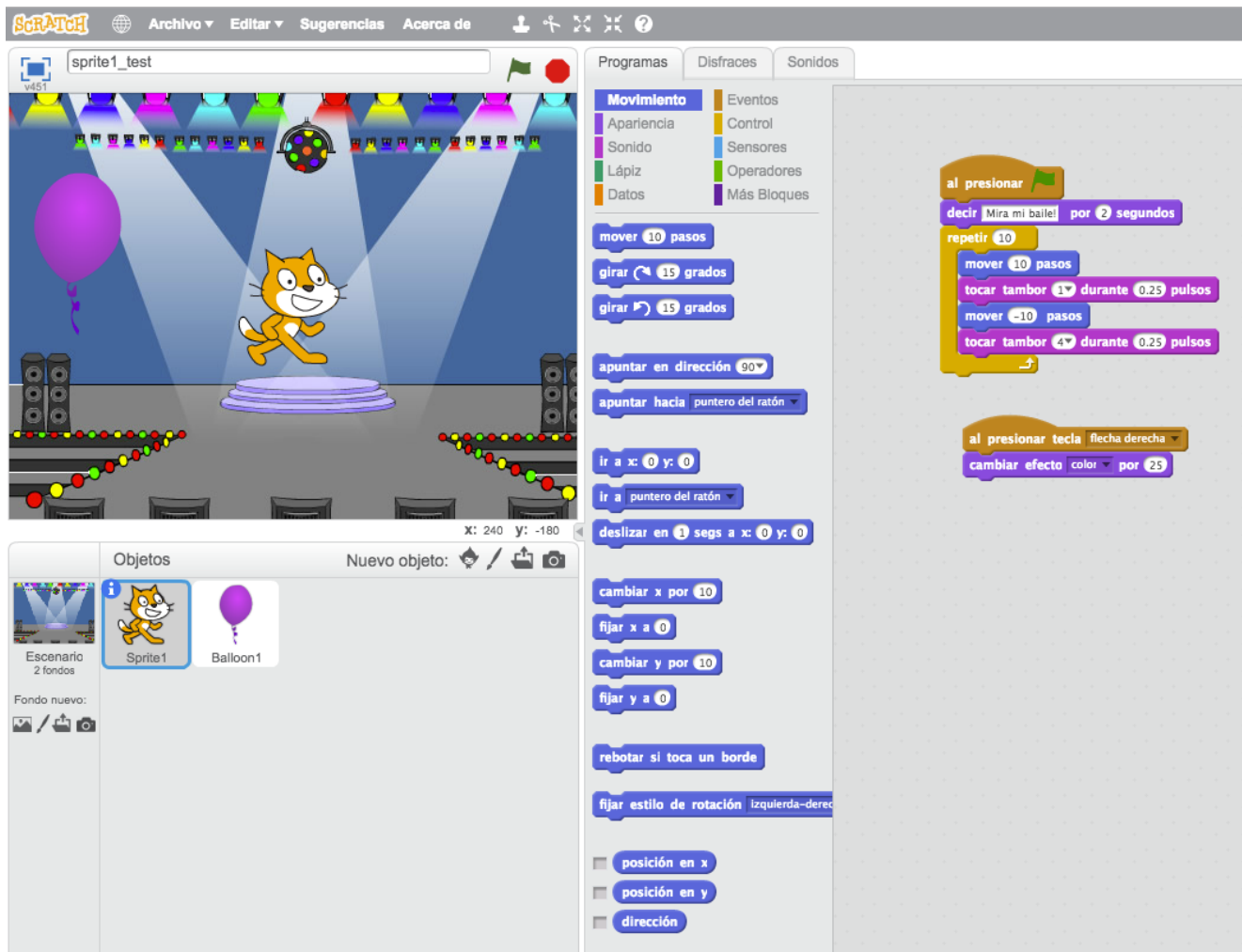
Your students can use Scratch to code their own interactive stories, animations, and games. In the process, they learn to think creatively, reason systematically, and work collaboratively — essential skills for everyone in today's society.



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How MIT App Inventor can assist educators as a learning tool?

Scratch for Educators



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How MIT App Inventor can assist educators as a learning tool?

Scratch for Educators



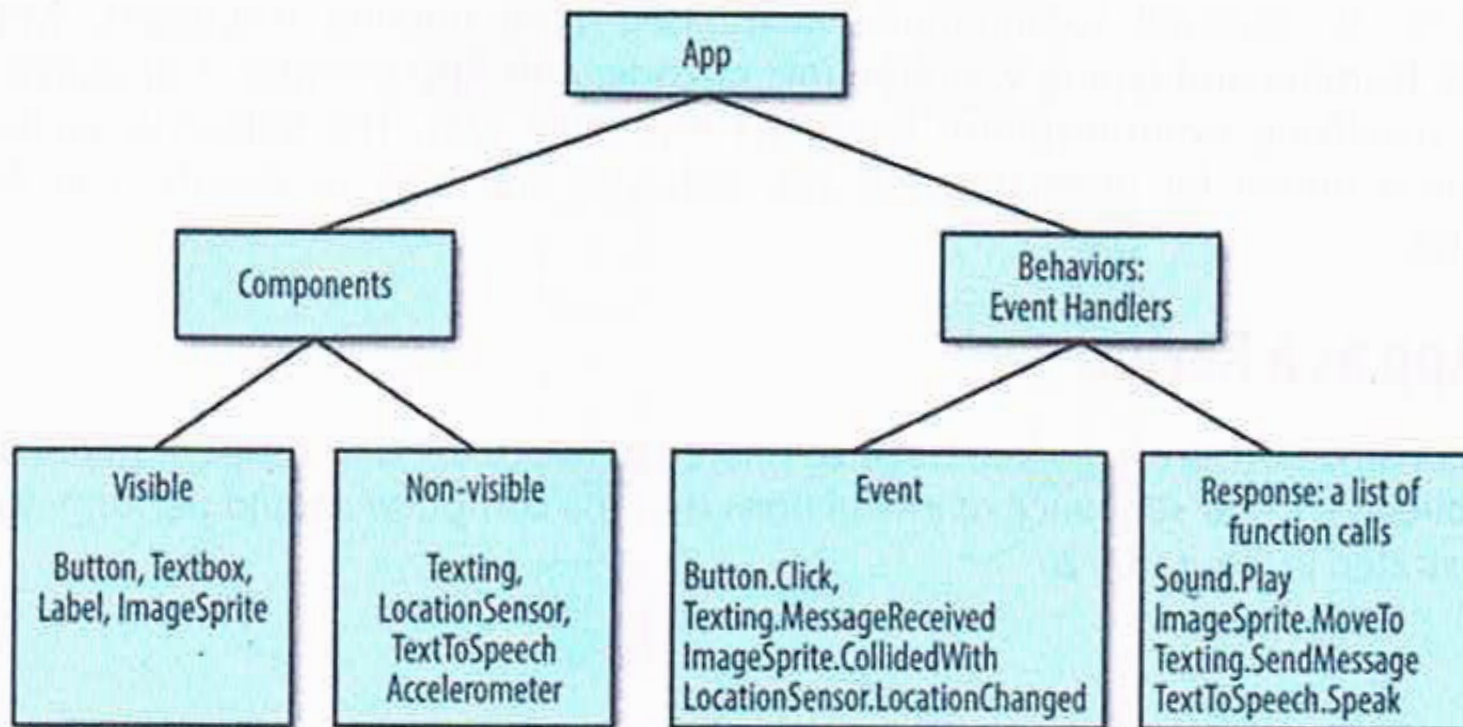
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Creating an Educational App: enjoy learning & learning by making

Understanding an App's Architecture:: Few concepts ...

... without us being experts ☺

The internal architecture of an App Inventor app



Source: D. Wolber, H. Abelson, E. Spertus and L. Looney (2014), "App Inventor 2. Create Your Own Android Apps", Ed. O'Reilly, USA

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Creating an Educational App: enjoy learning & learning by making

Understanding an App's Architecture:: Few concepts ...

... without us being experts ☺

Visible Components: you can see when the app is launched (*user interface*)

Non-Visible Components: you cannot see them, provide access to the *built-in* functionality of the device.

Behaviour: the behaviour defines how the app should *respond to events*, both user initiated and external. The difficulty of specifying such interactive behaviour is why programming is so challenging.

Fortunately, App Inventor provides a **high-level blocks-based language** for specifying behaviours.

Programming behaviours more like **plugging puzzle pieces** together.



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Creating an Educational App: enjoy learning & learning by making

Understanding an App's Architecture:: Few concepts ...

... without us being experts 😊

The *app as a recipe* paradigm does not fit for mobile phones, the Web, and in general most of the computing done today.

Most modern software does not perform a bunch of instructions in a predetermined order; instead; it **reacts to events**. For example:

- **Tapping**: if the user taps a button, the app responds by performing some operation.
- **Dragging**: for touchscreen phones and devices, the act of dragging your finger across the screen is another event.



A **touch** is when you place your finger on the canvas and lift it without moving it.



A **drag** is when you place your finger on the canvas and move it while keeping it in contact with the screen.

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Creating an Educational App: enjoy learning & learning by making

Show & Tell

Then, what do I need to create an Android App?



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Creating an Educational App: enjoy learning & learning by making

Show & Tell: What you'll need

Wifi connection -> **Computer** -> **Android Device***

5 simple steps:

- ① It usually takes a few ~~hours~~ **minutes** to set up any app development environment.
- ② You need **not download** anything to your computer*
- ③ On your phone or tablet, open the Google Play Store and find and **install the MIT AI2 Companion app**. *The Companion app is just an Android App that lets you test the apps you build as you're building them.*



MIT AI2 Companion app

(*You can emulate ☺)

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Creating an Educational App: enjoy learning & learning by making

Show & Tell: What you'll need

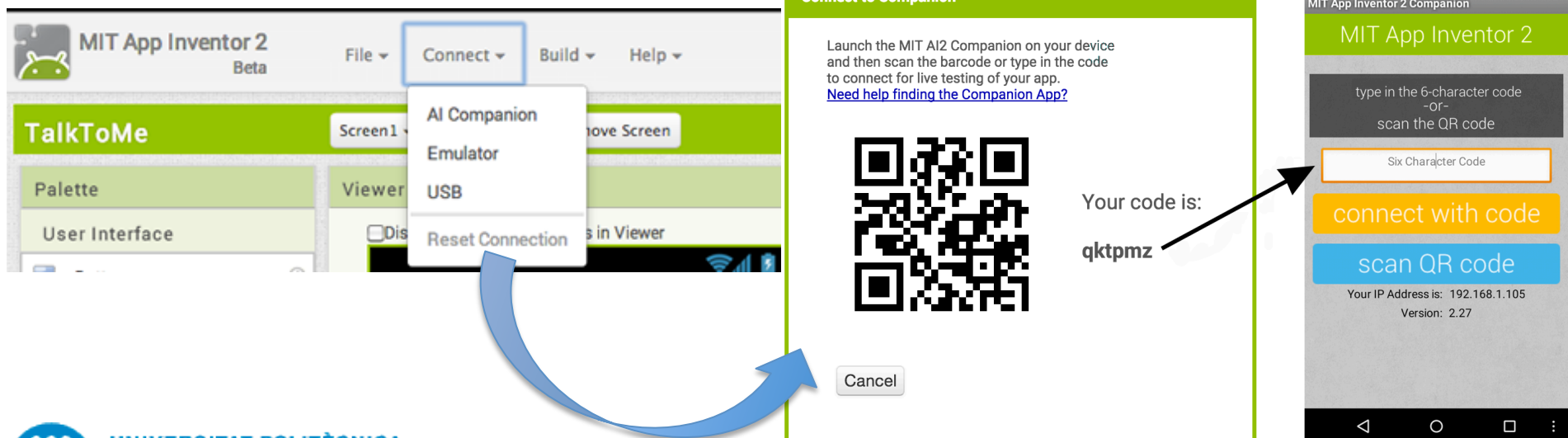
Working with APP INVENTOR 2

- ④ Back in your computer's browser (Chrome, Firefox or Safari), open app inventor by going to ai2.appinventor.mit.edu. **Create a new project.**

(important: type name project with no spaces!!!)



- ④ In the top menu, click on 'Connect' and 'Connect to Companion'. A QR code will appear. Scan this QR code with the MIT AI2 Companion. **You should see your app.**



Show & Tell: Learn to build Android apps

Introduction to **App Inventor 2** in just 4 easy steps, each treated separately:

- ① step: **DESIGNER**:: How your app looks
- ② step: **BLOCKS**:: How your app behaves
- ③ step: **TEST**:: Testing while your are building
- ④ step: **BUILD**:: Building your first app

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Creating an Educational App: enjoy learning & learning by making

① step: **DESIGNER**:: How your app looks

App Inventor Designer

Design the App's User Interface by arranging both on- and off-screen components.

Palette: Find your components and drag them to the Viewer to add them to your app.

Designer Button:
Click from any tab to go to the Designer tab.

The screenshot shows the MIT App Inventor 2 web interface. The top navigation bar includes 'New', 'Screen1', 'Add Screen', 'Remove Screen', and 'Designer' (highlighted) and 'Backs' buttons. Below this is a 'Palette' on the left with categories like 'User Interface', 'Layout', 'Media', 'Drawing and Animation', and 'Sensors'. The 'Viewer' in the center shows a mobile app preview with a 'Text for Button1' label. To the right of the Viewer is a 'Components' list showing 'Screen1', 'Textbox1', and 'Button1'. Further right is a 'Properties' panel for 'Textbox1' with various settings like 'BackgroundColor', 'Enabled', 'FontBold', 'FontSize', 'FontTypeface', 'Hint', 'Multiline', 'NumbersOnly', and 'Text'. Annotations with arrows point to the Palette, the Designer button, the Viewer, and the Properties panel.

Properties: Select a Component in the Components List to change its properties (color, size, behavior) here.

Viewer: Drag components from the Palette to the Viewer to see what your app will look like.

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Creating an Educational App: enjoy learning & learning by making

② step: **BLOCKS**:: How your app behaves

App Inventor Blocks Editor

Program the app's behavior by putting blocks together.

Built-In Drawers: Find Blocks for general behaviors you may want to add to your app and drag them to the Blocks Viewer.

Blocks Button: Click from any tab to go to the Blocks tab.

Component-Specific Drawers: Find Blocks for behaviors for specific Components and drag them to the Blocks Viewer.

Block: Snap Blocks together to set app behavior.

Viewer: Drag Blocks from the Drawers to the Blocks Viewer to build relationships and behavior.



Type names with no spaces!!!



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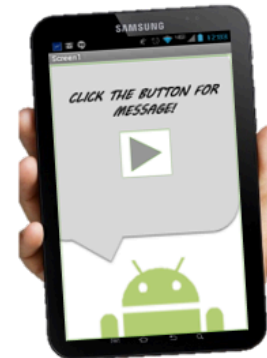
Creating an Educational App: enjoy learning & learning by making

③ step: **TEST::** Testing while your are building

- MIT App Inventor Companion App
- Same Wifi!



**Build your project on
your computer**



**Test it in real-time on
your device**

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Creating an Educational App: enjoy learning & learning by making

④ step: **BUILD**:: Building your first app

- Start new project, like **project New**, from scratch
- **Import** project (.aia-file) from a repository
- Gallery
- **Import** project (.aia-file) from my computer
- **Export** and **share** your app in an executable (.apk-file) form that can be installed on a device

The **time spent** to create apps with App Inventor **feels like minutes** compared to using traditional programming languages.



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Creating an Educational App: enjoy learning & learning by making

More information ...

- <http://appinventor.mit.edu/explore/>
As a start you can begin at AppInventor.mit.edu, the home of App Inventor.
- <http://www.appinventor.org/>
Web product of the University of San Francisco's Democratize Computing Lab, and it is intended to provide materials for learning and teaching App Inventor.
- <https://puravidaapps.com/>
PuraVidaApps is a site made by an App Inventor enthusiast, where you can find tons of snippets, tutorials and links.
- <https://www.udemy.com/desarrollo-de-aplicaciones-moviles-con-app-inventor/>
Spanish course by a Master Trainer of App Inventor targeting beginners of all age.

Book:

D. Wolber, H. Abelson, E. Spertus and L. Looney (2014),
“App Inventor 2. Create Your Own Android Apps”,
Ed. O'Reilly, USA



Educational App Example 1:: The Moody chart

We propose to our bachelor engineering students of Fluid Mechanics to carried out this first app:

Tarea 2B: App para el cálculo del factor de fricción

Se propone la primera tarea de creación de una App en Android mediante AppInventor (visitar <http://appinventor.mit.edu>).

Esta primera aplicación permitirá calcular el factor de fricción "f" sin la necesidad de utilizar el diagrama de Moody. Para ello, se utilizará una expresión alternativa proporcionada por Haaland, que presenta un error aceptablemente pequeño (alrededor de un 15%) en comparación con su sencillez (claro está, con las actuales calculadoras). La expresión es la siguiente:

$$\frac{1}{f^{1/2}} \approx -1.8 \cdot \log \left(\frac{6.9}{Re_d} + \left(\frac{\epsilon/d}{3.7} \right)^{1.11} \right)$$

Y sólo precisa de conocer el número de Reynolds en la tubería (Re_d), la rugosidad del material de la tubería (ϵ) y el diámetro interior de la tubería (d).

La App tendría una forma parecida a la que se muestra a continuación, ya que debe ser lo más sencilla posible para llevar a cabo el cálculo y nada más:

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Educational Apps with Bachelor Engineering Students

Educational App Example 1:: The Moody chart

TEST:: Testing while your are building



Calculo Factor de Fricción

Reynolds [-]:

Hint for TextBox1

Diametro [mm]:

Hint for TextBox2

Rugosidad [mm]:

Hint for TextBox3

Pulsa para calcular:



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BUILD:: Building your first app



Calculo Factor de Fricción

Reynolds [-]:

100000

Diametro [mm]:

150

Rugosidad [mm]:

0.15

Pulsa para calcular:

El factor f es: 0.02197

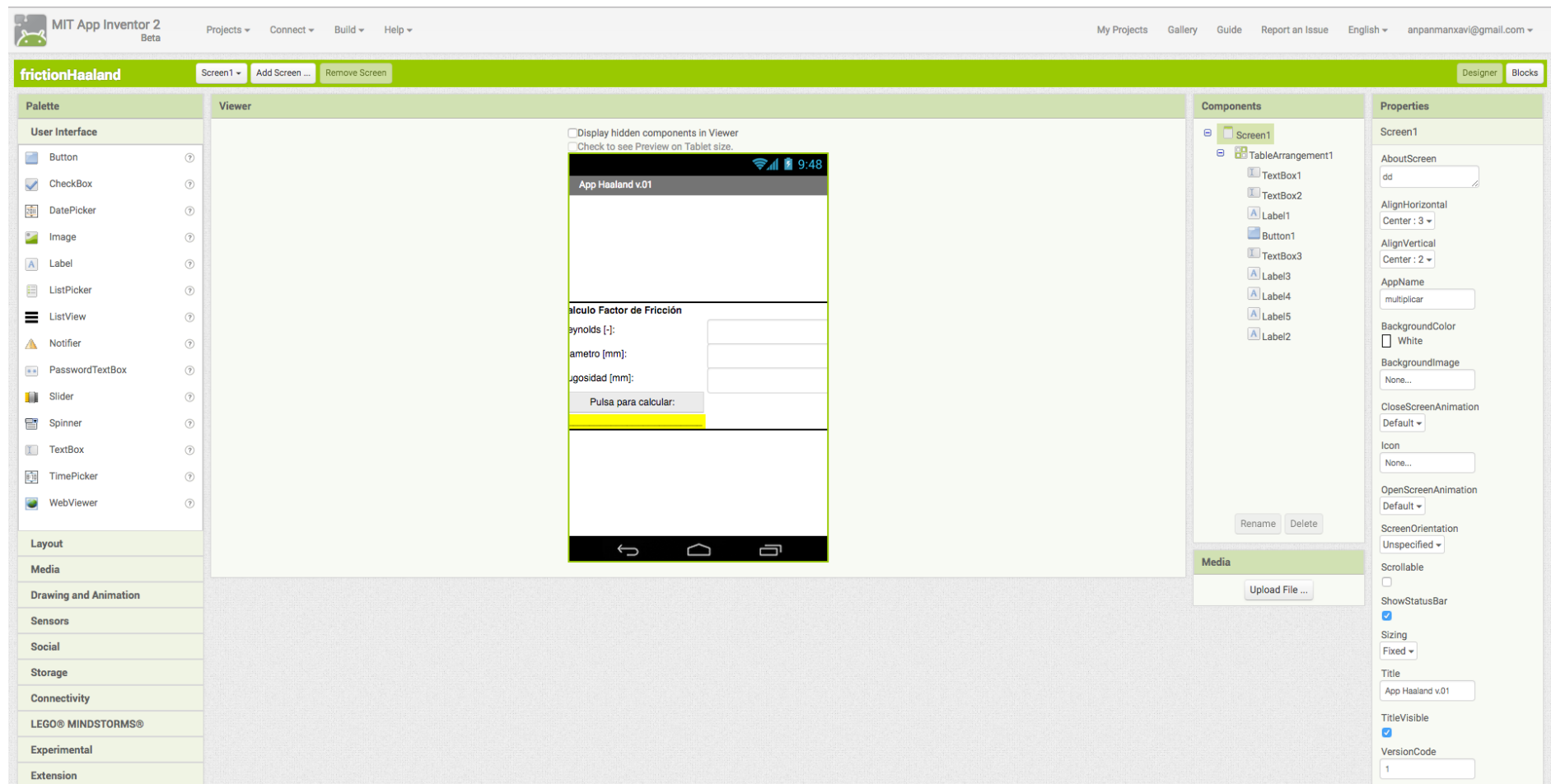


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Educational Apps with Bachelor Engineering Students

Educational App Example 1:: The Moody chart

DESIGNER:: How your app looks



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Educational Apps with Bachelor Engineering Students

Educational App Example 1:: The Moody chart

BLOCKS:: How your app behaves

The screenshot shows the MIT App Inventor 2 Beta interface. The top bar includes the MIT App Inventor logo, the name 'frictionHaaland', and navigation buttons like 'Screen1', 'Add Screen...', and 'Remove Screen'. The left sidebar contains the 'Blocks' palette with categories: Built-in (Control, Logic, Math, Text, Lists, Colors, Variables, Procedures), Screen1, and Media. The main 'Viewer' window displays a script for the Moody chart. The script starts with four 'initialize global' blocks for 'Reynolds', 'Dia', 'epsilon', and 'fDarcy', all set to 0. A 'when Button1.Click' block contains a 'do' loop with four 'set global' blocks for 'Reynolds', 'Dia', 'epsilon', and 'fDarcy', each set to the 'Text' of a corresponding text box. The 'fDarcy' block contains a complex mathematical expression for the Haaland equation:
$$\frac{1}{fDarcy} = \frac{1}{-1.8 \times \log\left(\frac{6.9}{Reynolds} + \frac{\epsilon \times 3.7}{Dia \times Reynolds^{1.11}}\right)}$$
. Below the loop, there are three 'set' blocks for 'Label1': 'FontSize' to 15, 'TextColor' to blue, and 'Text' to a join of 'El factor f es: ' and 'get global fDarcy'. The bottom status bar shows 0 warnings and a 'Show Warnings' button.

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Educational Apps with Bachelor Engineering Students

Educational App Example 1:: The Moody chart



Calculo Factor de Fricción

Reynolds [-]:

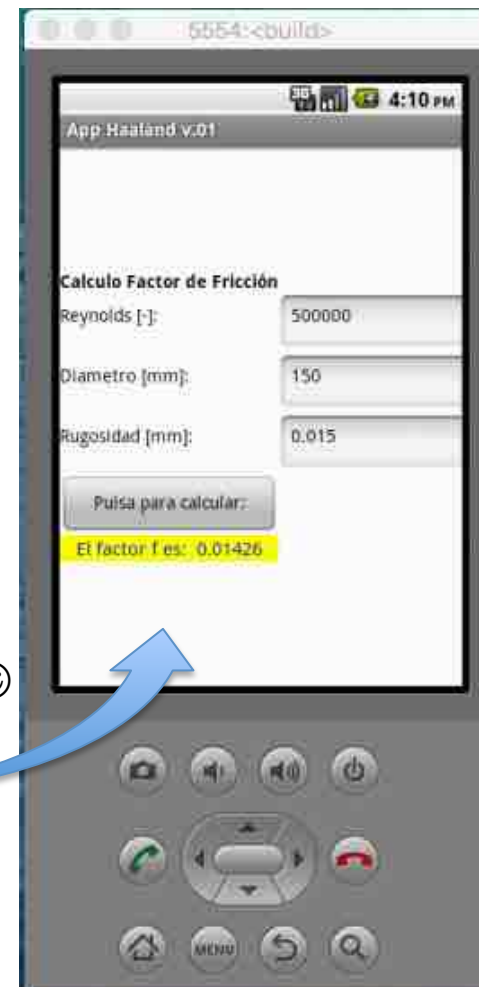
Diametro [mm]:

Rugosidad [mm]:

Pulsa para calcular:



You can emulate ☺



Educational App Example 2:: Turbomachinery

We propose to our students of Fluid Mechanics to carried out this second app:

Tarea 3B: App para cálculo de velocidad específica

Se propone la segunda y última tarea de creación de una App en Android mediante AppInventor (visitar <http://appinventor.mit.edu>).

Esta segunda y última aplicación permitirá calcular la velocidad específica definida en el tema "Semejanza en Bomba" así como las imágenes que se utilizan. Además, determinará que tipo de máquina se trata en función de la velocidad específica y mostrará una imagen sencilla de la misma.

La App tendría una forma parecida a la que se muestra a continuación, ya que debe ser lo más sencilla posible para llevar a cabo el cálculo y nada más:

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Educational Apps with Bachelor Engineering Students

Educational App Example 2:: Turbomachinery

TEST:: Testing while your are building

App Turbomáquinas EFG

Revoluciones Específicas

Altura H [m]:

Potencia N [CV]:

Revoluciones n [rpm]:

Calcular Reset



BUILD:: Building your first app

App Turbomáquinas EFG

Revoluciones Específicas

Altura H [m]:

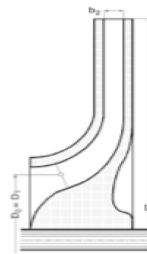
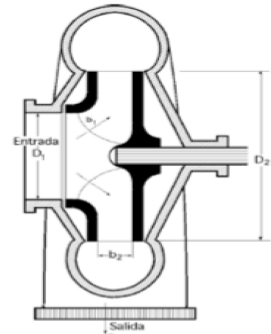
Potencia N [CV]:

Revoluciones n [rpm]:

Calcular Reset

El valor de ns es: 80

Máquina Radial Lenta

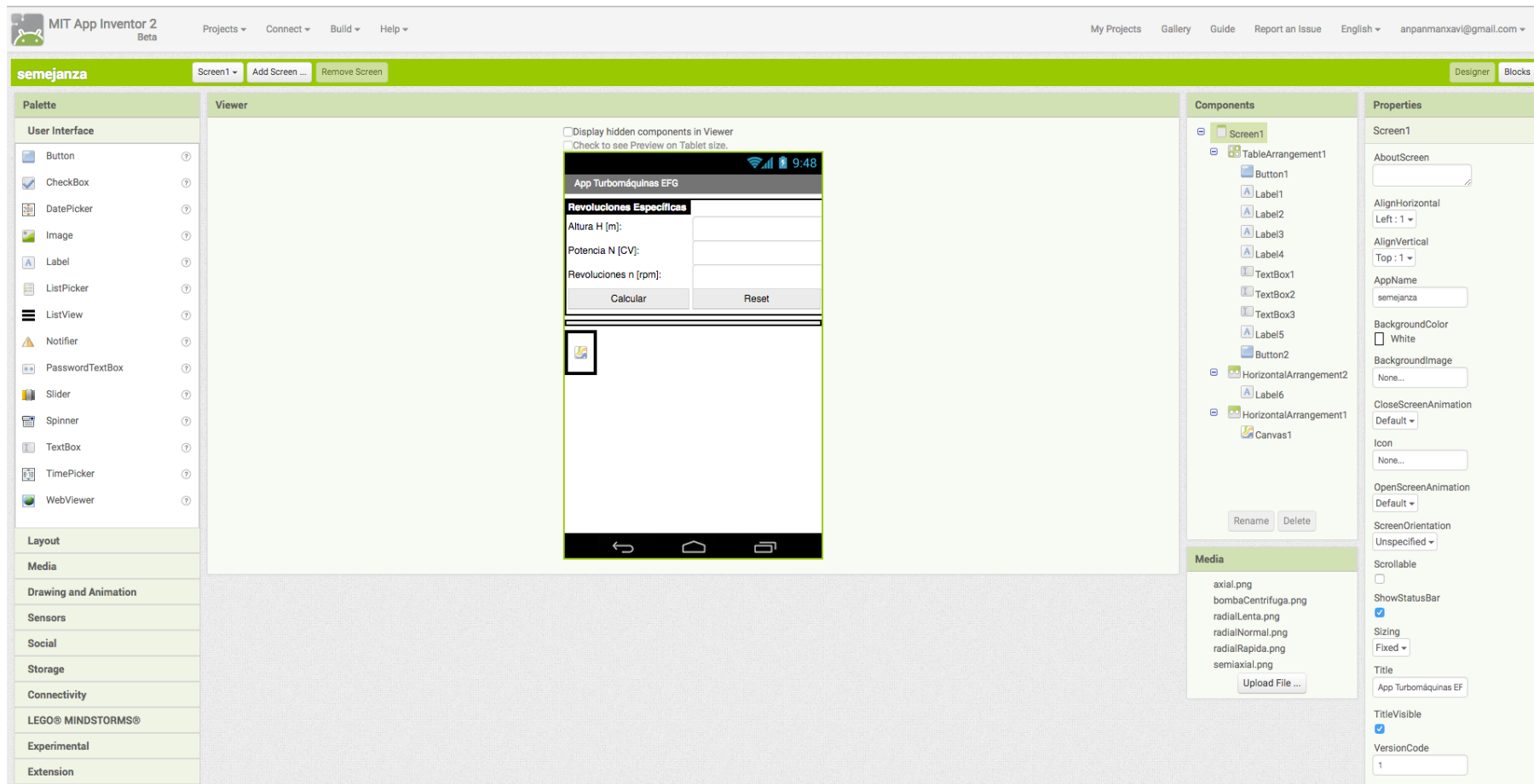


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Educational Apps with Bachelor Engineering Students

Educational App Example 2:: Turbomachinery

DESIGNER:: How your app looks



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Educational Apps with Bachelor Engineering Students

Educational App Example 2:: Turbomachinery

BLOCKS:: How your app behaves

The screenshot displays the MIT App Inventor 2 Beta web interface. The top navigation bar includes 'MIT App Inventor 2 Beta', 'Projects', 'Connect', 'Build', and 'Help'. The right side shows 'My Projects', 'Gallery', 'Guide', 'Report an Issue', 'English', and a user email 'anpanmanxavi@gmail.com'. The main workspace is titled 'semejanza' and shows 'Screen1' with 'Add Screen ...' and 'Remove Screen' buttons. The 'Blocks' palette on the left is organized into categories: Built-in (Control, Logic, Math, Text, Lists, Colors, Variables, Procedures), Screen1, and TableArrangement1. The 'Media' section lists various image files like 'axial.png', 'bombaCentrifuga.png', 'radialLenta.png', 'radialNormal.png', 'radialRapida.png', and 'semiaxial.png'. The 'Viewer' area on the right shows the code for the app. The code includes several initialization blocks for global variables (N, n, H, ns, image_list) and a 'when Button1.Click' event handler. This handler sets global variables to text box values, calculates a value for 'Label5' using a formula involving 'global n', 'square root', and 'global H', and then uses an 'if' statement to set the background image of 'Canvas1' based on the value of 'global ns'. The 'if' statement has two branches: one for 'global ns' less than or equal to 80, and another for 'global ns' greater than 80 and less than or equal to 150. Each branch sets the background image, font size, text color, and background color of 'Label6'.

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Educational Apps with Bachelor Engineering Students

Educational App Survey

:: Questions



Escola d'Enginyeria de Terrassa
UNIVERSITAT POLITÈCNICA DE CATALUNYA



Departament de Mecànica de Fluids
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Breve Encuesta sobre la Tarea: "App Android para Ingeniería de Fluids"

Se ruega contesten con completa franqueza siendo la encuesta anónima

Sus opiniones son muy valiosas y servirán para mejorar la asignatura en futuras ediciones

Género	Hombre	Mujer
¿Conocía <i>App Inventor</i> antes de la propuesta de la tarea por parte del profesor?	Si	No
1. Valore de 0 a 10 (0:min – 10:max) el grado de adecuación y de aprendizaje en la asignatura de esta tarea con relación a la otras tareas del curso		
2. Valore de 0 a 10 (0:min – 10:max) el grado de dificultad que representa el haber realizado esta tarea con relación a la otras tareas del curso		
3. Valore de 0 a 10 (0:min – 10:max) el grado de relevancia y atractivo que tiene el aprendizaje mediante el desarrollo de aplicaciones para dispositivos móviles en la asignatura		
4. Valore de 0 a 10 (0:min – 10:max) el grado de satisfacción que le ha aportado la experiencia de realizar esta tarea de desarrollo de la App		
5. Valore de 0 a 10 (0:min – 10:max) el grado de utilidad que considera le ha aportado el aprendizaje de desarrollar esta App Android para aplicarlo a futuras asignaturas y su futura carrera profesional		

Por favor indique, si lo desea, muy brevemente un aspecto que se podría haber llevado a cabo en la tarea más eficazmente.

Por favor indique, si lo desea, muy brevemente un aspecto que se debería incluir si hubiese una segunda edición de esta tarea.

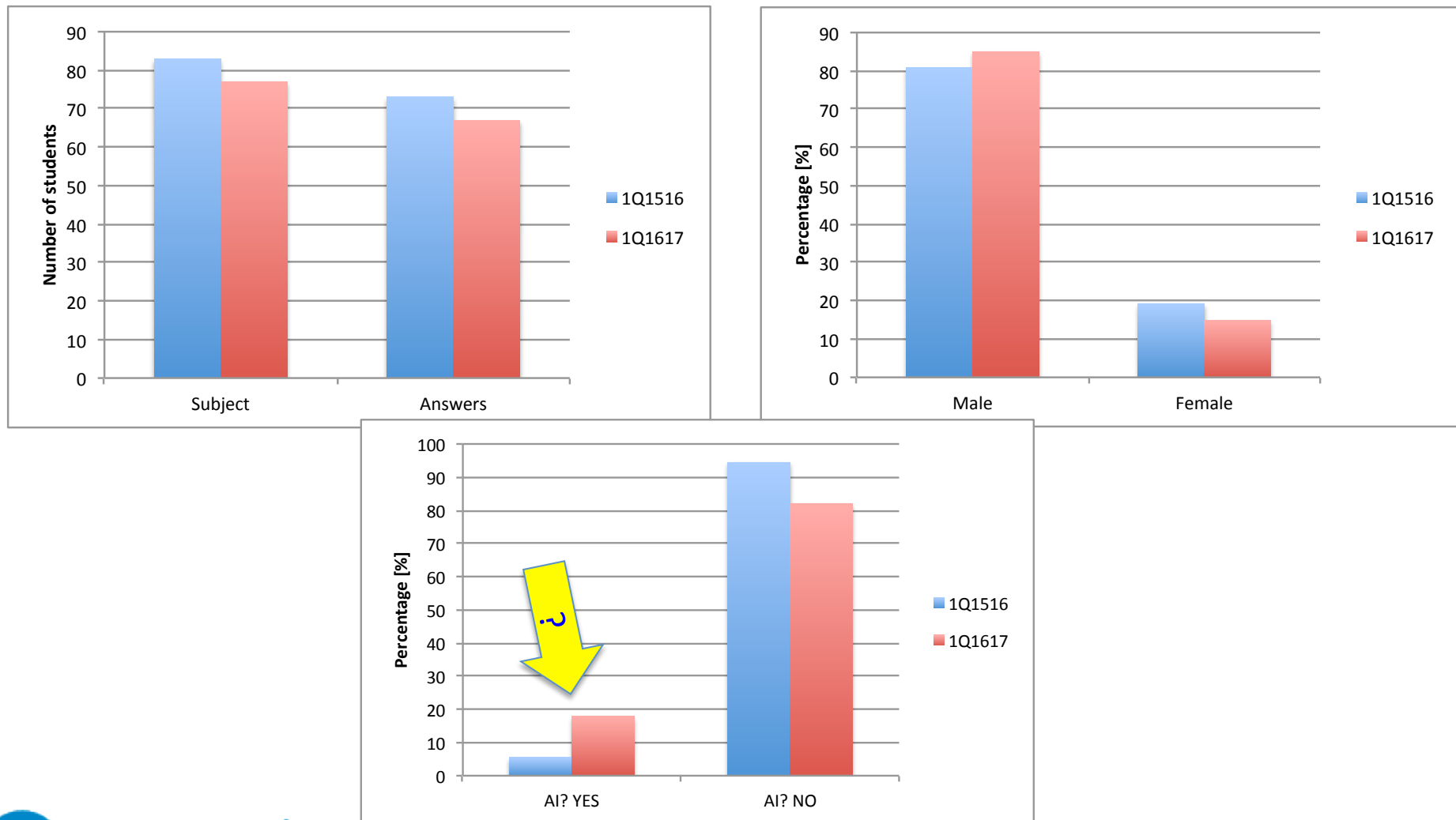


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Educational Apps with Bachelor Engineering Students

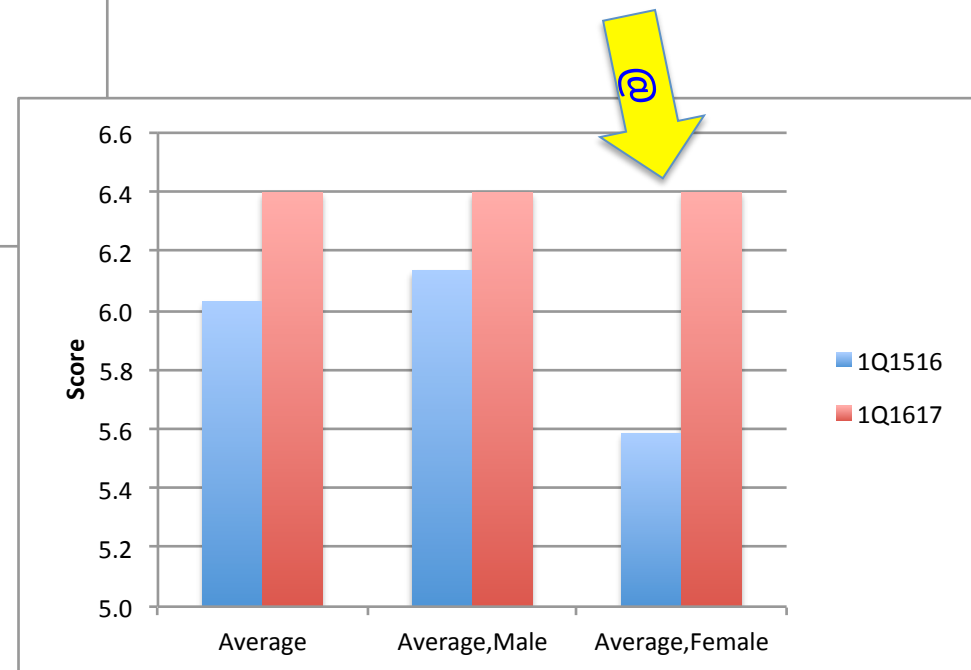
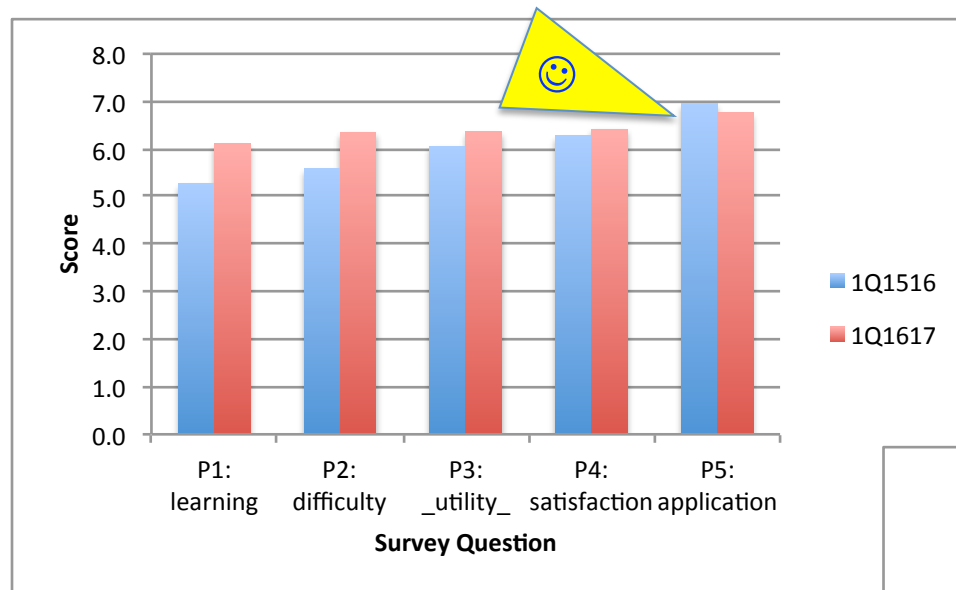
Educational App Survey:: Results



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Educational Apps with Bachelor Engineering Students

Educational App Survey:: Results



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Educational Apps with Bachelor Engineering Students

Educational App:: Request for Bachelor project

8 de noviembre de 2016, 18:29

HT

Para: Pedro Javier Gamez-Montero
Proyecto fin de grado (PFG)

Buenas tardes Pedro Javier,

me llamo . Actualmente estoy de intercambio en la Universidad de Terrassa y estoy llevando a cabo 4º curso del grado en Ingeniería Electrónica Industrial.

Revisando los proyectos fin de grado propuestos por la universidad, he considerado interesante aquel que estudia "Development of Android App for designing spur gear pumps".

Por consiguiente, estaría interesada en concretar una cita con usted, y si puede, explicarme un poco sobre el tema a tratar.

Muchas gracias,
Un saludo.



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Aquest missatge ha estat analitzat per [MailScanner](#)
a la cerca de virus i d'altres continguts perillosos,
i es considera que està net.



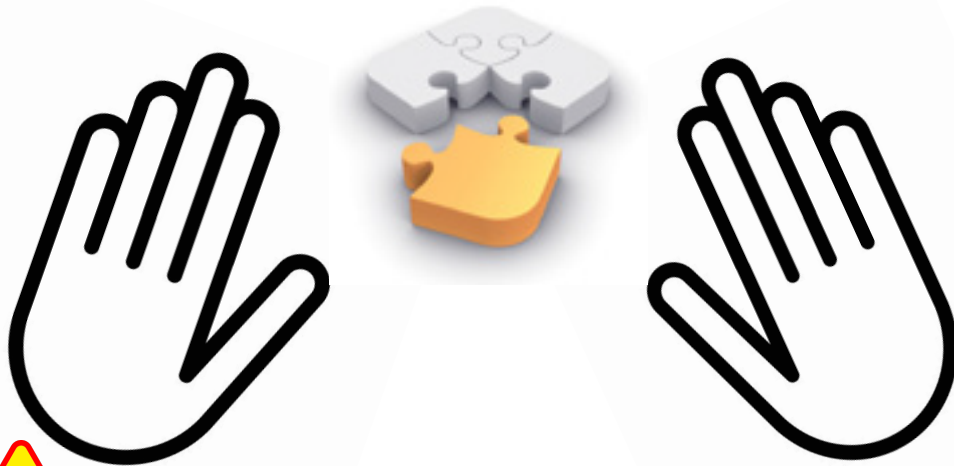
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Hands-on session: creating your first App

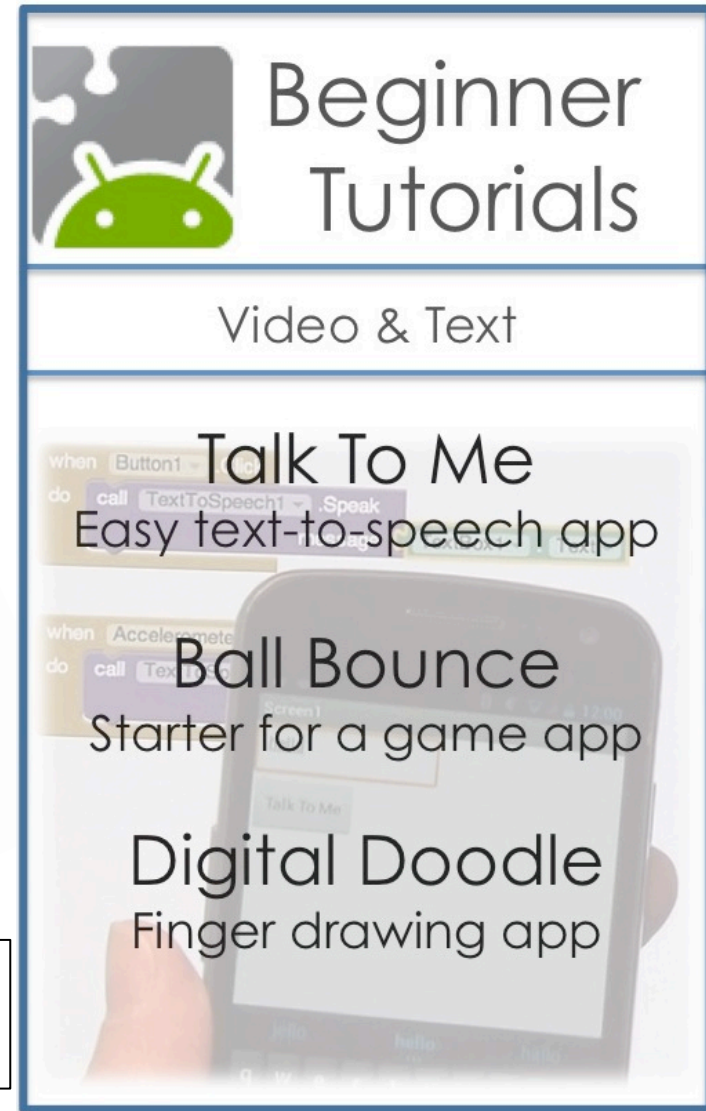
The first Apps of this Workshop

So now, let's get hands-on-work

Let's build our first Apps!!!



In App Inventor, an object within the drawing canvas is called a **sprite**



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MIT App Inventor WORKSHOP

Hands-on session: creating your first App

Talk To Me (part1) -> <https://vimeo.com/78782032>



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Hands-on session: creating your first App

Talk To Me (part2) -> <https://vimeo.com/78782033>



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Hands-on session: creating your first App

Ball Bounce -> <https://vimeo.com/81401989>



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Hands-on session: creating your first App

Digital Doodle -> <https://vimeo.com/81401988>



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More things ...

App Inventor Concept Cards

App Inventor Concept Cards provide a quick way to learn new App Inventor code and concepts.

<http://explore.appinventor.mit.edu/resources/beginner-app-inventor-concept-cards>

The concept card is titled "Shaking Phone" and features the MIT App Inventor logo in the top left. It includes a design screen preview showing a cat image and the text "Shake the Kitty". Below the preview, the "Non-visible components" list includes "Meow" and "AccelerometerSensor1". The card is divided into three sections: "Get Ready", "Try These Blocks", and "What Does it Mean?".

Shaking Phone

Make something to happen when you shake your phone.

Screen1

Shake the Kitty

Non-visible components

Meow AccelerometerSensor1

Get Ready

You will need these components in your design screen:

- Image
- Sound
- AccelerometerSensor
- Label

Try These Blocks

```
when AccelerometerSensor1 .Shaking
do
  call Meow .Play
  call Meow .Vibrate
  milliseconds 20
```

What Does it Mean?

The `AccelerometerSensor.Shaking` event will detect when the phone is shaking and then the Meow sound will play and the phone will vibrate for 20 milliseconds.

App of the Month

https://play.google.com/store/apps/details?id=appinventor.ai_gic1pc.quellevoyoy2

Congratulations to the September winners!

Adult Winner



¿Que llevo yo?
by Gerard Fossoul
Soler



Planning a meal with family and friends? Spanish developer Gerard's comprehensive app makes the task easy and organized!



Crea un evento, escoge los productos imprescindibles, envíales la invitación, ... a partir de ahora todos podrán colaborar para que el encuentro sea un éxito. Confirma tu asistencia, decide qué llevarás y si tienes alguna duda ponlo en común en el foro de la aplicación.

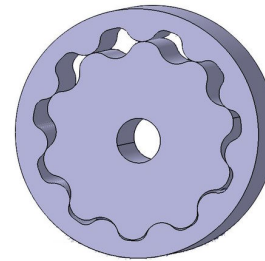
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Fluid Mechanics Apps of our Bachelor Thesis Students

Fluid Mechanics Apps of our Bachelor Thesis Students

Here we present three examples of educational apps created with App Inventor

Student App #1: “GearPumpDesigner”



Student App #2: “PumpCALC”



Student App #3: “App4Comp”



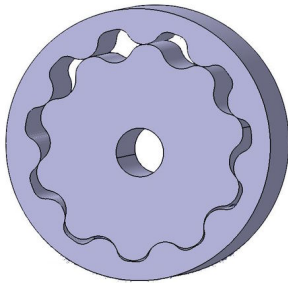
MIT App Inventor WORKSHOP

Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #1: “GearPumpDesigner”

Please, visit -> <http://www.gerolab.es/app/>

GearPumpDesigner



App for volumetric machinery calculation

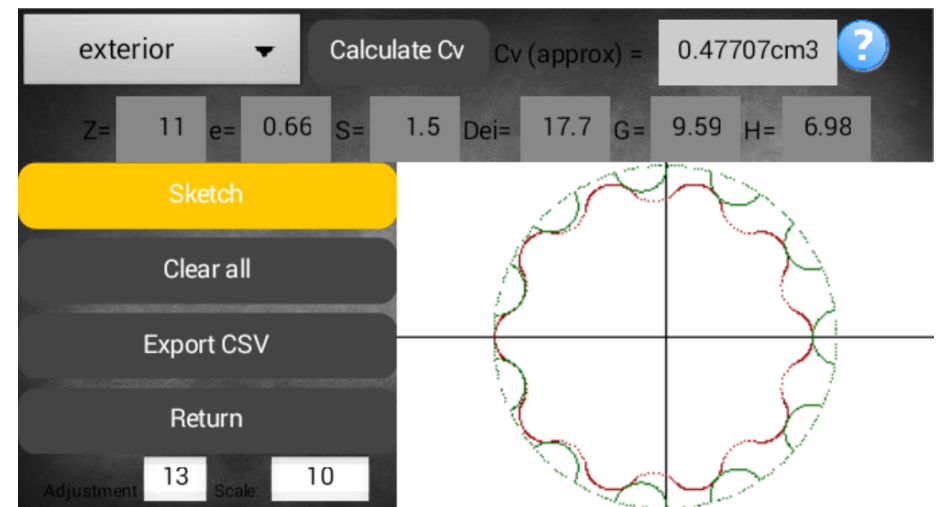
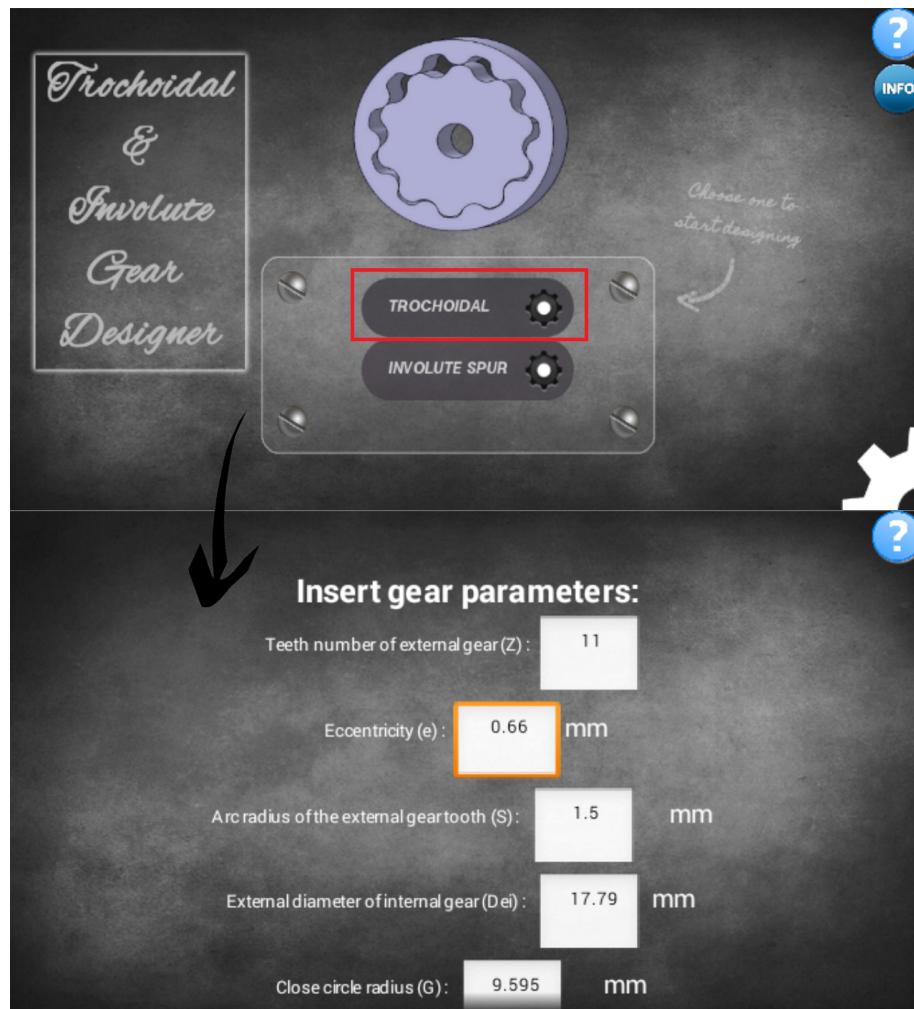
Intended for students
and engineers that
need to check data or
draw a tooth profile

Gear Pump Designer is an Android Application programmed by using MIT App Inventor intended to reach a first draft design of a either trochoidal-gear or involute spur-gear to work as a part of a hydraulic pump just using your Android device.

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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #1: "GearPumpDesigner"



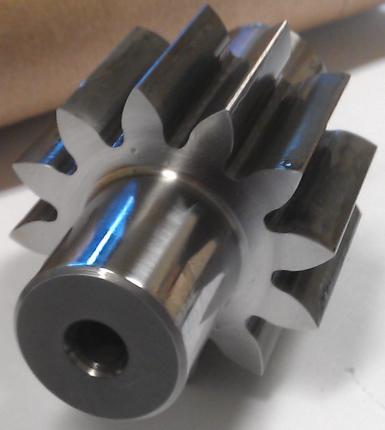
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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #1: "GearPumpDesigner"

The app interface is divided into several sections:

- Main Menu:** Features a title "Trochoidal & Involute Gear Designer" and a gear icon. It has two buttons: "TROCHOIDAL" and "INVOLUTE SPUR", with the latter highlighted by a red box. A note says "Choose one to start designing".
- Input Parameters:** A section titled "Insert gear parameters:" with a unit note "*Units in mm". It includes input fields for:
 - Number of teeth: 12
 - Module (m): 3
 - Pressure angle (degrees°): 20
 - Gear displacement coefficient (profile correction offset):
- Calculations:** A section titled "Calculations:" with two radio buttons:
 - GEAR WITHOUT PROFILE CORRECTION (ZERO - GEAR):** Selected. It shows:
 - Limit number of teeth: 17.09726
 - Circular pitch: 9.42477 mm
 - Base pitch: 8.85639 mm
 - Standard centre distance (without profile correction): 36 mm
 - GEAR WITH PROFILE CORRECTION OFFSET (V - GEAR):** Unselected.Below these are buttons for "GEAR TO PUMP (ASSEMBLY TO BE MOUNTED)" and "One gear info & Sketch".
- Output and Graph:** A section titled "Discharge:" showing:
 - Theoretical output: 11.92921 cm³/rev
 - Non uniformity grade of the flow rate: 1.77514 %
 - Buttons: "Export CSV" and "Return".Next to this is a graph showing a bell-shaped curve with a yellow outline and a blue dashed line.



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Student App #2: “PumpCALC”

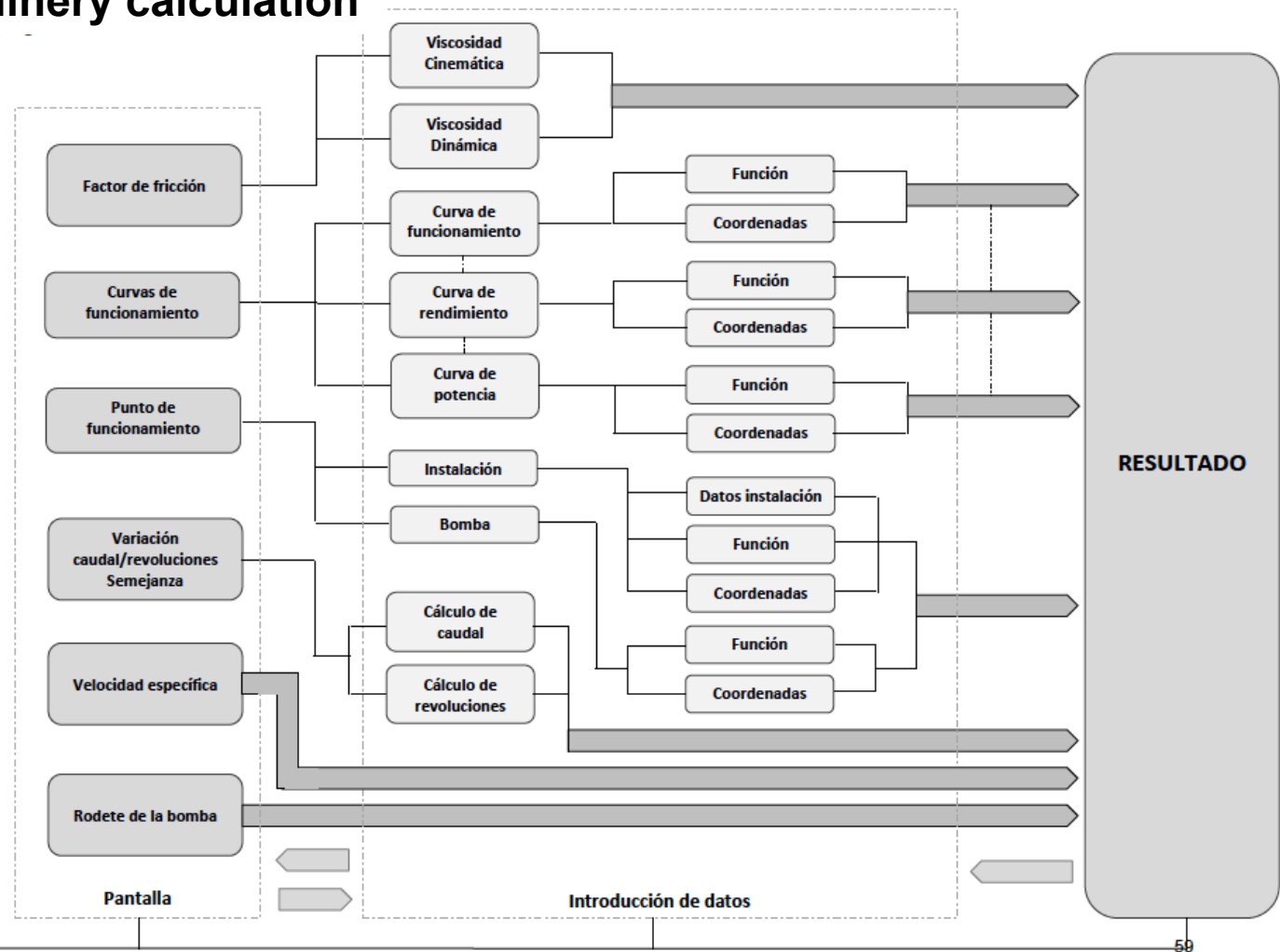
Please, visit -> <http://www.pumpcalc.edusite.me>

App for turbomachinery calculation

Intended for students and engineers that need to check data or results, or to get a first approximation without doing calculations by hand.



PumpCALC V.1.0

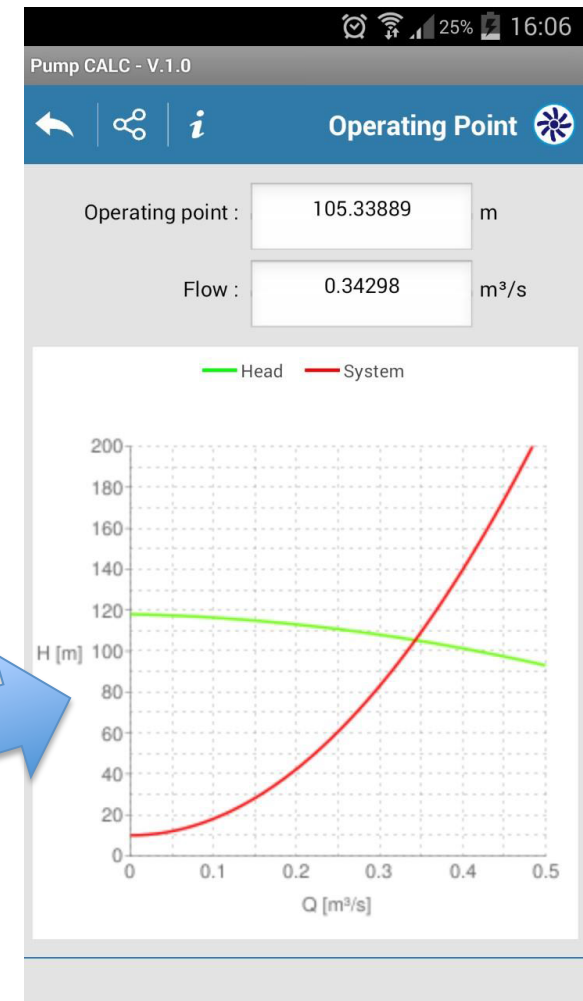
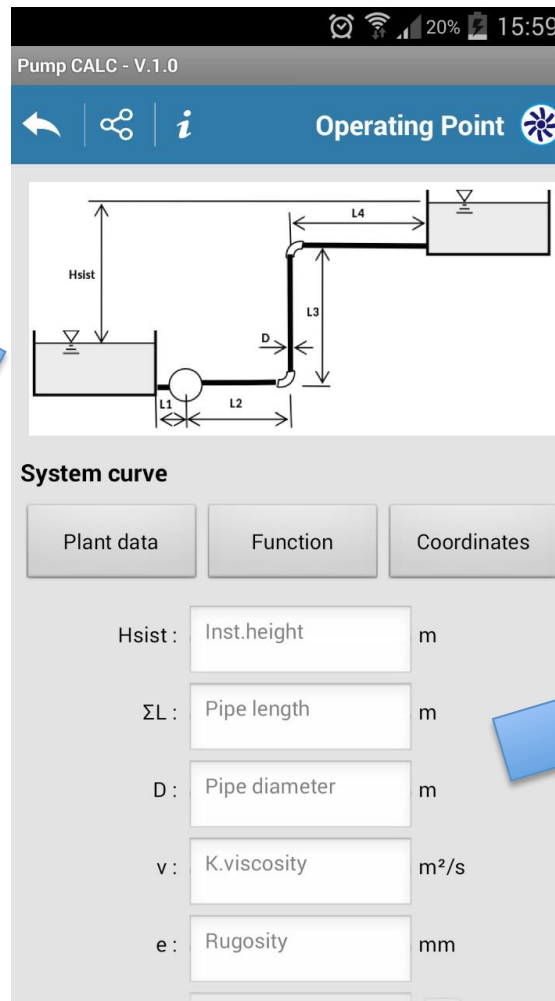
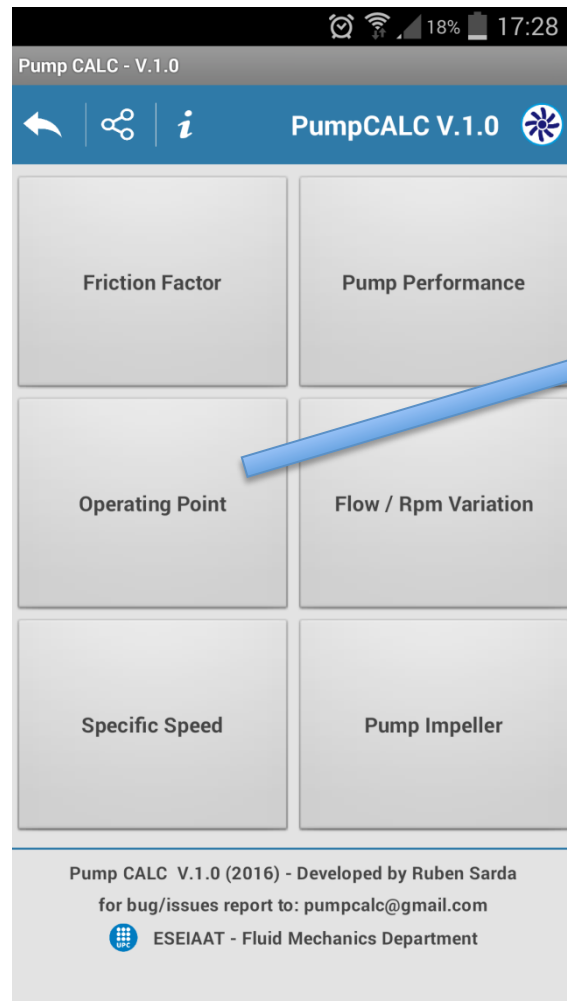


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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #2: "PumpCALC"



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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #2: "PumpCALC"

Pump CALC - V.1.0

18% 17:28

PumpCALC V.1.0

Friction Factor

Pump Performance

Operating Point

Flow / Rpm Variation

Specific Speed

Pump Impeller

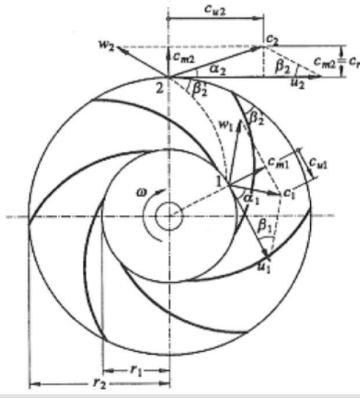
Pump CALC V.1.0 (2016) - Developed by Ruben Sarda
for bug/issues report to: pumpcalc@gmail.com
ESEIAAT - Fluid Mechanics Department

Pump CALC - V.1.0

16:26

Pump Impeller

Configuration of the pump impeller



Pump impeller data

D1 [m]: 0.20 ?

D2 [m]: 0.35 ?

β_1 [°]: 30 ?

β_2 [°]: 20 ?

b1 [m]: 0.04 ?

b2 [m]: 0.04 ?

w [rpm]: 1440 ?

η_m [-]: 0.8 ?

ρ [kg/m³]: 1000 ?

Pump CALC - V.1.0

34% 16:27

CALCULATE

Flow : 0.2188 m³/s

Hmax : 34.21776 m

Head : 27.37421 m

Power : 58.75677 kW

Velocity Diagrams - EULER

U1 : 15.07928 m/s

C1m : 8.70603 m/s

C1u : 0 m/s

w1 : 17.41205 m/s

U2 : 26.38873 m/s

C2m : 4.97485 m/s

C2u : 12.72044 m/s

w2 : 14.54549 m/s

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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #3: “App4Comp”

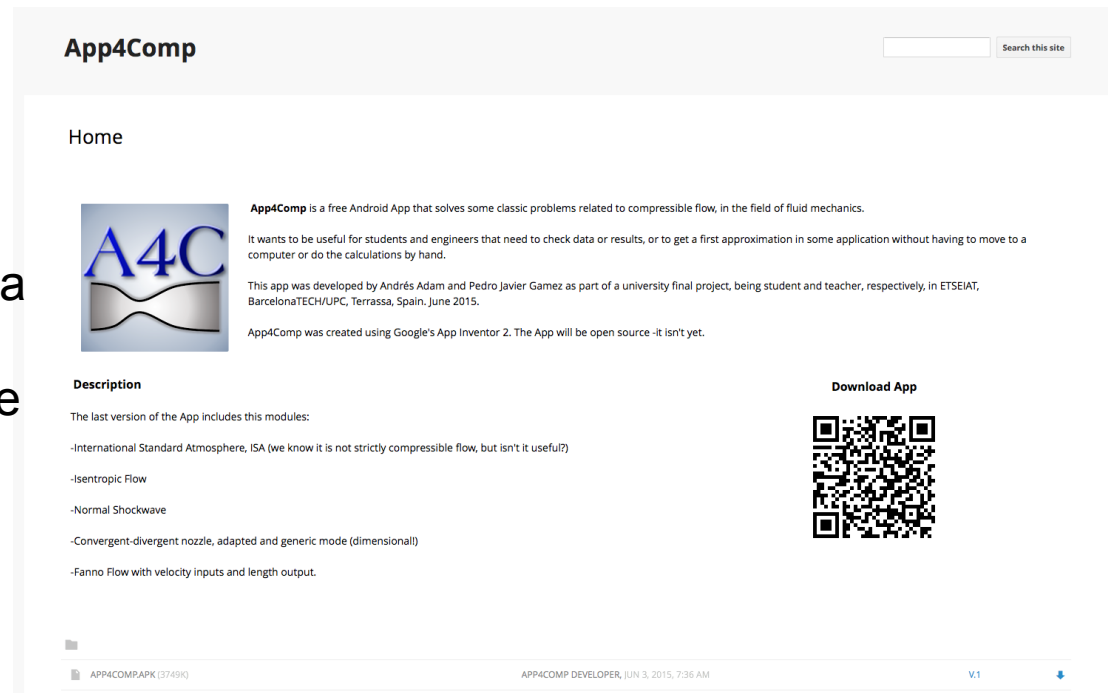
Please, visit -> <https://sites.google.com/site/app4comp/>

App4Comp



App4Comp is a free Android App that solves some classic problems related to compressible flow, in the field of fluid mechanics.

The app wants to be useful for students and engineers that need to check data or results, or to get a first approximation in some application without having to move to a computer or do the calculations by hand.

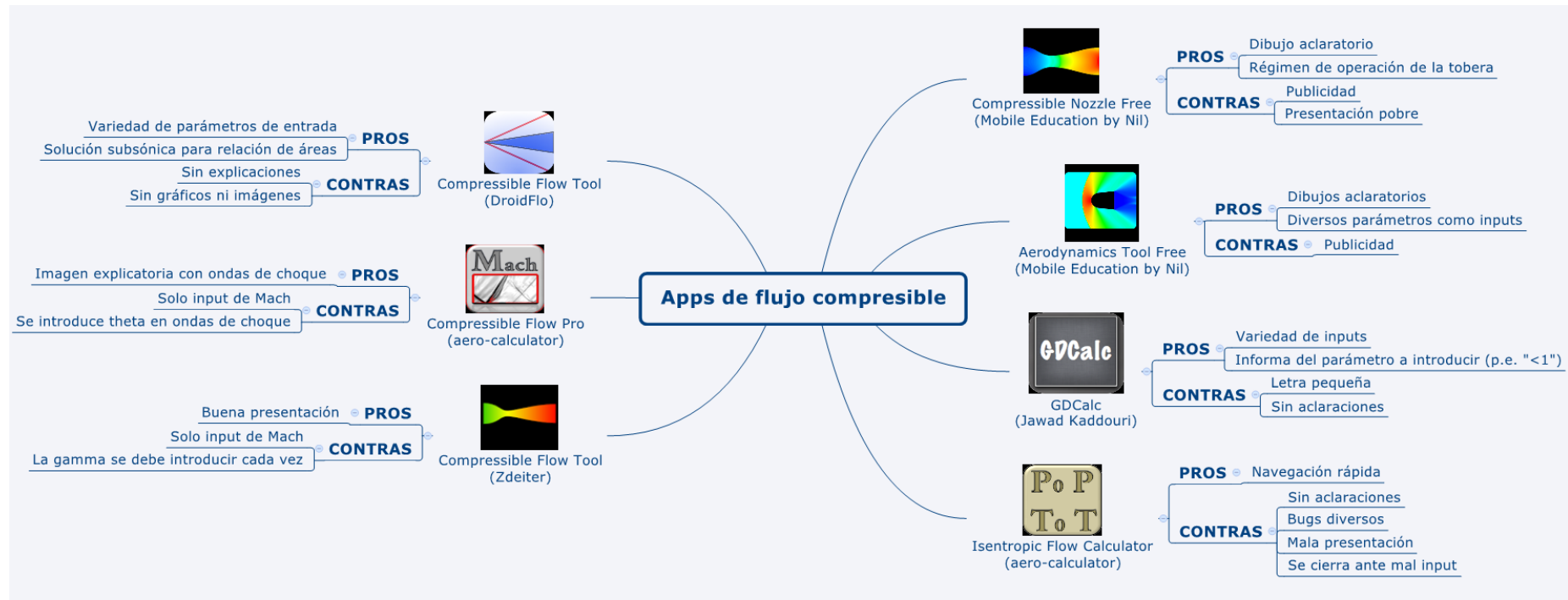


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Student App #3: “App4Comp”

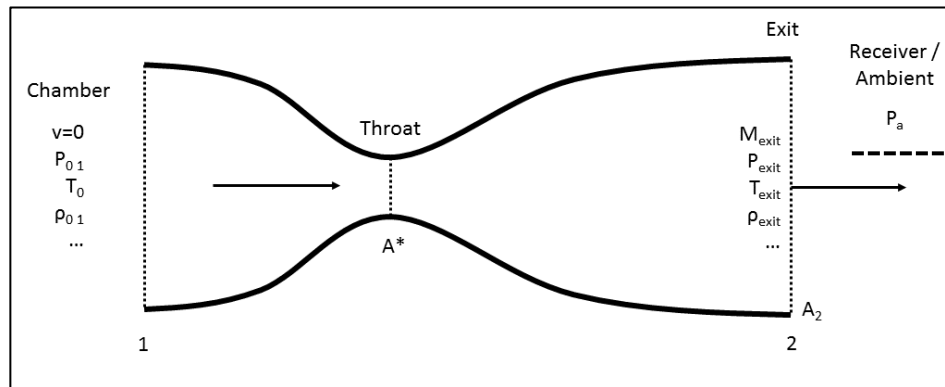
App “market” research of free apps of compressible flow



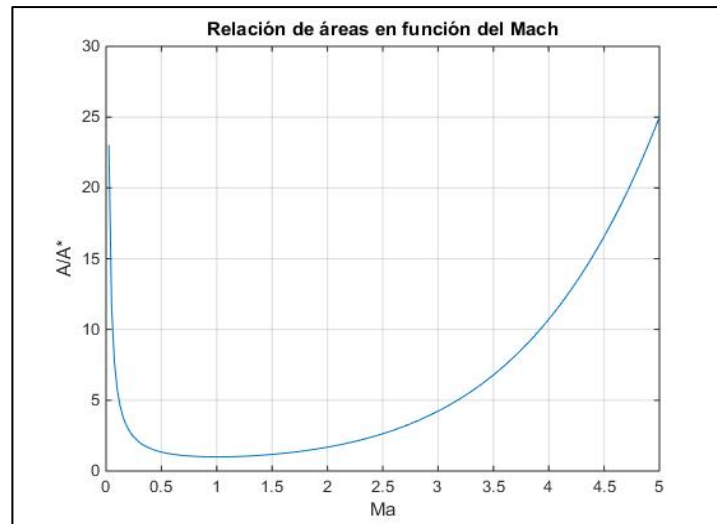
MIT App Inventor WORKSHOP

Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #3: “App4Comp”



Método Newton-Raphson



Convergent-Divergent Nozzle

Mode: Generic

Data

$P_0 (1)$: 100

$P_{ambient}$: 80

A^* : 1

A_2 : 2

T_0 : 300

γ : 1.4

r : 287.058

Calculate

Results

Convergent-Divergent Nozzle

A^* : 1 m2

A_2 : 2 m2

T_0 : 300 K

γ : 1.4

r : 287.058 J/kgK

Calculate

Results

Regime: Shockwave

Shockwave area: 1.29712 m2

M_{exit} : 0.35715

Mass flow rate: 233.33228 kg/s

P_{exit} : 80 kPa

T_{exit} : 292.5371 K

ρ_{exit} : 0.95266 kg/m3

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Fluid Mechanics Apps of our Bachelor Thesis Students

Student App #3: “App4Comp”

Development of an App for Compressible Flow “App4Comp”

Paper presented in the Educational Congress:

TEEM'15 Porto

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ABSTRACT

In this paper is discussed the development and operation of a new Android App made through Google's platform App Inventor 2. This App is focused on solving classic problems related to compressible flow, dealing with the typical cases seen in the subject of Fluid Mechanics of a degree in Aeronautics. It is downloadable from [1], or through the QR code at the end of this paper.

The main objective of this project was to bring in a new, useful app about compressible flow to the market, but also to test the platform App Inventor and see its usefulness in engineering applications.

Categories and Subject Descriptors

- Applied computing-Physics
- Applied computing-Computer-assisted instruction

General Terms

Algorithms, Performance, Theory, Verification.

Keywords

App Inventor, Compressible Flow, Fluid Mechanics, Mobile Applications.

1. INTRODUCTION

The application of Compressible Fluid Mechanics is an everyday topic in many areas of engineering. As everybody used to them can relate, the behavior of a compressible flow is not always intuitive and involves many complex formulas that are very difficult to remember, let alone use them easily. All this forces the working engineer to move from the “work place” to the “calculus

place” whenever a question or problem arises. With the mobile technology available nowadays, this problem is outdated. The devices carried in our pockets are perfectly capable of solving most of these problems; they just need a proper solving software.

On the other hand, students that are required to learn about compressible regimes of Fluid Mechanics might find useful a mobile tool that solves the same problems that they are seeing. That can help them get used to that kind of problems, verify their solutions, see them from another point of view and, when they get familiar with them, get intermediate results within a bigger problem, allowing the students to solve it faster.

All that gave us the idea of developing a mobile app that solves classic problems of compressible flow in a first, theoretical approximation. Aimed mainly to students, as it was made by one as well, it is expected to be useful for working engineers.

2. APP4COMP

App4Comp is an Android App that solves classic problems related to compressible flow. It is thought to be a valuable tool for engineering students when learning about compressible flow. As problems regarding compressible flow are long and time-consuming, the App can be used to solve them in-class in a quick and easy way by everyone there, allowing the teacher to show the students a bigger amount of cases, focusing more on the physical concept seen than on the formulas and calculations.

In addition, the students can use App4Comp to check the validity of the problems solved as homework, including intermediate results rather than the final one, and helping to expand their knowledge when testing even more cases just out of curiosity.

When deciding the problems to solve and the modules to create, it was decided that, as the App is aimed to students, it should have whatever can be useful for them. More specifically, the degree in aerospace technologies of the Polytechnic University of Catalonia was taken as a reference.

The App has these modules:

- International Standard Atmosphere (ISA)
- Isentropic flow
- Normal shockwave
- Convergent-divergent nozzle
- Fanno Flow

A. Adam and P. J. Gamez-Montero (2015),
Development of an App for Compressible Flow “App4Comp”,
Third International Conference on Technological Ecosystems
for Enhancing Multiculturality - TEEM'15 Porto, October 7-9,
2015, pp. 297-302

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TEEM '15, October 07-09, 2015, Porto, Portugal
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DOI: <http://dx.doi.org/10.1145/2808580.2808625>

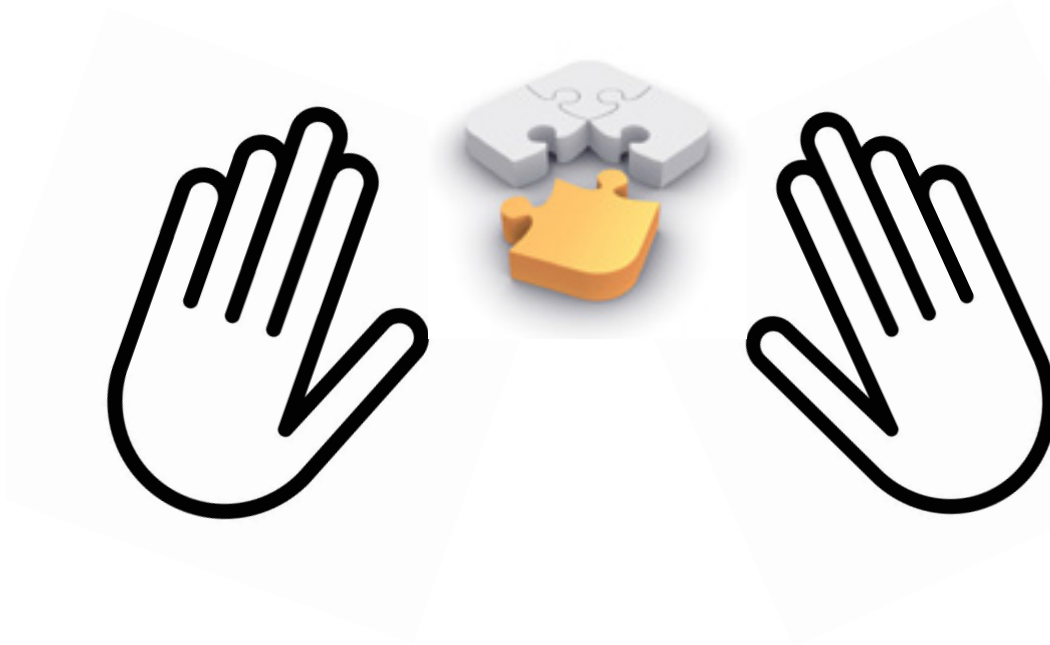
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Hands-on session: creating more apps

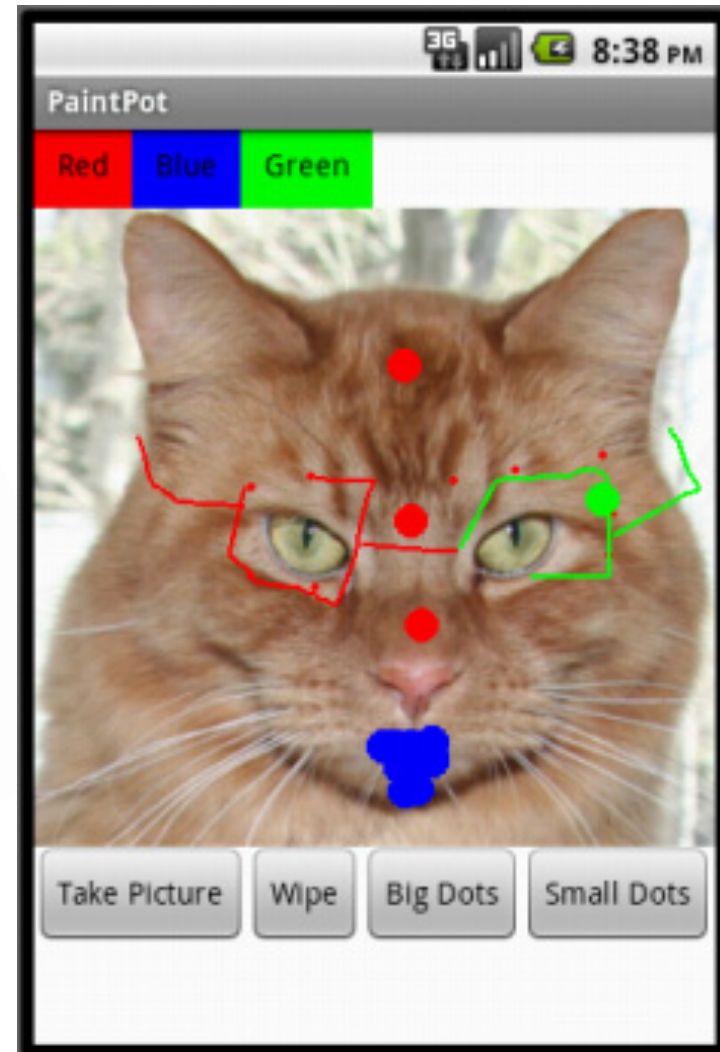
More Apps in this Workshop

Let's create a new App?

Again, let's get hands-on-work



the PaintPot app



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Hands-on session: creating more apps

More Apps from this Workshop

**Have fun with these apps, ...
or others that you think up!**



Thank you for attending
the workshop!



Basic tools to create an educational
App with MIT App Inventor

Trainers:

Xavier and Robert
pjgm@mf.upc.edu
castilla@mf.upc.edu

