Basic tools to create an educational App with MIT App Inventor

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MIT App Inventor

UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

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MIT App Inventor®

The CONTENTS

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”

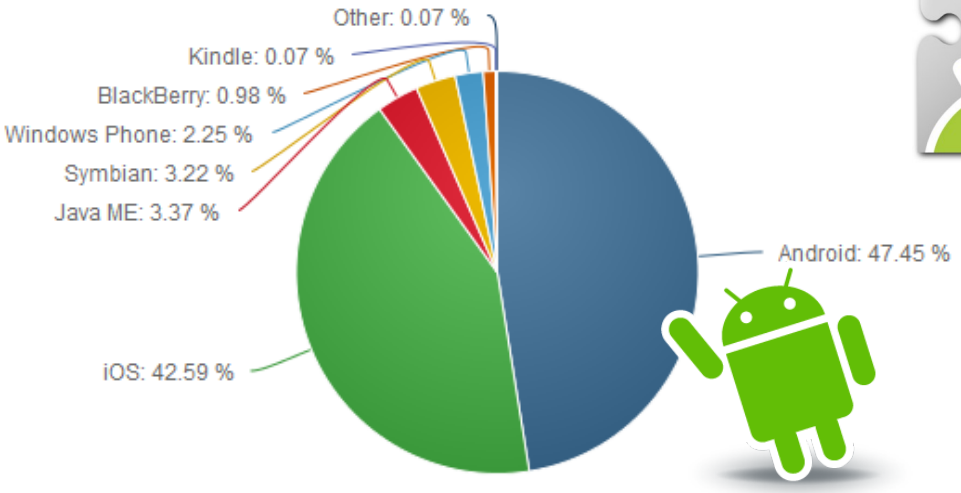
What is MIT App Inventor? Several figures …

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



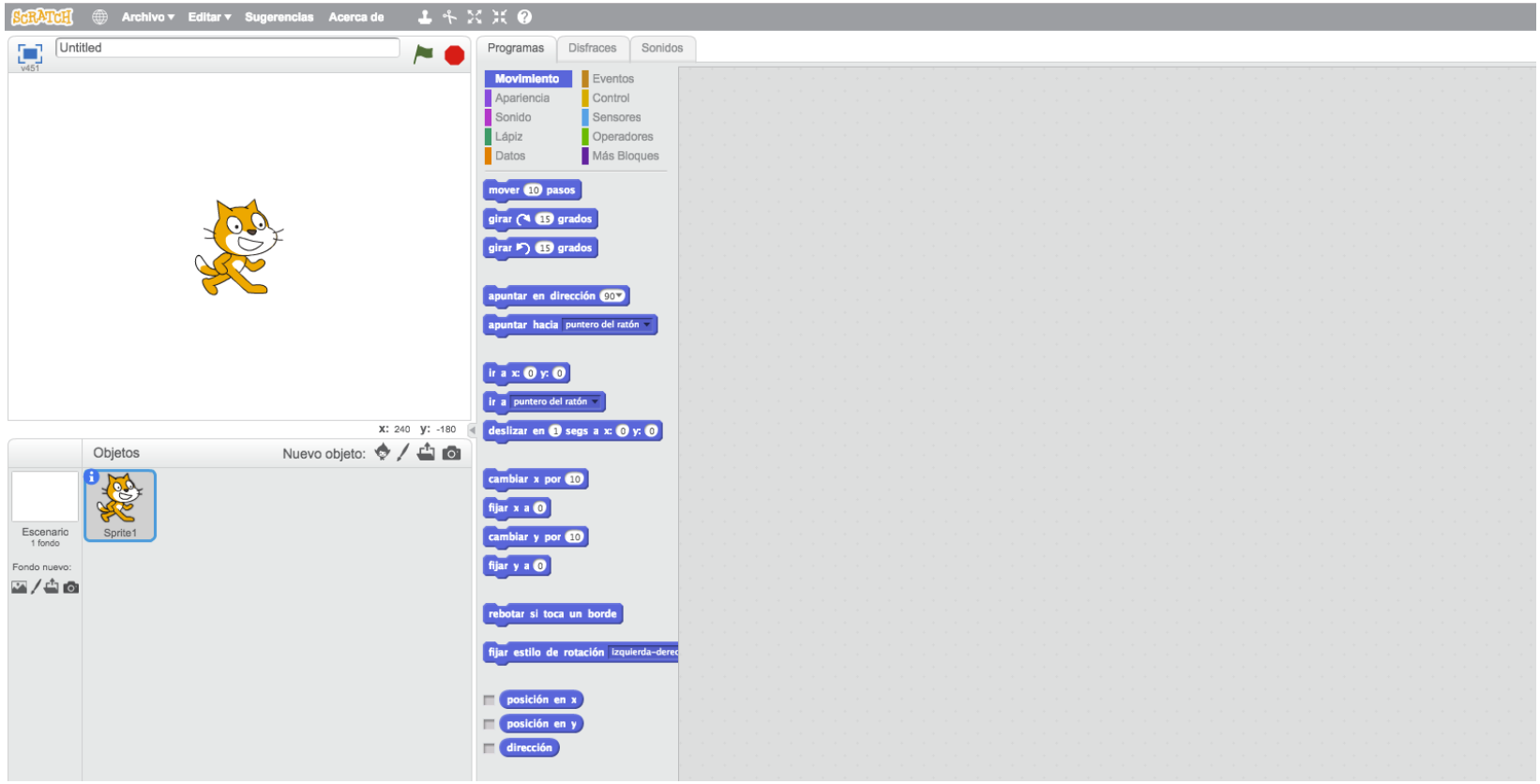
*Web UCH (Universidad Cardenal Herrera)
Ranking de sistemas operativos mas usados 2015

Source: MIT App Inventor

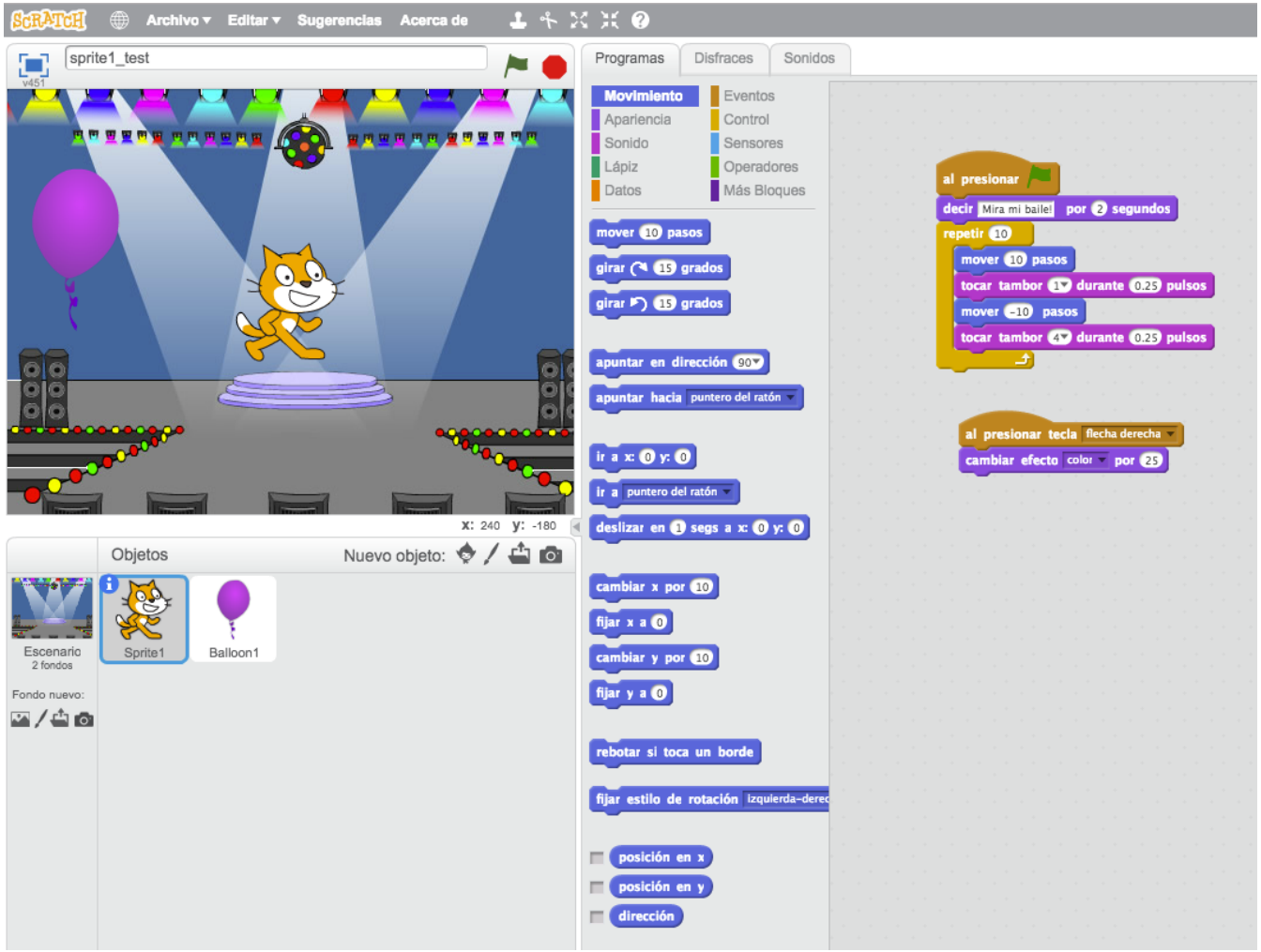
Scratch for Educators

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.



Scratch for Educators

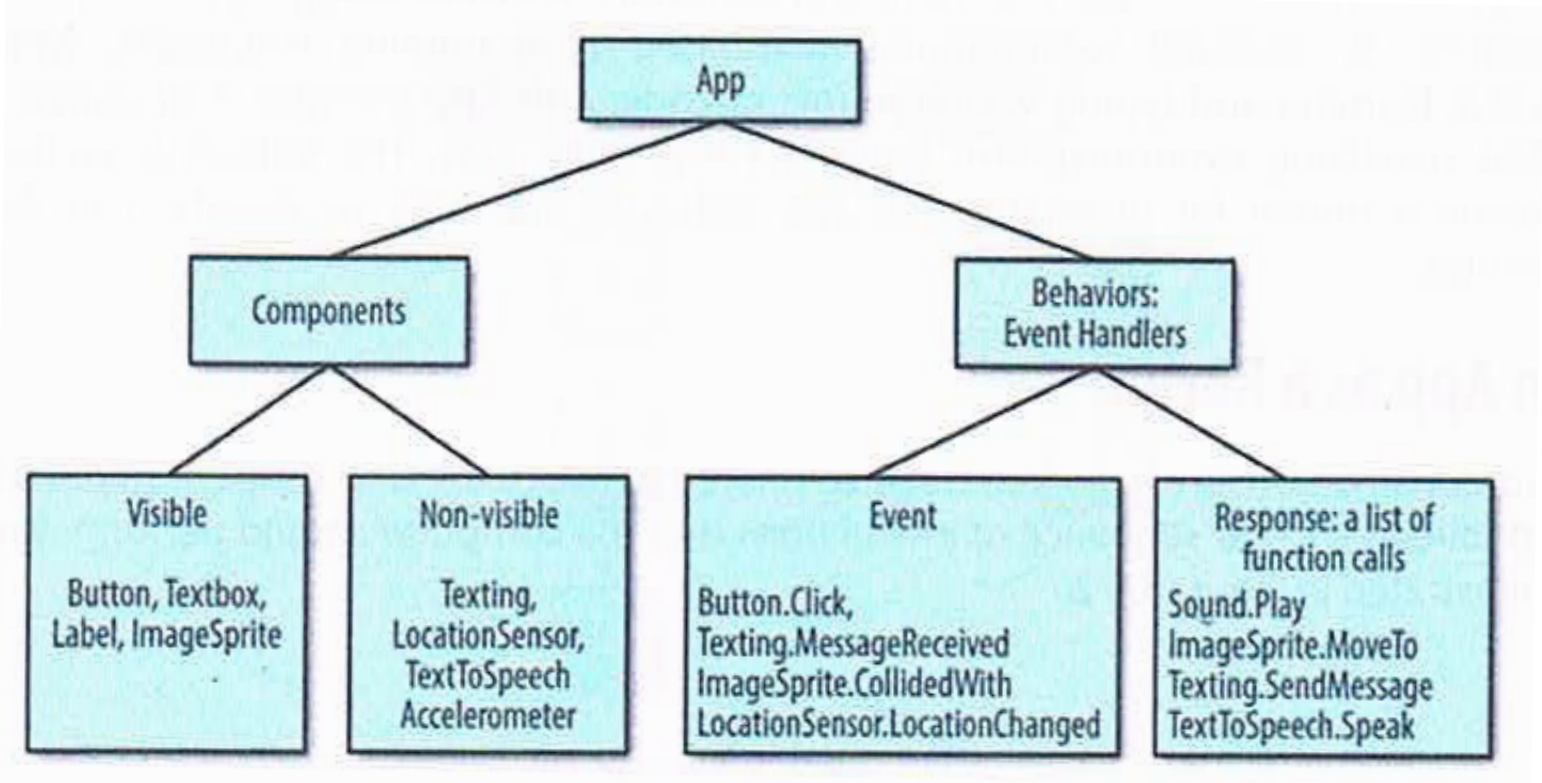


Scratch for Educators

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. CreateYour Own Android Apps", Ed. O'Reilly, USA

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.

Understanding an App's Architecture:: Few concepts …

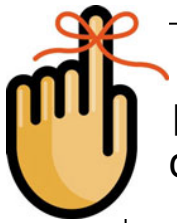
… without us being experts ☺

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.

Show & Tell

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

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 ☺)

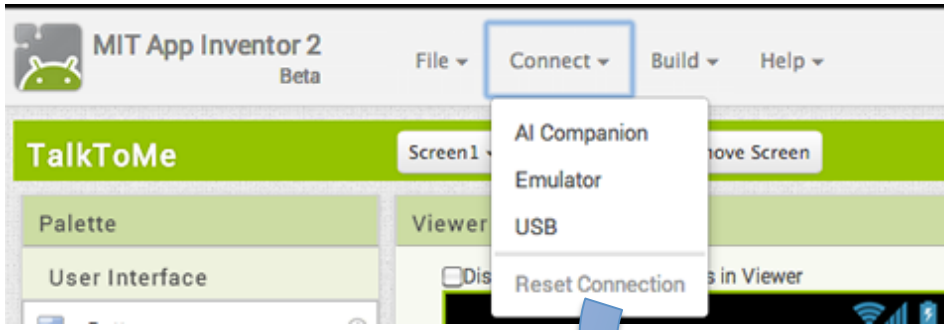
Show & Tell: What you'll need

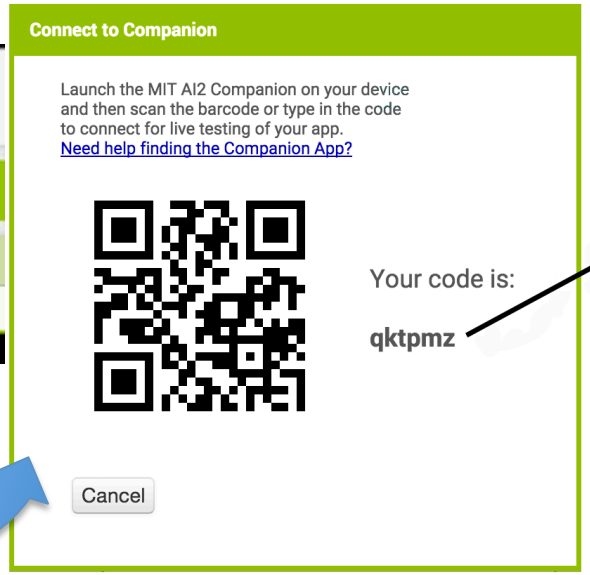
Working with APP INVENTOR 2

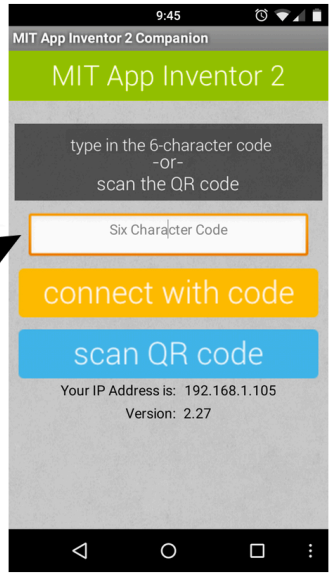
④ Back in your computer's browser (Chrome, Firefox or Safari), open app inventor by going to ai2.appinventor.mit.edu. **Create a new project**.

(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

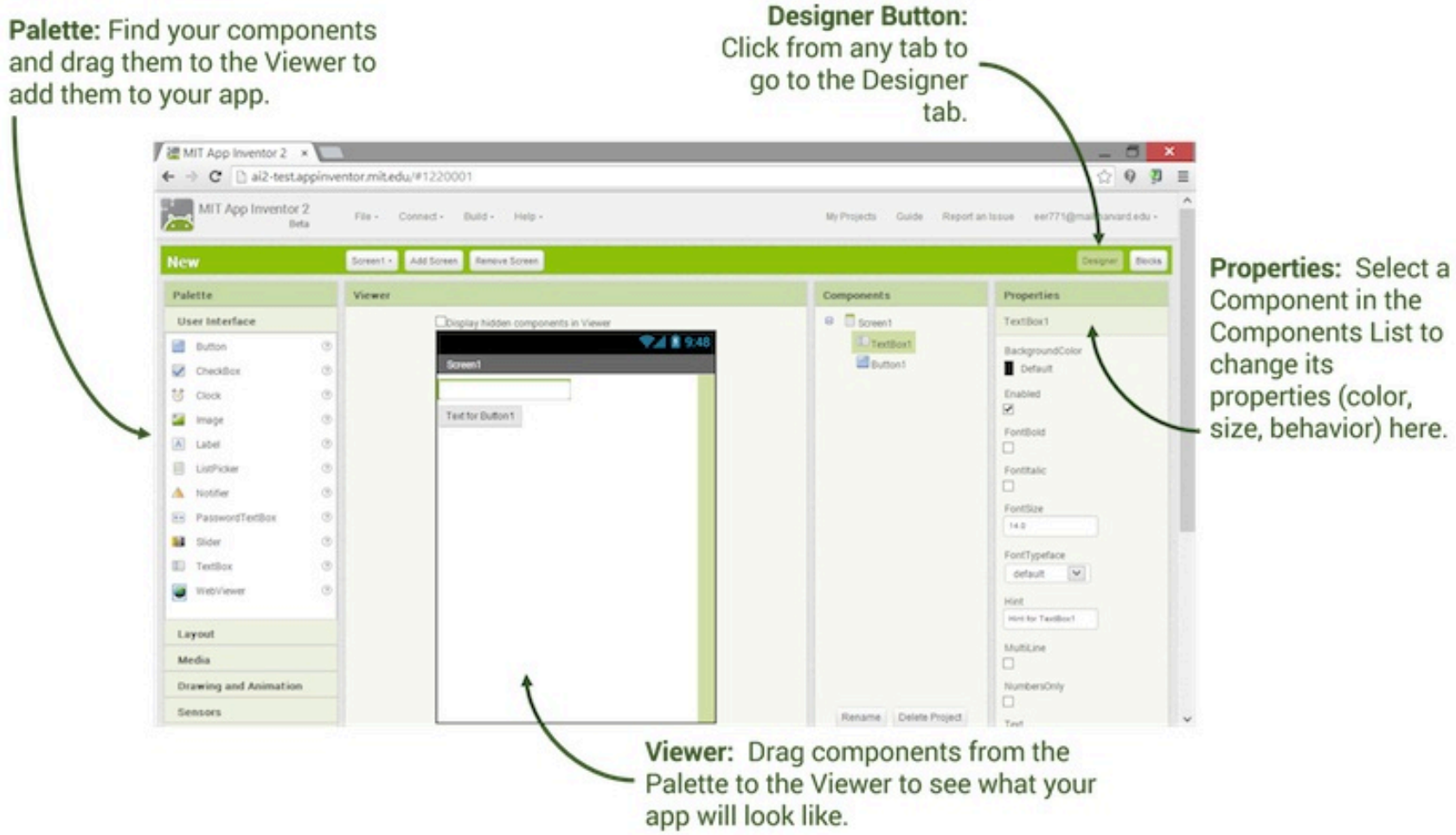
③ step: **TEST**:: Testing while your are building

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

① step: DESIGNER:: How your app looks

App Inventor Designer

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



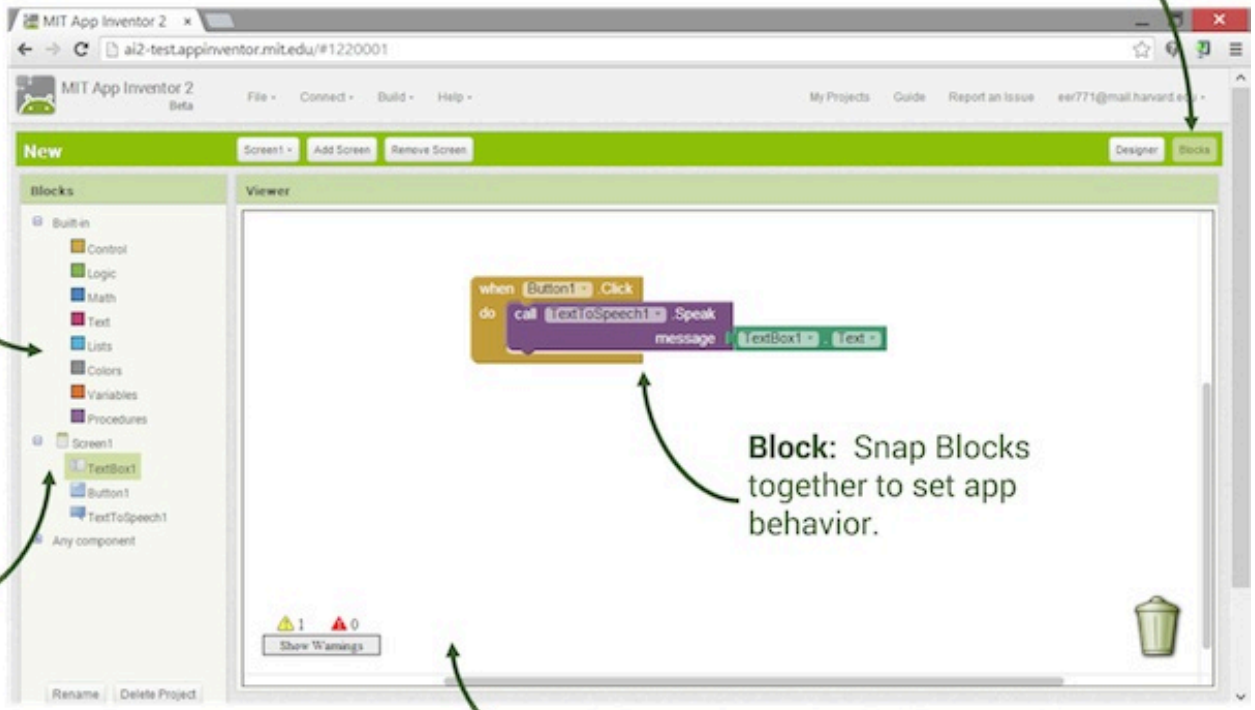
App Inventor Blocks Editor

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

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.

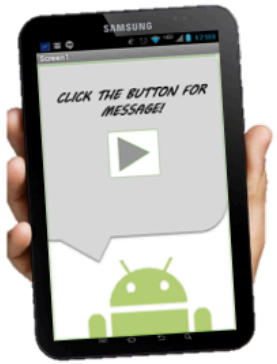
Block: Snap Blocks together to set app behavior.

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

Type names with no spaces!!!

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

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

- Start new project, like **project New**, from scratch
- Import project (**.aia**-file) form a repository
- Gallery
- Import project (**.aia**-file) form 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.

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. CreateYour 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:

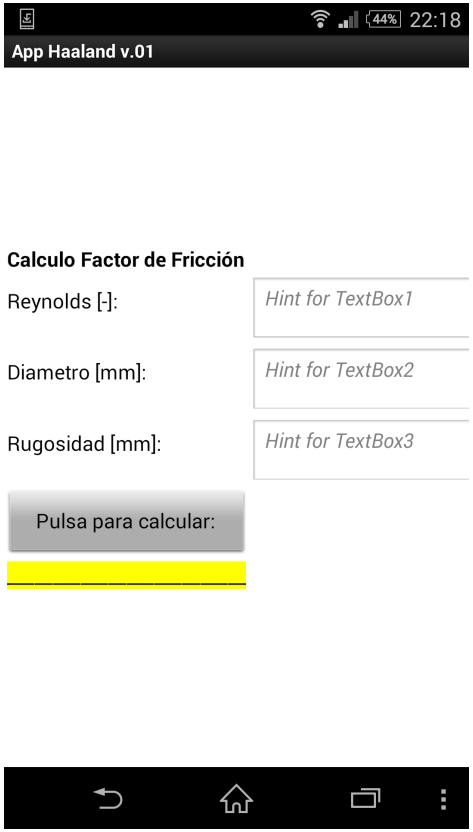
$$\frac{1}{f^{1/2}} \approx -1.8 \cdot \log\left(\frac{6.9}{Re_d} + \left(\frac{\varepsilon/d}{3.7}\right)^{1.11}\right)$$

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).

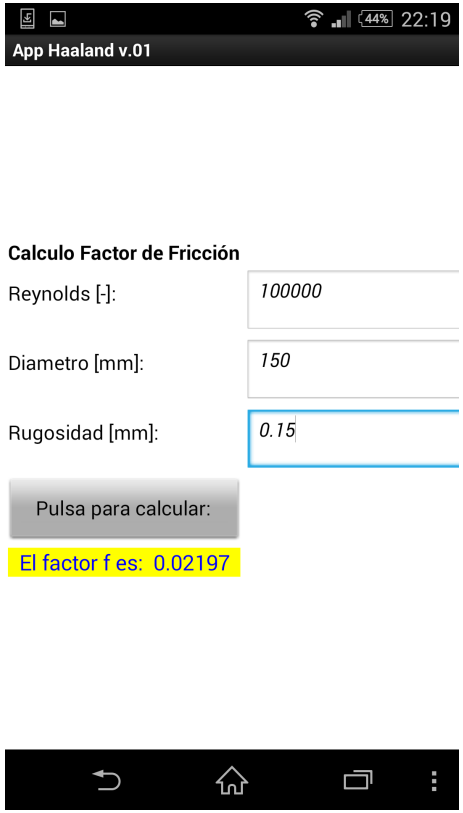
La App tendría una forma parecida a la que se muestra a continuación, ya que debe ser lo más sencilla posible para llevar a cabo el cálculo y nada más:

Educational App Example 1:: The Moody chart

TEST:: Testing while your are building

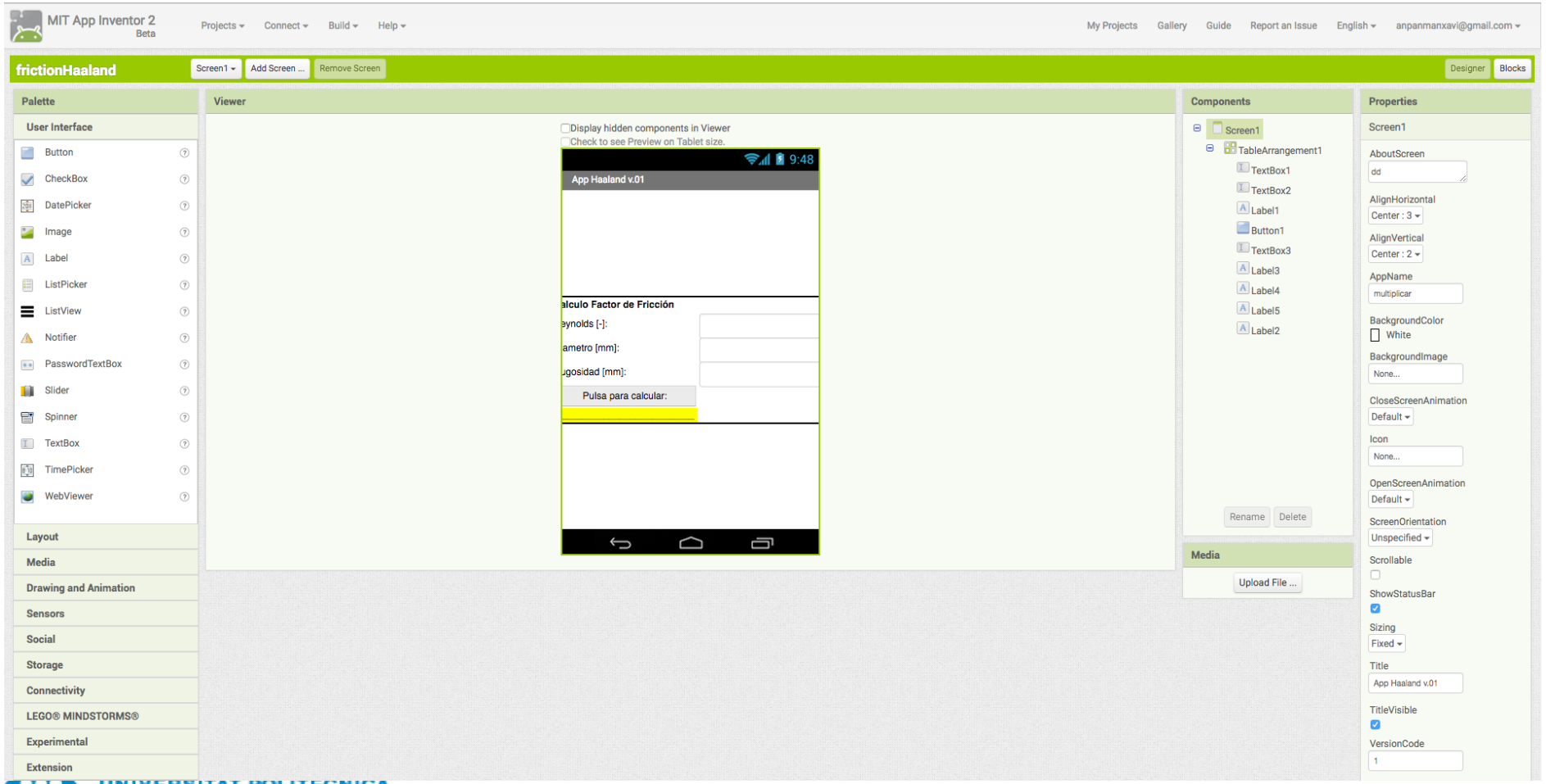


BUILD:: Building your first app



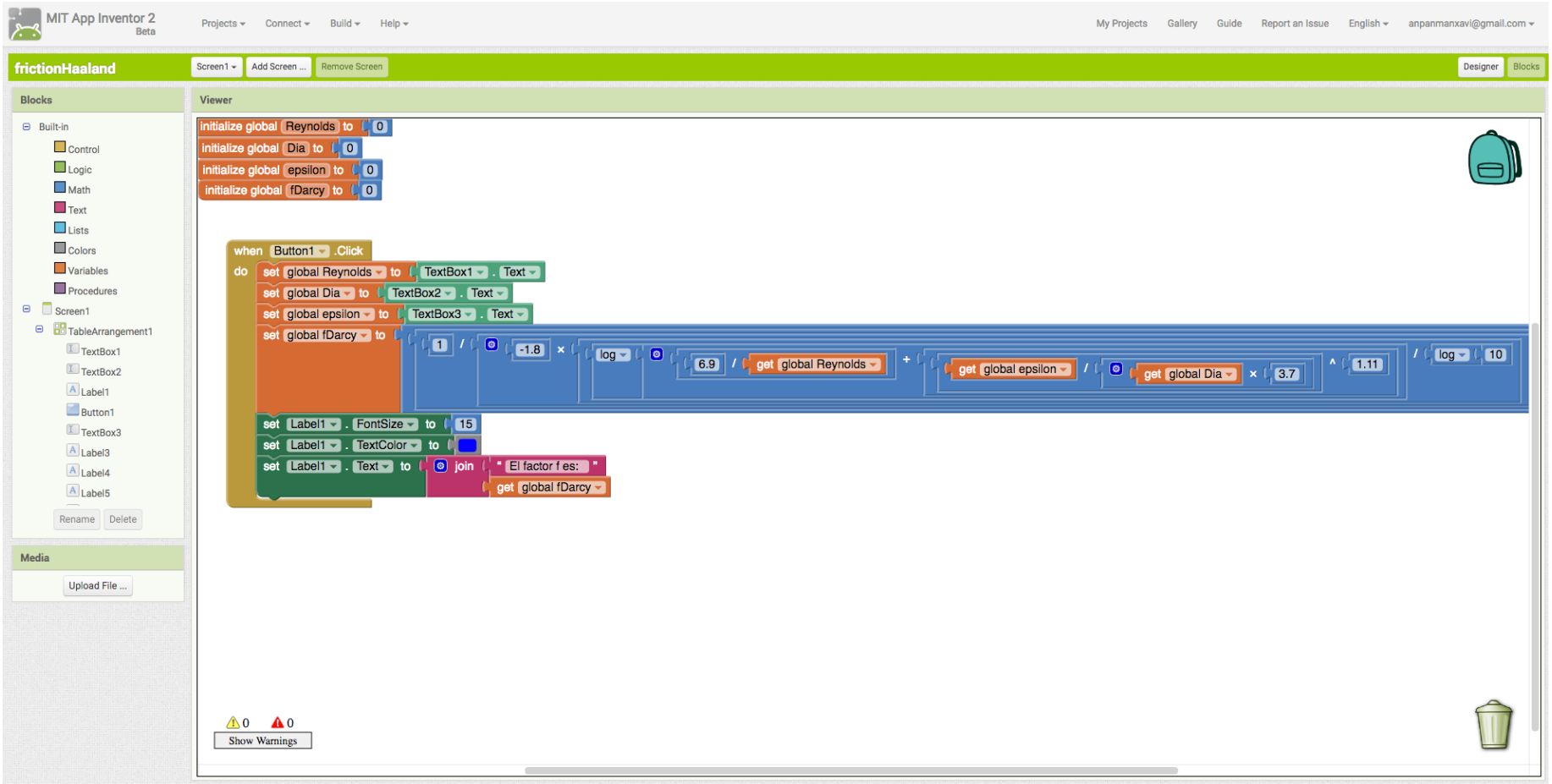
Educational App Example 1:: The Moody chart

DESIGNER:: How your app looks

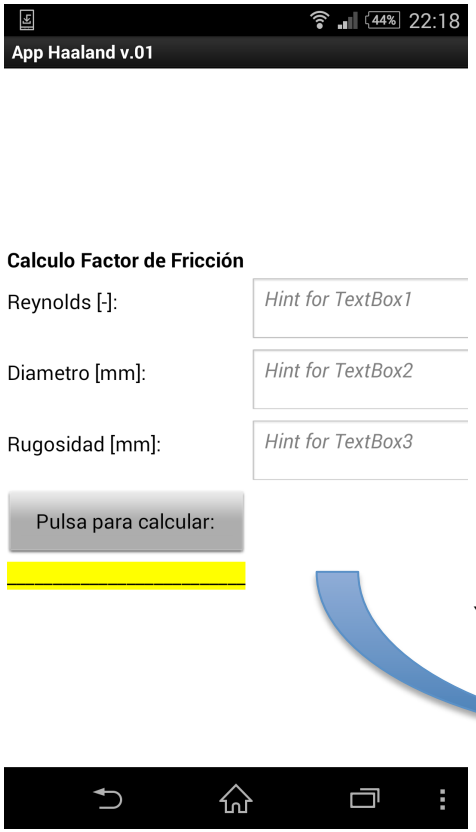


Educational App Example 1:: The Moody chart

BLOCKS:: How your app behaves



Educational App Example 1:: The Moody chart



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).

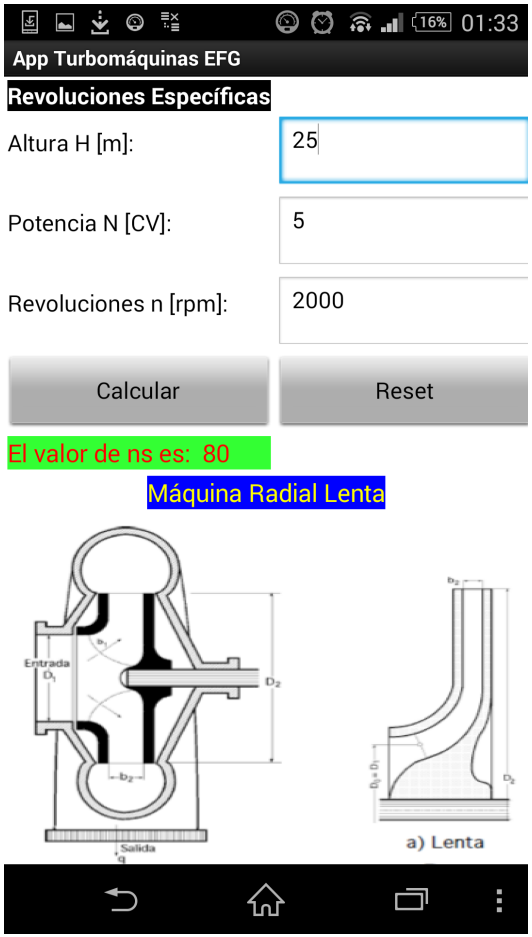
Esta segunda y última aplicación permitirá calcular la velocidad específica definida en el tema "Semejanza en Bomba" así como las imágenes que se utilizan. Además, determinará que tipo de máquina se trata en función de la velocidad específica y mostrará una imagen sencilla de la misma.

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:

Educational App Example 2:: Turbomachinery

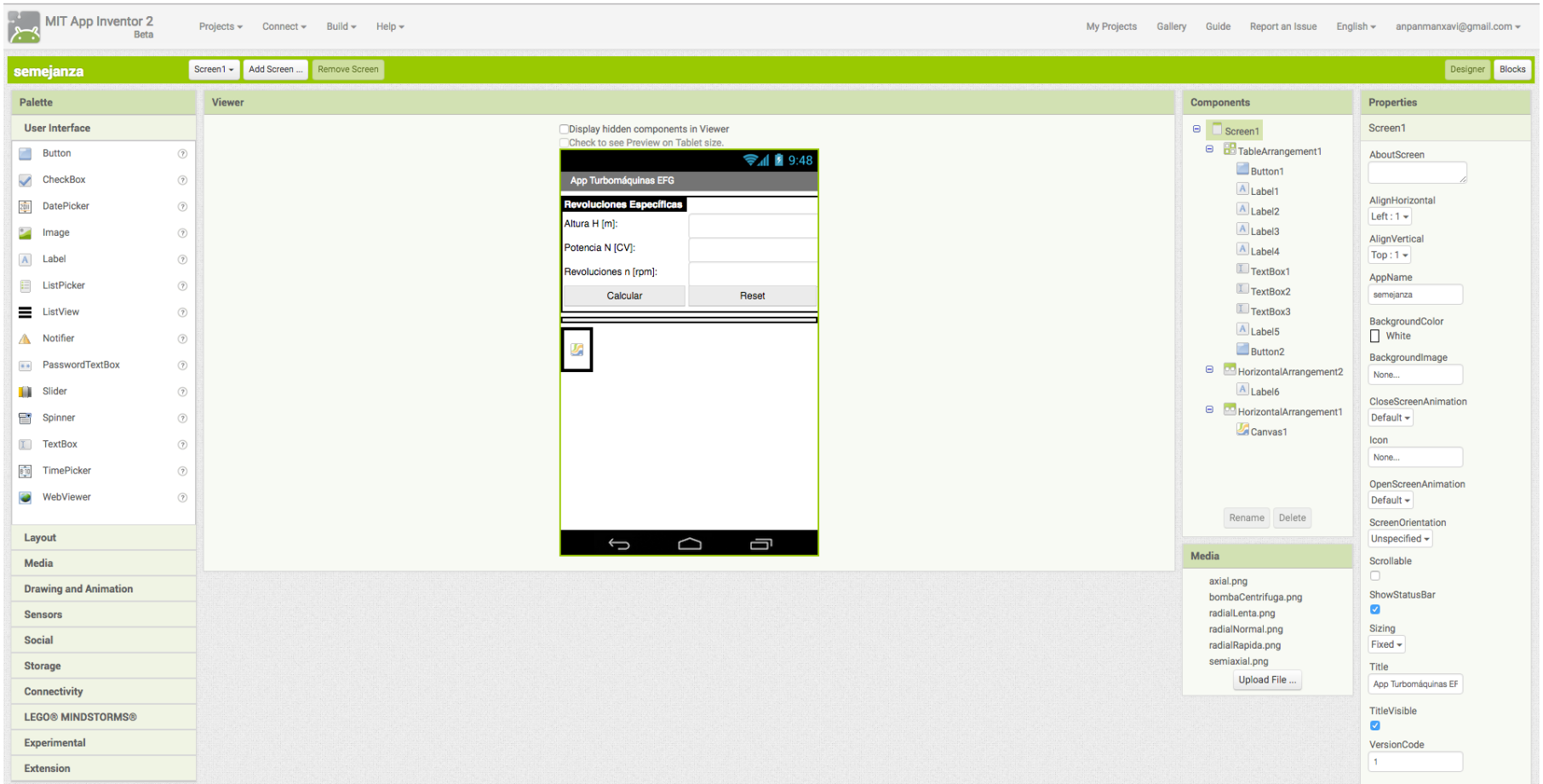
TEST:: Testing while your are building

BUILD:: Building your first app



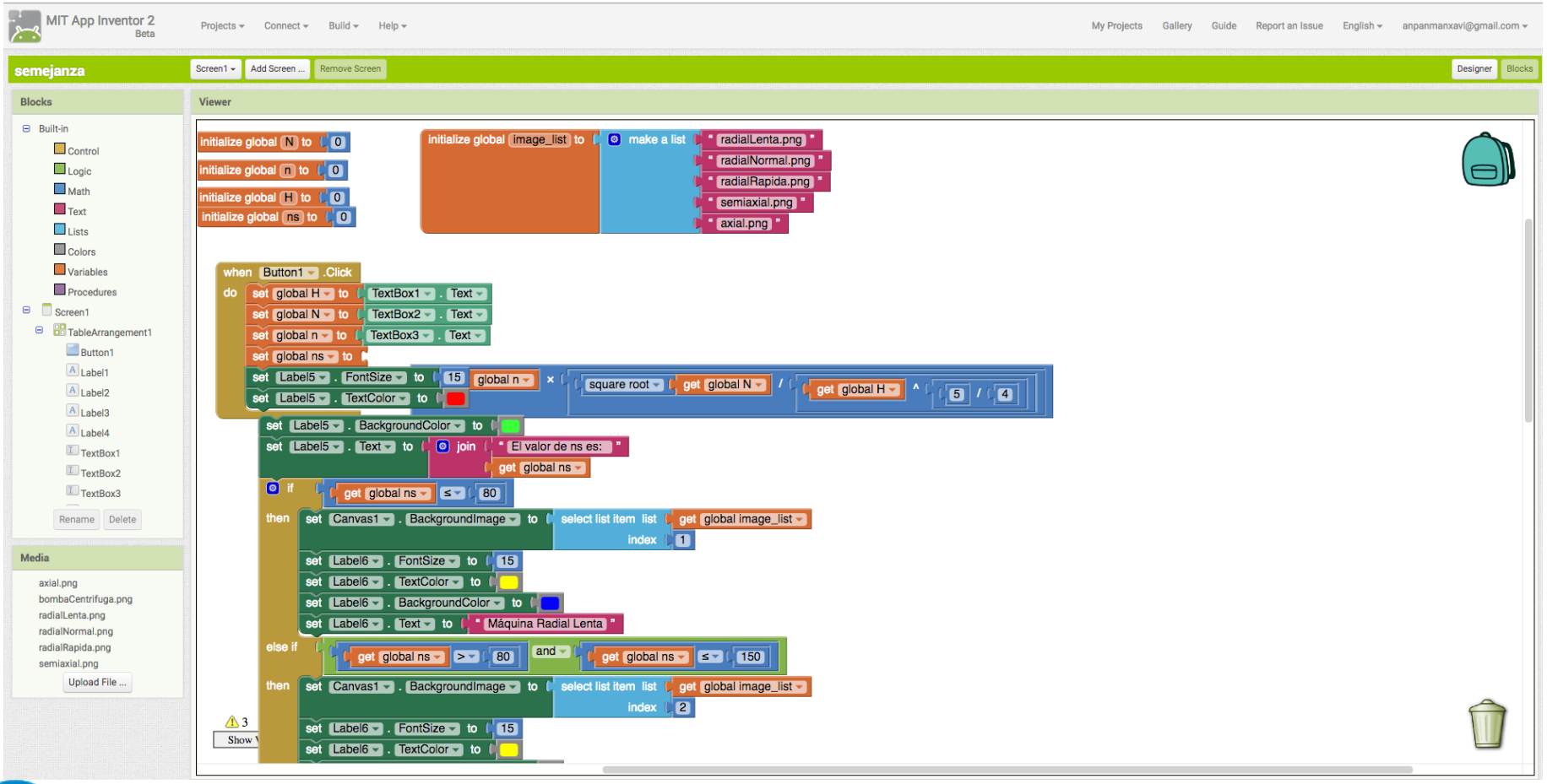
Educational App Example 2:: Turbomachinery

DESIGNER:: How your app looks



Educational App Example 2:: Turbomachinery

BLOCKS:: How your app behaves



Educational App Survey

:: Questions

Escola d'Enginyeria de Terrassa
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Departament de Mecànica de Fluids
UNIVERSITAT POLITÈCNICA DE CATALUNYA

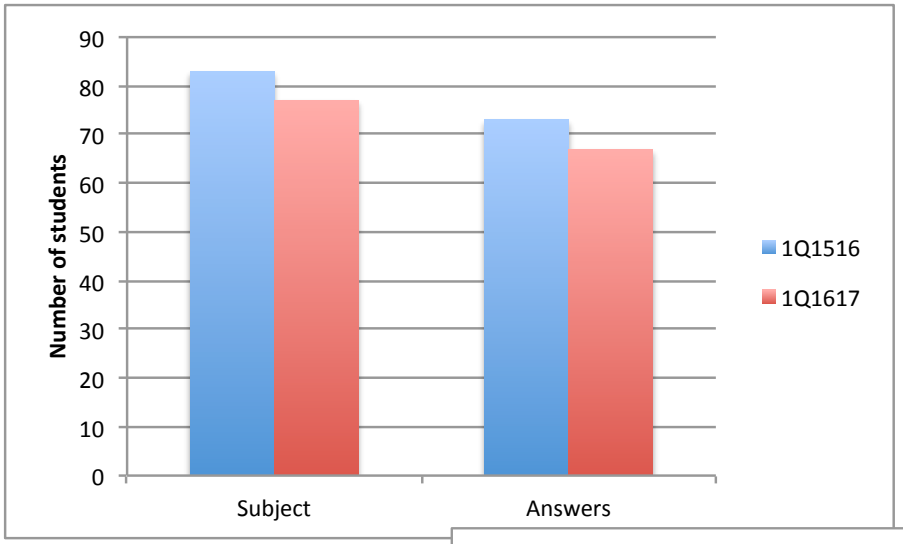
Breve Encuesta sobre la Tarea: "App Android para Enginyeria de Fluids"
Se ruega contesten con completa franqueza siendo la encuesta anónima
Sus opiniones son muy valiosas y servirán para mejorar la asignatura en futuras ediciones

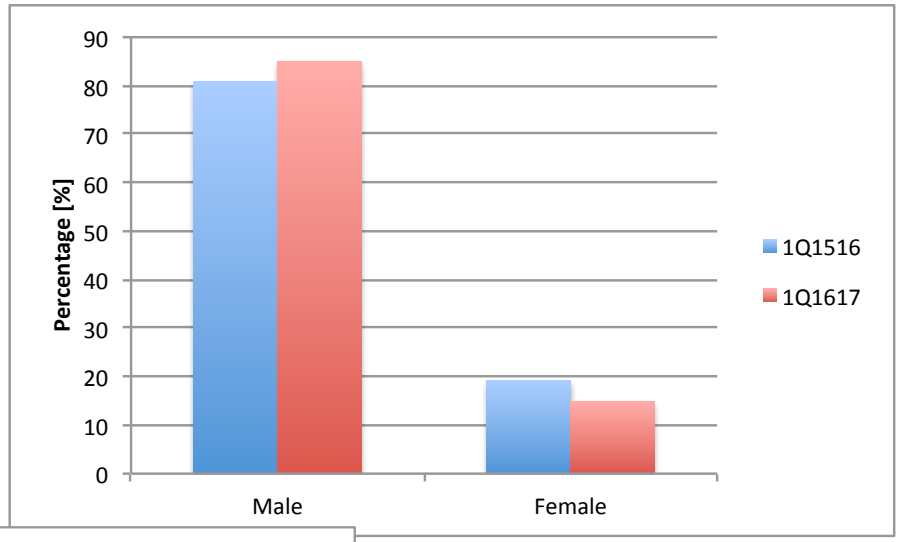
Género Hombre Mujer	
¿Conocía *App Inventor* antes de la propuesta de la tarea por parte del profesor? Si No	
1. Valore de 0 a 10 (0:min – 10:max) el grado de **adecuación y de aprendizaje en la asignatura** de esta tarea con relación a la otras tareas del curso	
2. Valore de 0 a 10 (0:min – 10:max) 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	

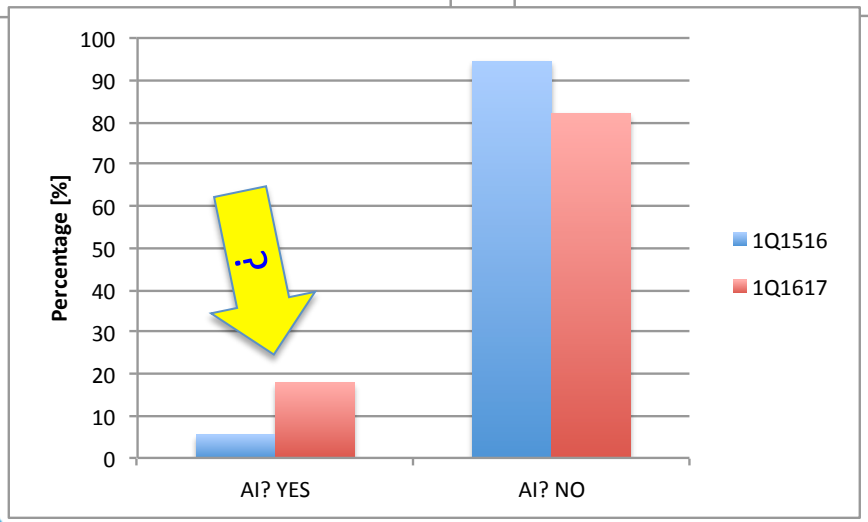
Por favor indique, si lo desea, muy brevemente un aspecto que se podría haber llevado a cabo en la tarea más eficazmente.

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

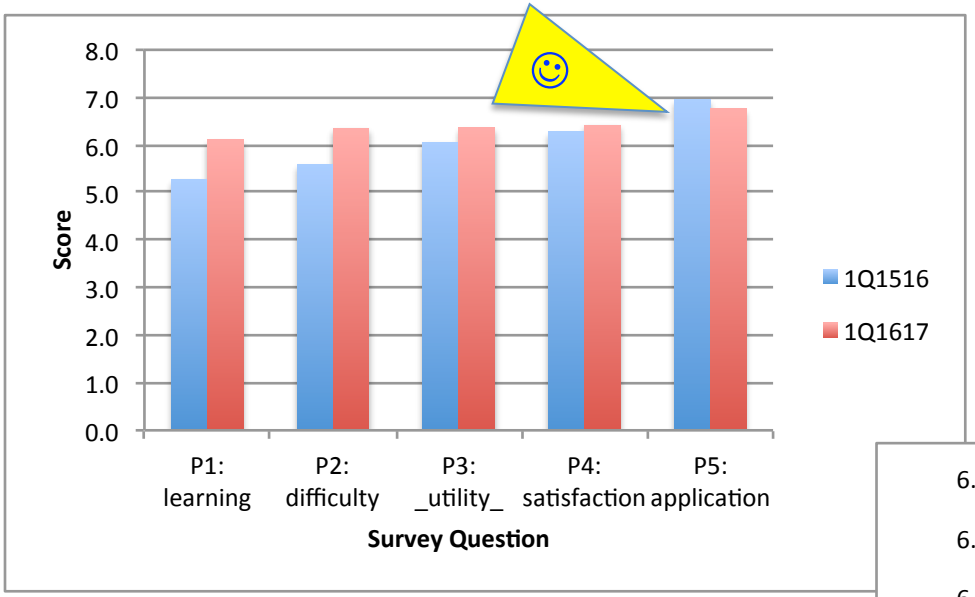
Educational App Survey:: Results

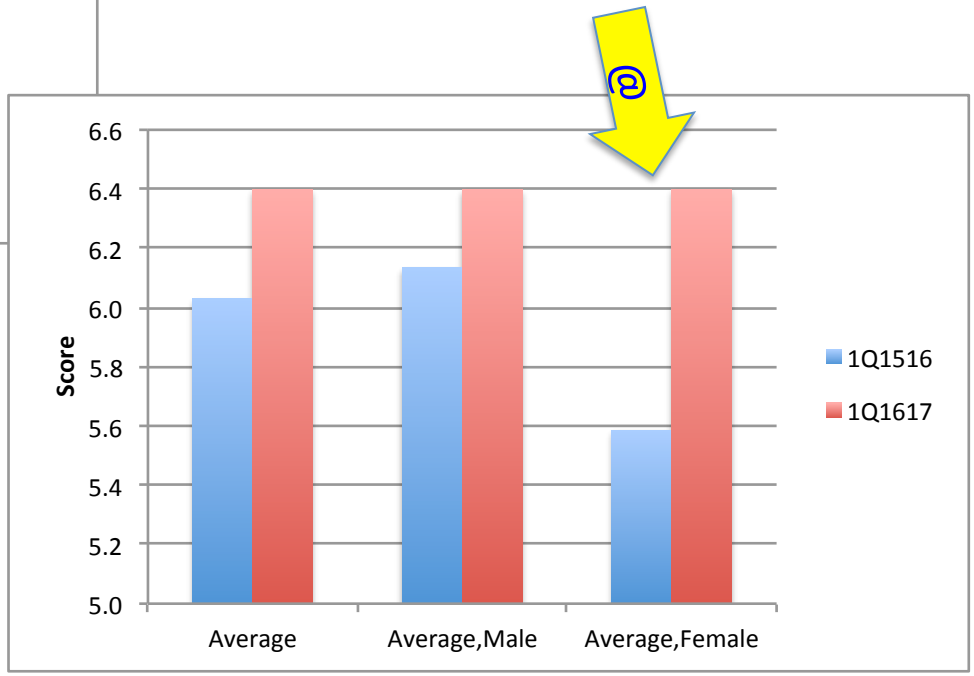






Educational App Survey:: Results





Educational App:: Request for Bachelor project

☆ [redacted]

8 de noviembre de 2016, 18:29

HT

Para: Pedro Javier Gamez-Montero

Proyecto fin de grado (PFG)

Buenas tardes Pedro Javier,

me llamo [redacted]. 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.

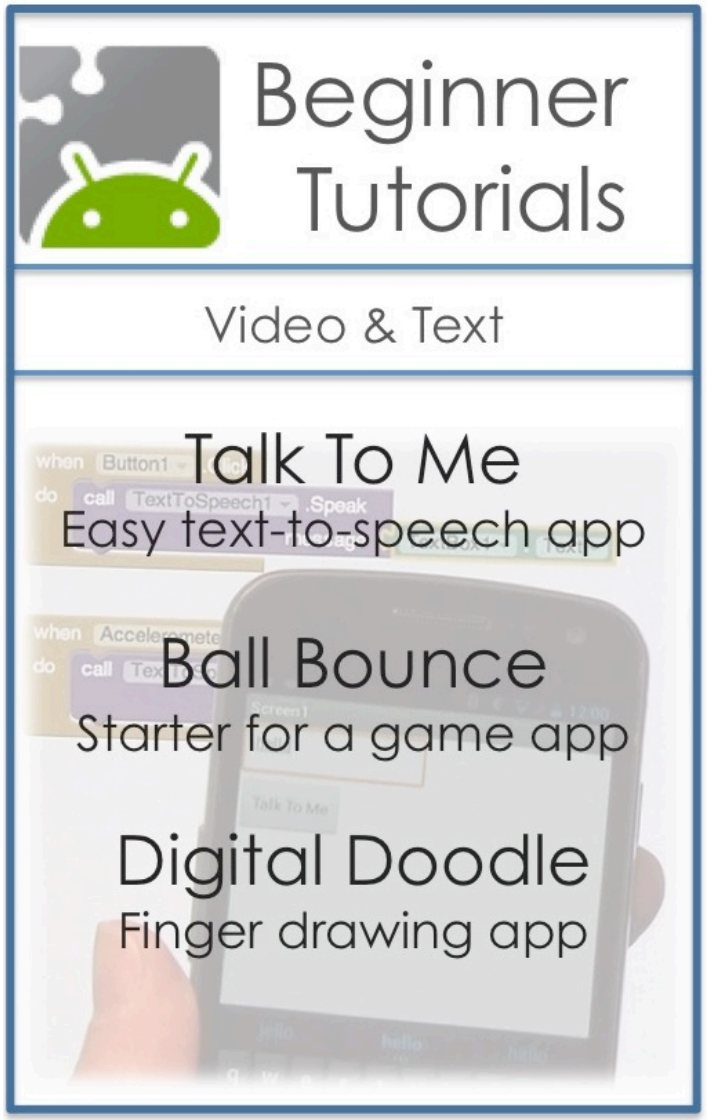
[redacted]

--
Aquest missatge ha estat analitzat per MailScanner
a la cerca de virus i d'altres continguts perillosos,
i es considera que está net.

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**

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

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

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

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

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

App of the Month

https://play.google.com/store/apps/details?id=appinventor.ai_gic1pc.quellevoyo2

Congratulations to the September winners!

Adult Winner

¿Que llevo yo?

by Gerard Fossoul Soler

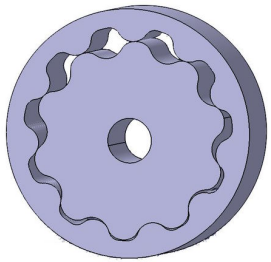
Planning a meal with family and friends? Spanish developer Gerard's comprehensive app makes the task easy and organized!

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.

Fluid Mechanics Apps of our Bachelor Thesis Students

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

Student App #1: “GearPumpDesigner”



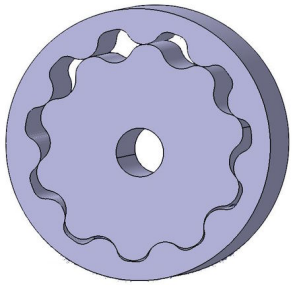
Student App #2: “PumpCALC”

Student App #3: “App4Comp”

Student App #1: "GearPumpDesigner"

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

GearPumpDesigner



APP

New Android Application for Hydraulic Pumps

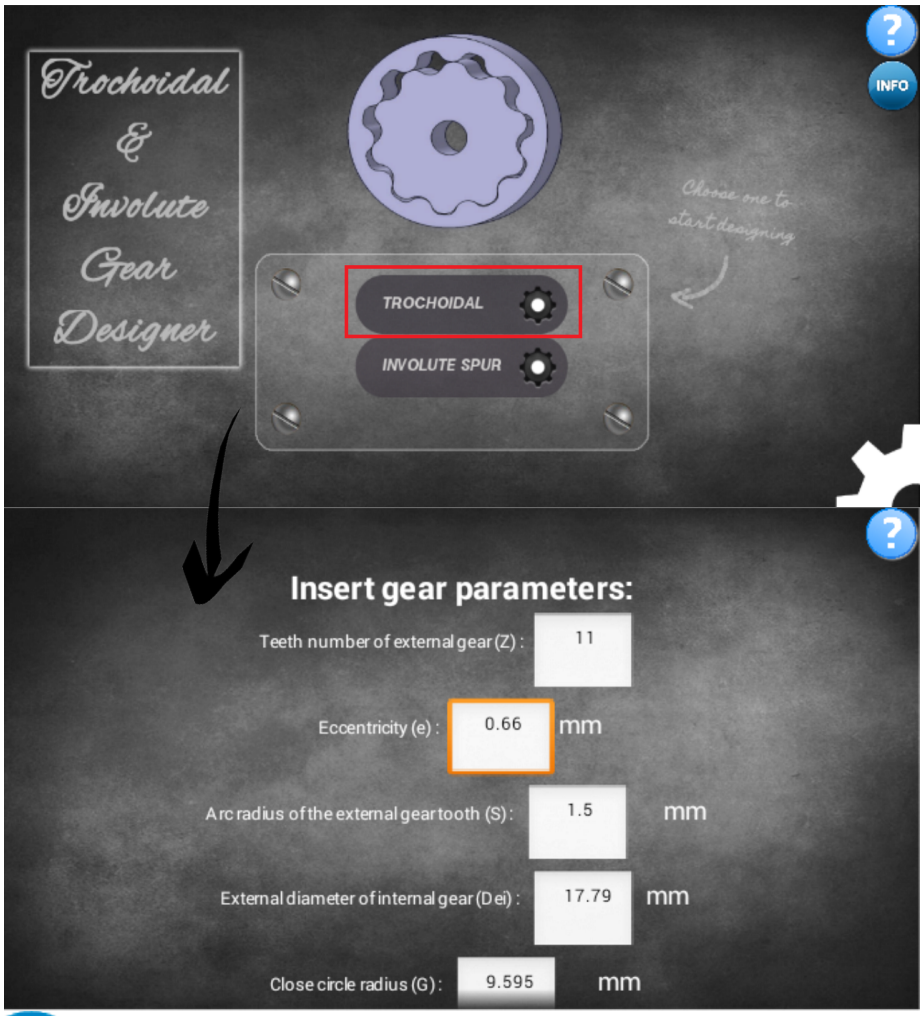
App for volumetric machinery calculation

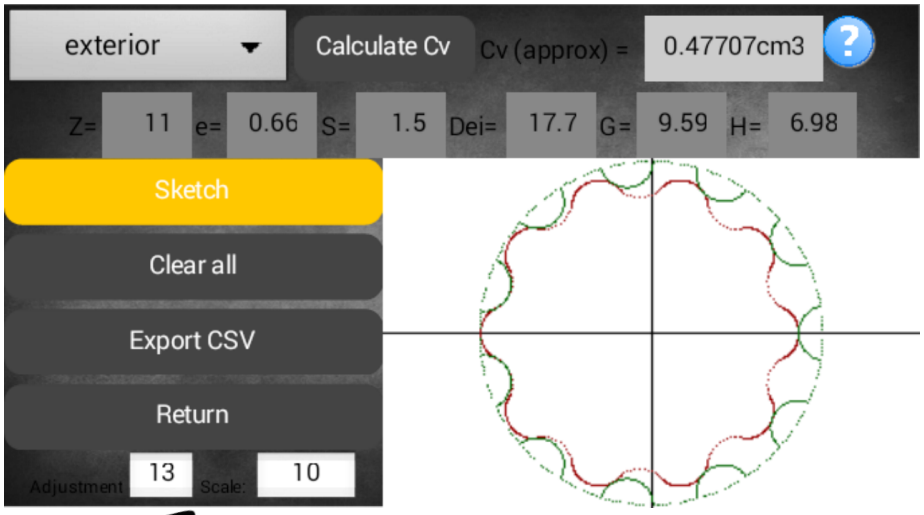
Intended for students and engineers that need to check data or draw a tooth profile

Gear Pump Designer

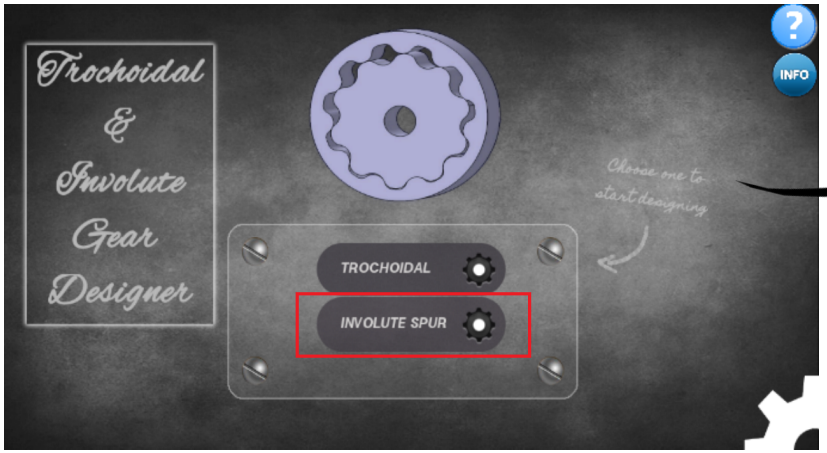
Gear Pump Designer is an Android Application programmed by using MIT App Inventor intended to reach a first draft design of a either trochoidal-gear or involute spur-gear to work as a part of a hydraulic pump just using your Android device.

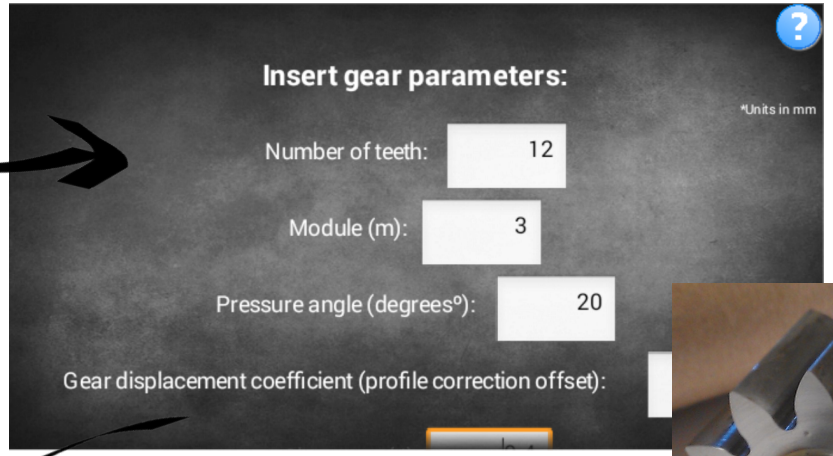
Student App #1: "GearPumpDesigner"

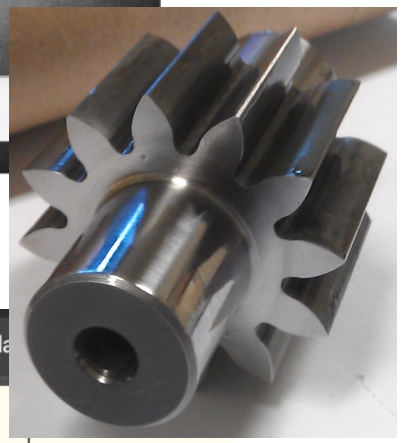


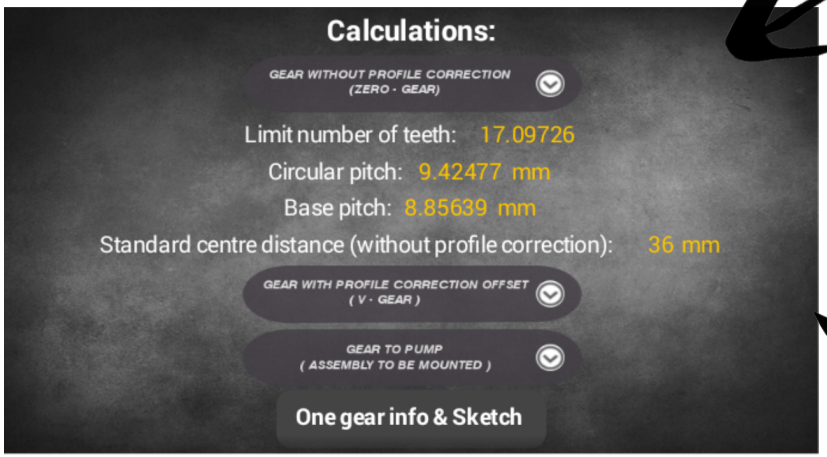


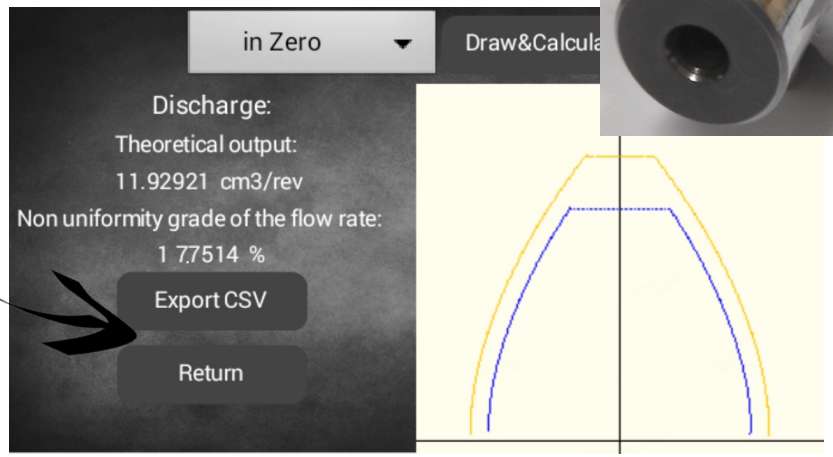
Student App #1: "GearPumpDesigner"











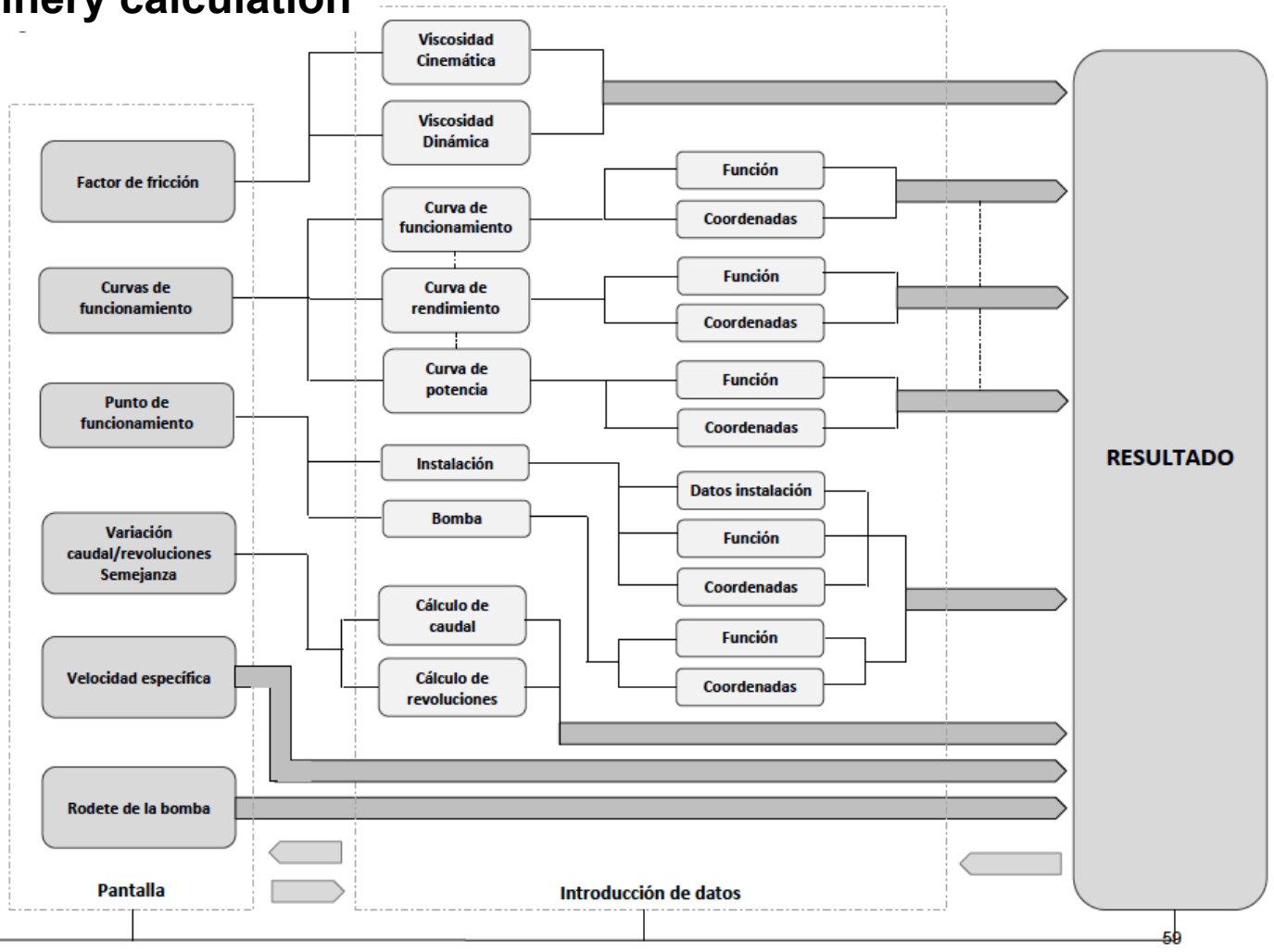
Student App #2: "PumpCALC"

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

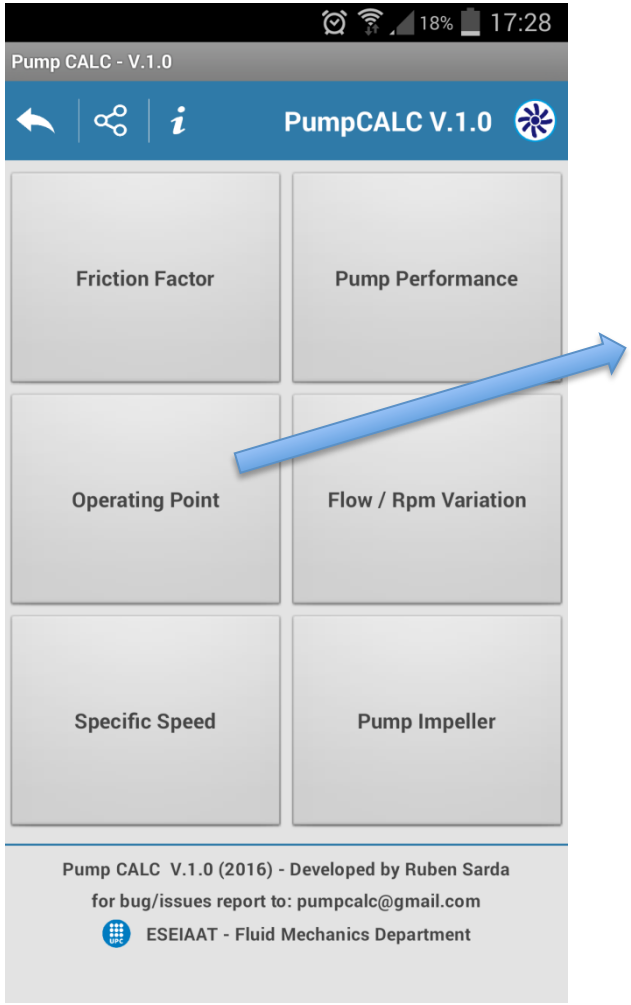
App for turbomachinery calculation

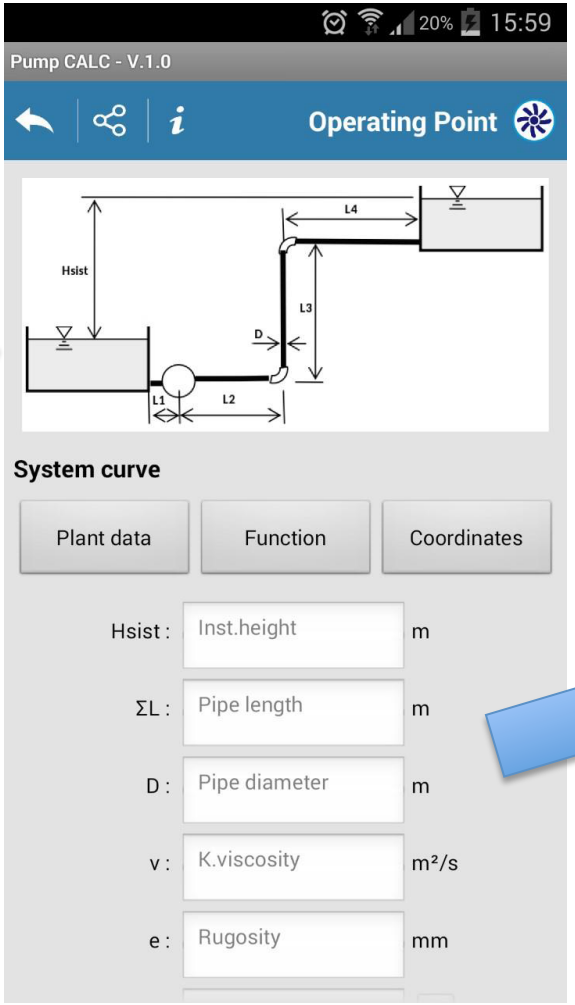
Intended for students and engineers that need to check data or results, or to get a first approximation without doing calculations by hand.

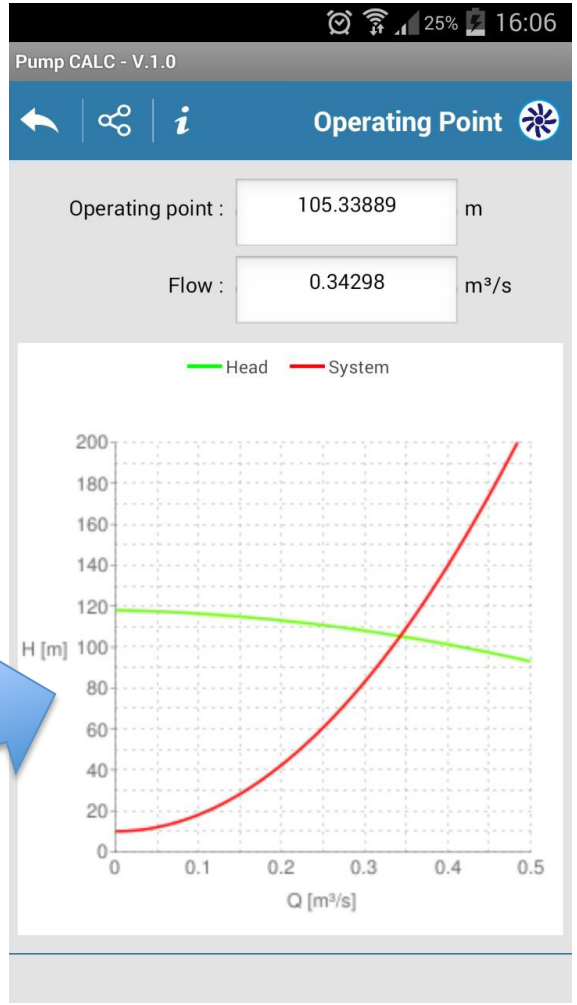
PumpCALC V.1.0



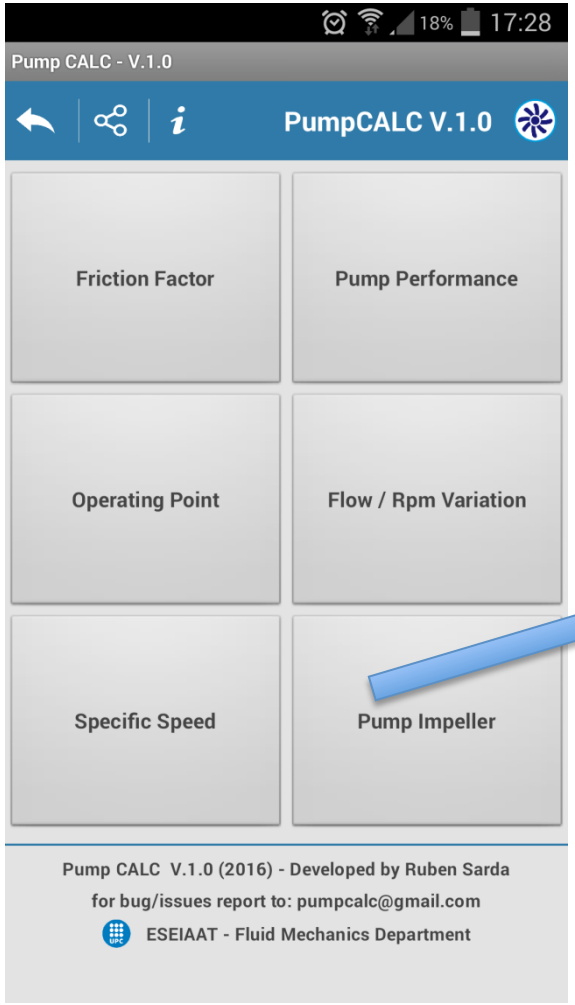
Student App #2: "PumpCALC"

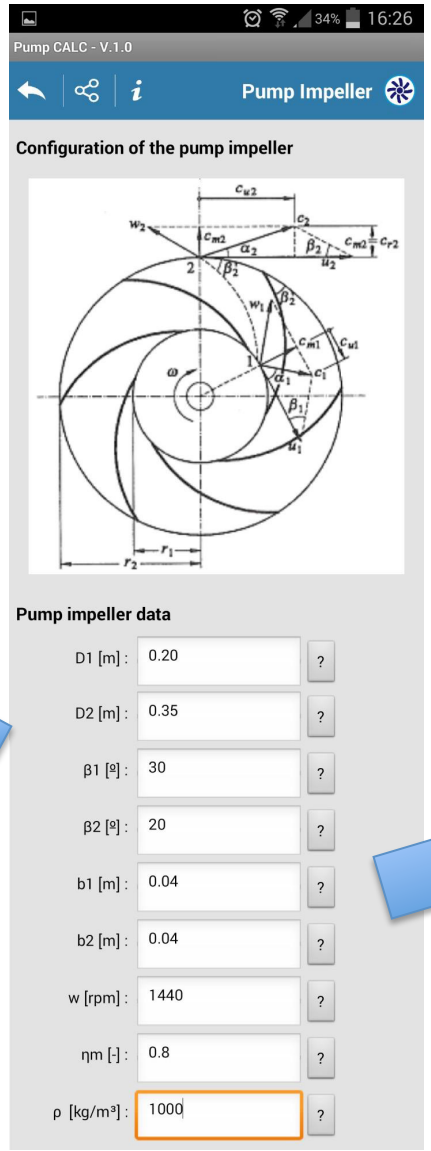


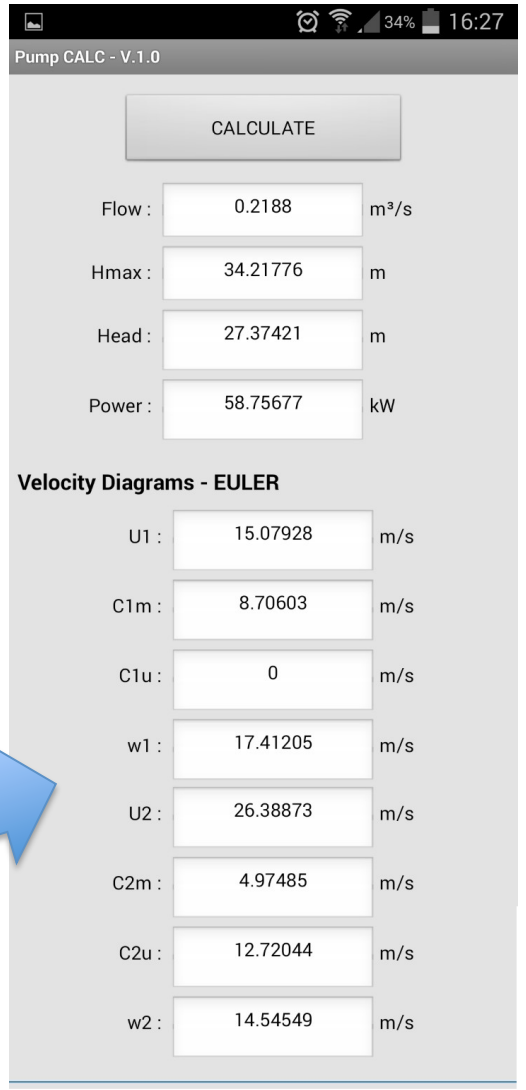




Student App #2: "PumpCALC"







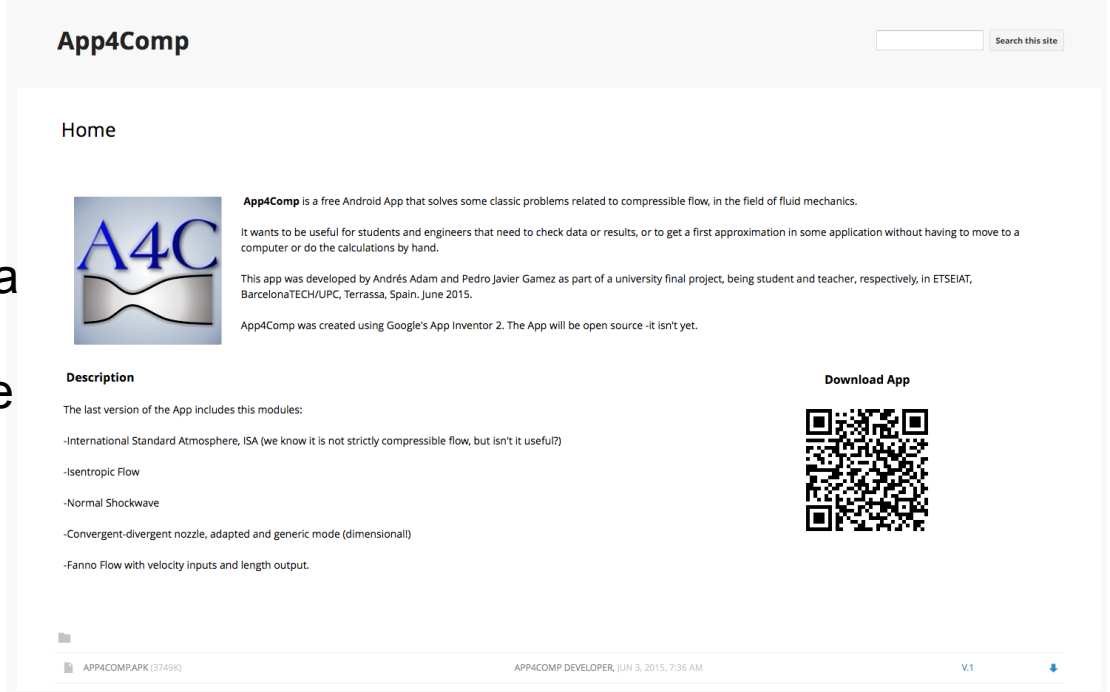
Student App #3: "App4Comp"

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

App4Comp

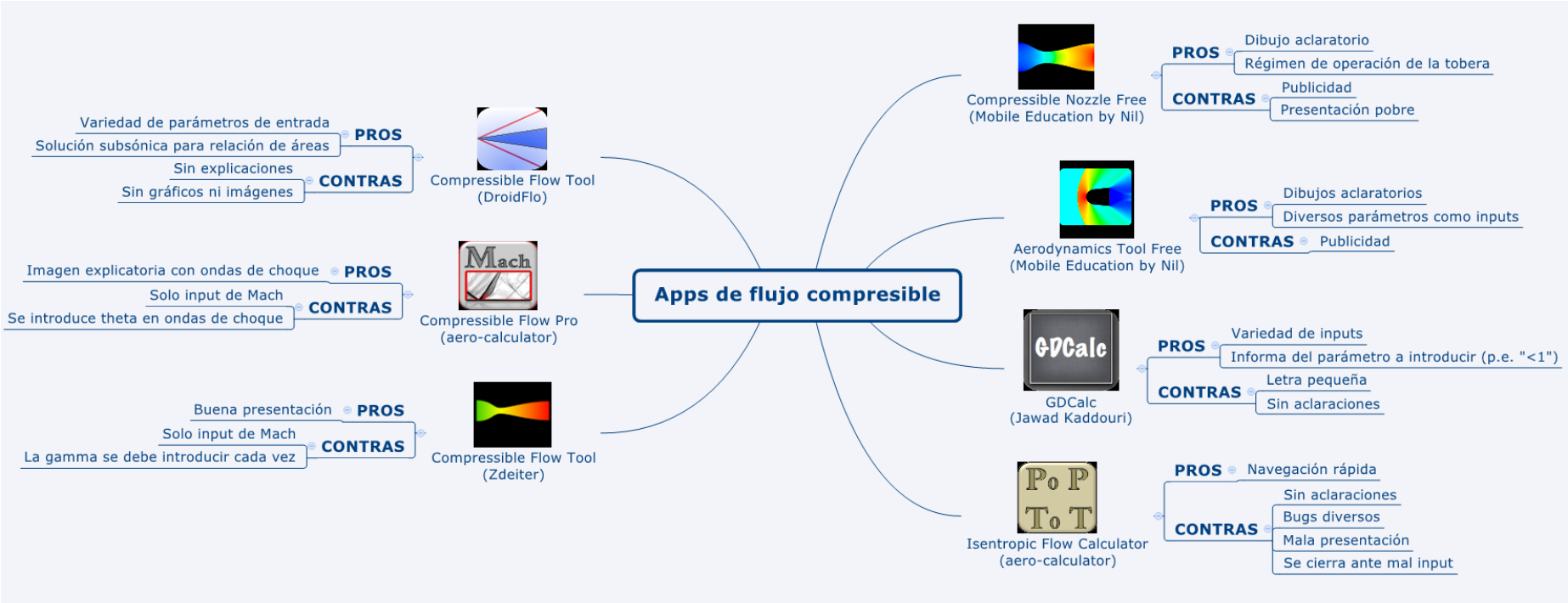
App4Comp is a free Android App that solves some classic problems related to compressible flow, in the field of fluid mechanics.

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.

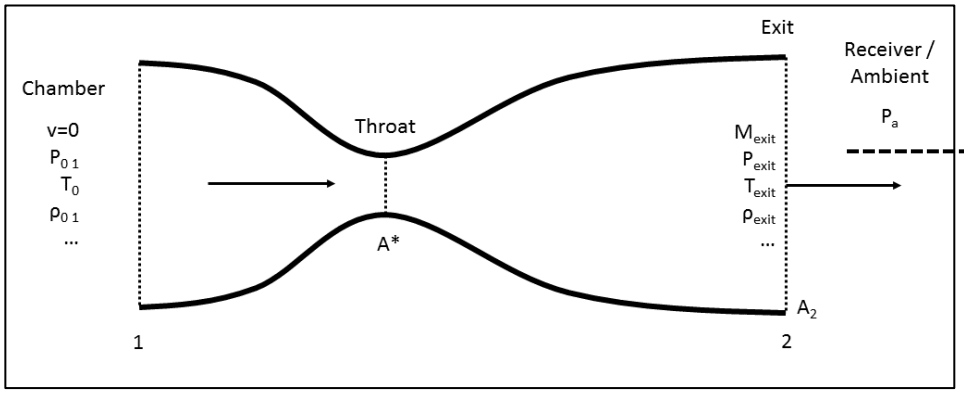


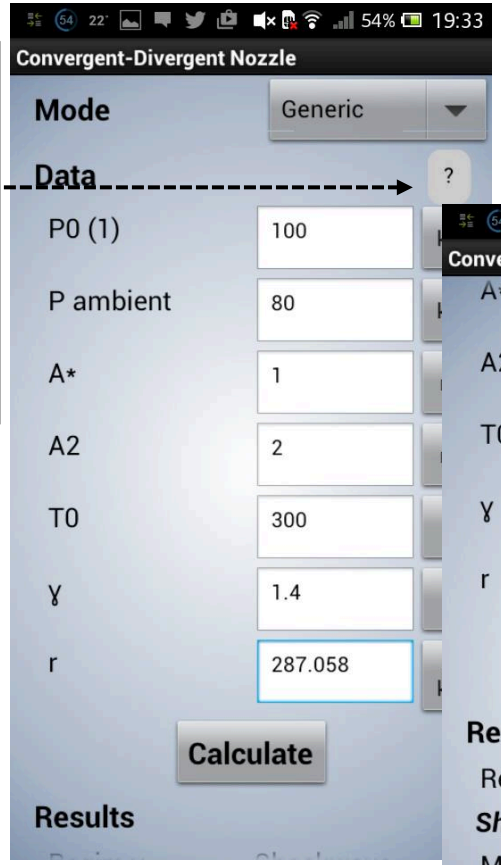
Student App #3: "App4Comp"

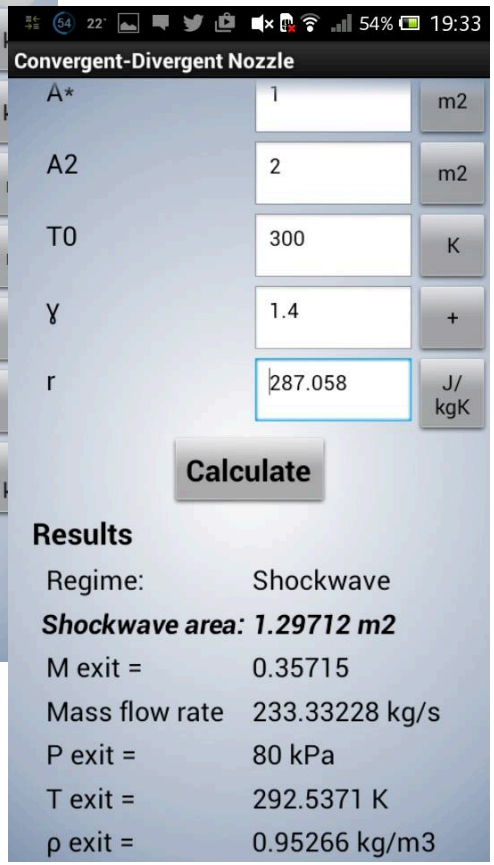
App "market" research of free apps of compressible flow



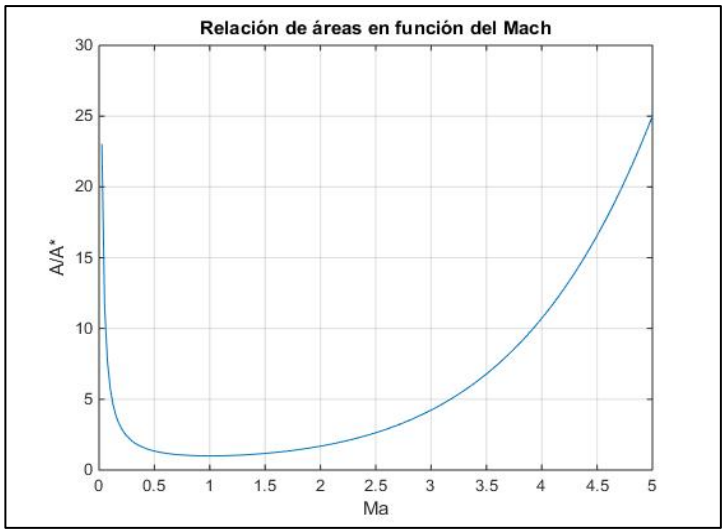
Student App #3: "App4Comp"







Método Newton-Raphson



Student App #3: "App4Comp"

Paper presented in the Educational Congress:

TEEM'15 Porto

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

Development of an App for Compressible Flow "App4Comp"

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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 it 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.

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

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.

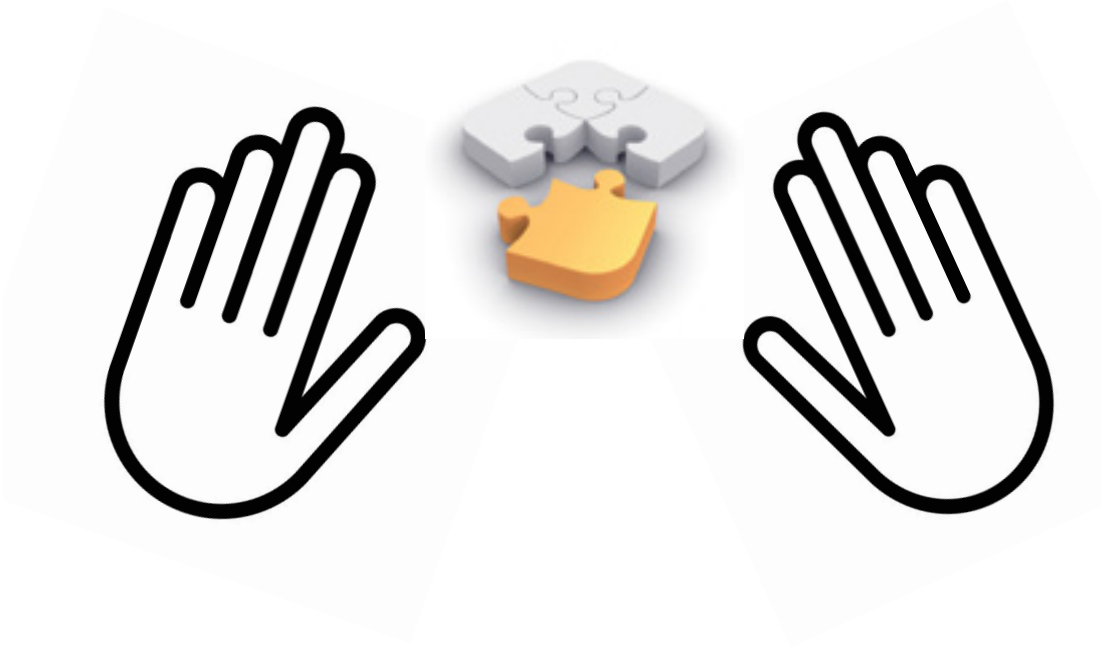
When deciding the problems to solve and the modules to create, it was decided that, as the App is aimed to students, it should have whatever can be useful for them. More specifically, the degree in aerospace technologies of the Polytechnic University of Catalonia was taken as a reference.

The App has these modules:

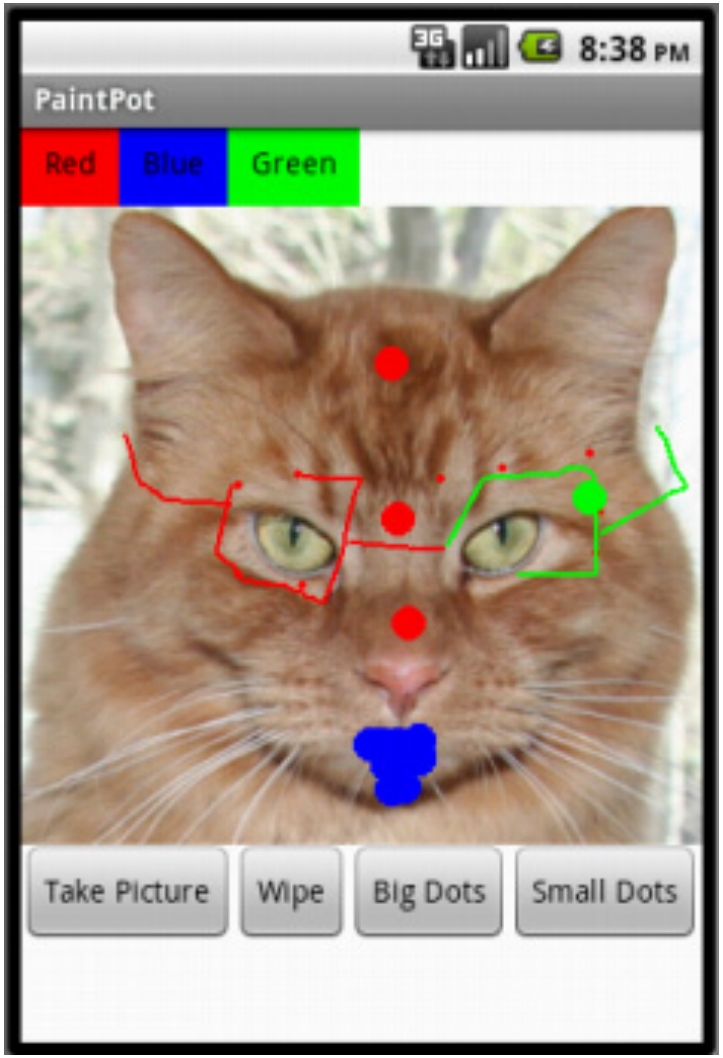
- International Standard Atmosphere (ISA)
- Isentropic flow
- Normal shockwave
- Convergent-divergent nozzle
- Fanno Flow

More Apps in this Workshop

Let's create a new App?
Again, let's get hands-on-work



the PaintPot app



More Apps from this Workshop

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

MIT App Inventor | for Educators

Thank you for attending the workshop!

Basic tools to create an educational App with MIT App Inventor

Trainers:

Xavier and Robert

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