CyberCamp at UNK

MIT App Inventor 2

What you will learn with this tutorial. . .

In this tutorial we are going to build and Android application. We will develop a basic app that shows an image, changes the background color and speaks a text typed by the user. This guide will teach you the basics of the design process, programming and testing. At the end, you will have a fully functional app to run on phones and tablets with Android. Let's start!

1 Definition

The **MIT App Inventor 2**, also called *"App Inventor for Android"*, is an open-source web application where you can easily create apps for your Android devices. It has a lot of resources that you can make use of, and real time debugging, which means that you can see the changes directly on your device while you develop your project. We will now go through the steps to develop an application using the App Inventor.

2 Requirements and log in

As stated on the previous section, the App Inventor is a web application, which means we will access it through a website. The URL for it is: `http://ai2.appinventor.mit.edu/`. You will **need to have a Google account**. Gmail is a Google account, so if you have a Gmail log in with your credentials now. If you don't have a Google account, you will have to create one in order to be able to access the App Inventor.

After you click on log in, you may have to authorize the App Inventor to access some information of your Google account. Click on *Allow*. A window with the *Terms of Service* will show up, click on the button *I accept the terms of service* to continue.

Another box asking about a voluntary survey will show up, take it if you wish, otherwise just click on *Never take survey*.

A box welcoming you will then pop up, go ahead and close it. The log in process is complete. Now you have to prepare the device where you will test your projects.

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Get you phone or tablet, open the play store and search for: **mit ai2 companion**. Select the first result and install it. An icon will then be created on your home screen with the launcher for the application. That's it for now, we are ready to start our project.
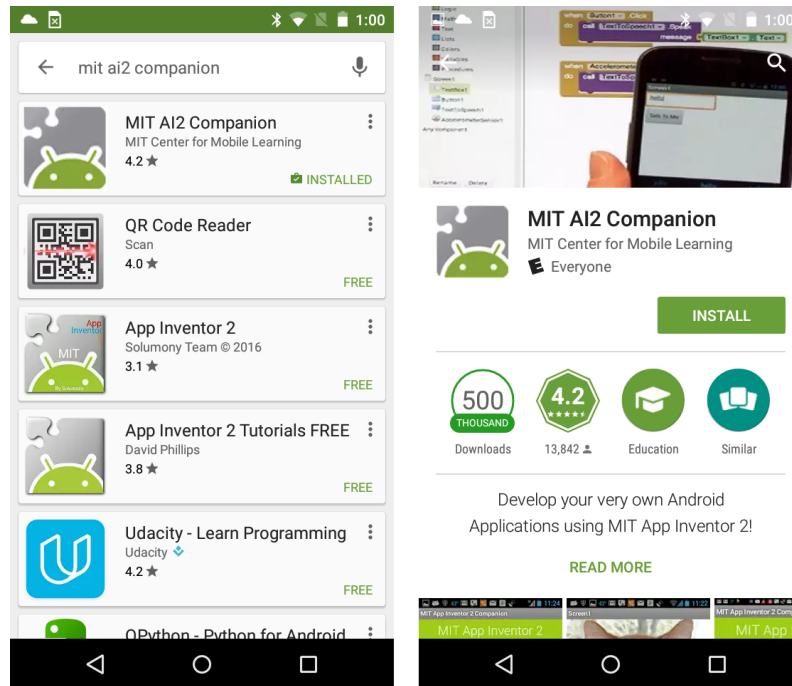

Figure 1: MIT AI2 Companion installation

3   Designing the application

First step is to create our project. Go to the App Inventor website, and after the log in click on the top left button *Start new project*. Give it a name of your preference. Once it's created, double click over it to access your new project.

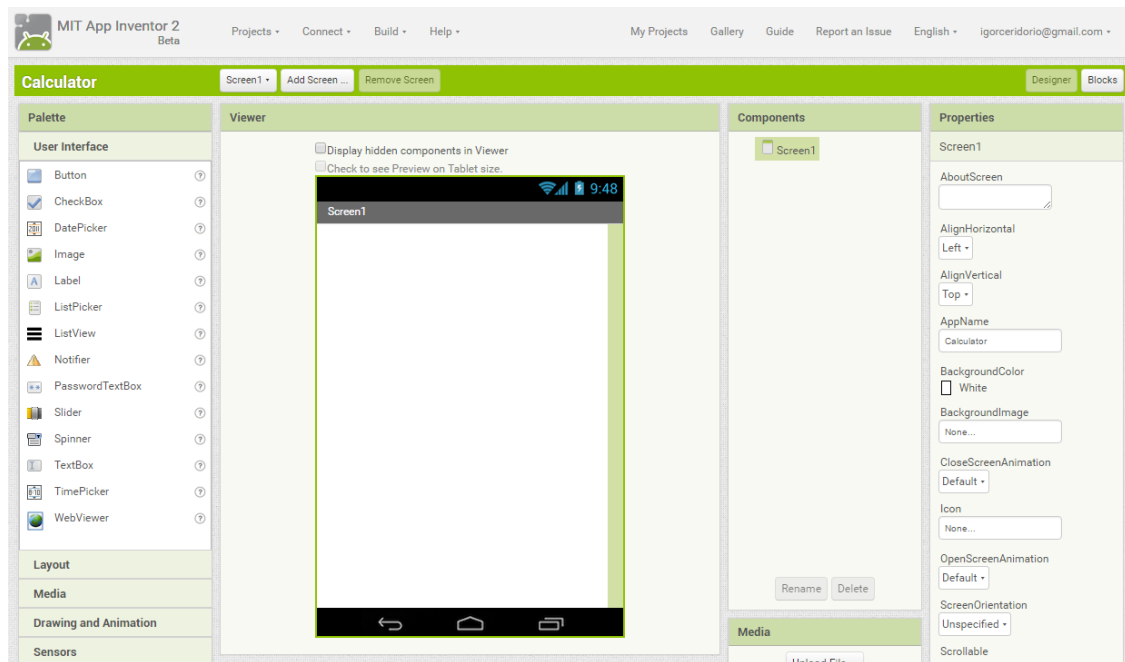You will now be on the main screen of your application, similar as follows:

Figure 2: Project main screen

Now that we have our project created and opened we can start creating our interface.

Our application will be made of:

- One image;

- One button used to show/hide the image;

- One button to change the background color;

- One text box where the user will write the desired text;

- One button that will trigger the app to say the written text.

Follow these steps to create the interface:

1. In the right side of the screen, note that you have **Components** and **Properties** boxes. The component box will list all the components we add to the design. The properties box allows us to change many characteristics of each one of these components. Click on the *Screen1* component, and in the properties box set *AlignHorizontal* to *Center*.

2. In the left side, on the **User Interface** category, select and drag a *Image* component to inside the screen. Click on the *Picture* property and choose *Upload file* to upload a picture of your choice. In *Width* and *Height* choose the amount of pixels you want for your image.

3. Now drag and drop a *Button* component and change its *Text* property to something like: *Hide image*.

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4. Drag and drop another button and change its *Text* to: *Change background color*.

5. Drag and drop a *TextBox* component.

6. Drag and drop the last button and name it *Talk*.

7. We need to have the component responsible for the speech. It is under the **Media** category. Drag and drop a *TextToSpeech* component to the screen.

After all this work the design of your app should be done! Down below you can check a simple example of how it can look like:
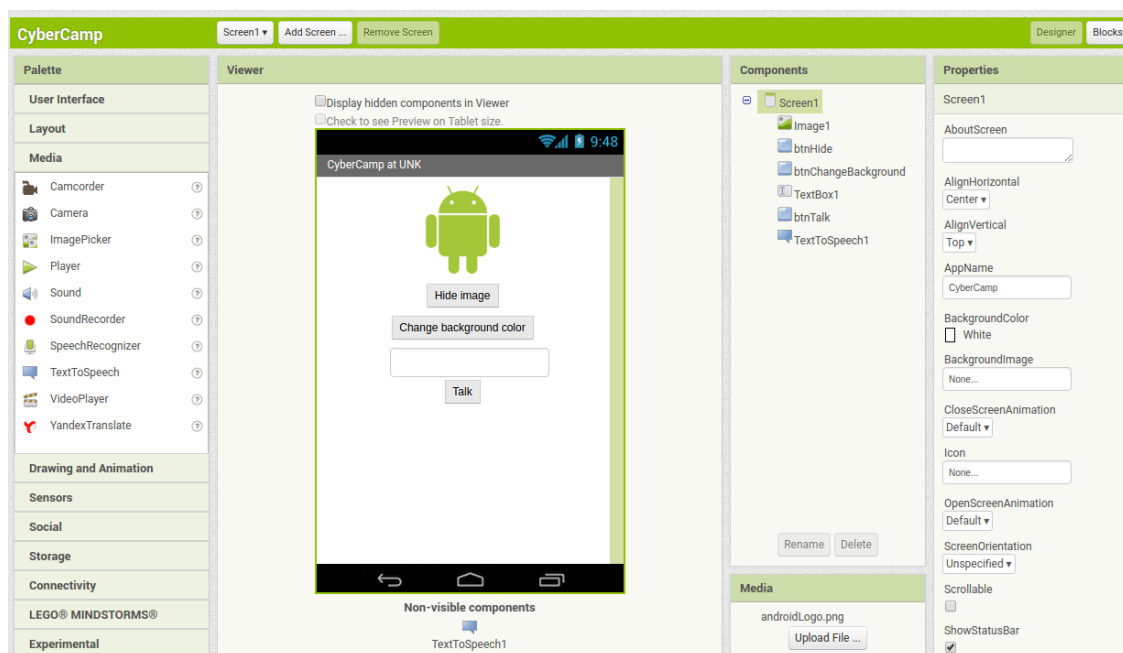

Figure 3: Example of project design

4   App preview and debugging

To see how your interface will look like in your Android device we can use that application we installed before on section 2.

Open up the *MIT AI2 Companion* app on your Android. At the website, in the top menu select **Connect** > **AI Companion**. This will open a QR Code in the middle of the screen. On the Android device tap on *scan QR code*, and then scan the code of the screen. After the code is scanned tap on *connect with code*. That's it, now you should be able to preview your calculator design and behavior directly on your Android.

The next step is to program our app. Let's do it.

5   Programming your app

Now that the design part is done, we will start programming the behavior of our app.

App Inventor has a **block structure** programming style. All of our code will be created with blocks that connect with each other, like a puzzle. It's really easy programming with App Inventor.

First step is to access the *Blocks* environment. On the top right side of the screen you will see two buttons: *Designer* and *Blocks*. Since we are done with the design part, go ahead and click on *Blocks*. This is the blocks screen that you should be right now:
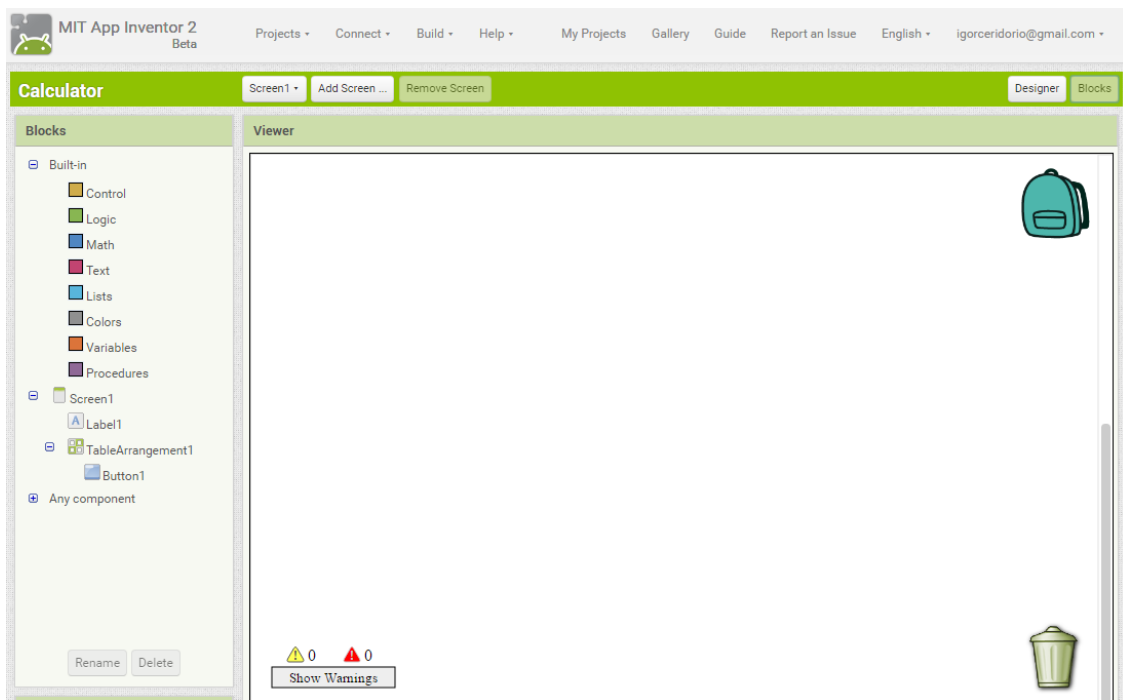

Figure 4: Project blocks screen

On the left side of the screen you will see a list with **Built-in** blocks, and under that another list with all the components of your created design. We will use both as we create our desired behavior.

First thing to do is program the block responsible for showing/hiding the image. Let's do it now.

5.1   Showing/hiding the image

We will use the click event of the button image to program what should happen. On your list of components of the left side click on the first button (whose text is *Hide image*) and select the block **when Button1.Click**, click and drag it to the blocks screen.

Try replicating the following block of code, the only different things that you may have is the name of the components that may differ. If you have difficulties locating some block ask for the instructor's help. The idea here is to show the image when it's hidden, and hide it when it's visible, that's why we use an *if* conditional with an *else* expression.
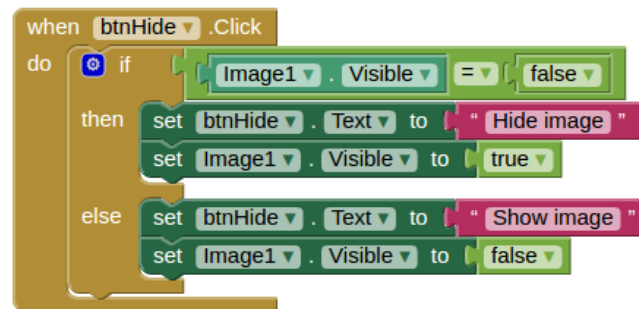

Figure 5: Show/hide block

5.2 Change background color

The next feature of our app is to code a button to change the background color. We will use some **math** blocks to generate a random number between 1 and 5, and store this value in a variable here called *color*. We will then associate each of the numbers with a different color. Try replicating the following block:
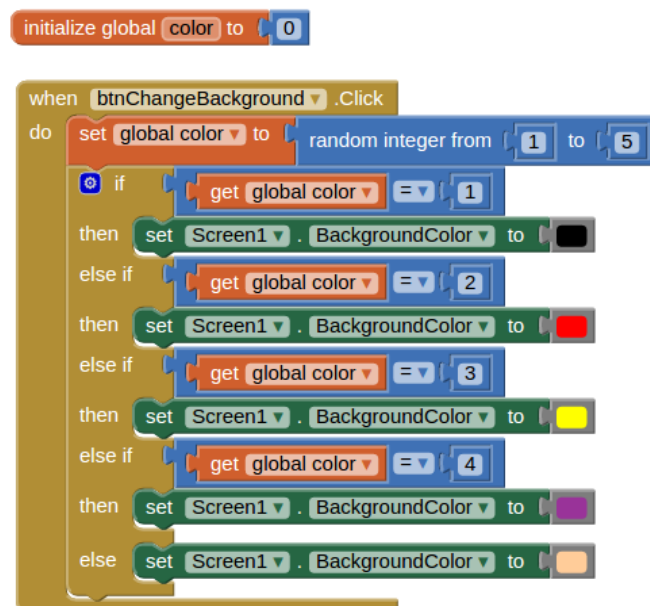

Figure 6: Background color change block

Now when you try it the background color of your screen will change randomly for one of the colors you previously chose.

5.3 Text speech

The text speech is really simple. Once again, try replicating the block below. The purple **call TextToSpeech.Speak** is located clicking on the component *Text-ToSpeech1* on the left side.

Figure 7: Speech block

Test you app now! If you did everything as described above you should have a fully functional app. Type some texts and hit the speech button to check the result!

6 Exporting your project

Once your project is done, you can download it to your computer and even generate a file called **apk** to share your work and install it in other Android devices.

To download a project file that you can keep and upload to App Inventor again when necessary:

- Inside the desired project click on **Projects** on the top left of the screen and select *Exported selected project (.aia) to my computer*. This will download an exported file of the project that you can keep stored on your hard drive as backup.

To build your project and create the apk file:

- Inside the desired project click on **Build** on the top left of the screen and select *App (save .apk to my computer)*. This will build your program and download the .apk after it's done. You can share via Gmail this .apk to other people's Gmail, so they can download it and install your app on their Android devices.

That's it! You just finished developing your first Android application! Of course this is a really simple project, but if you're interested in it there are a lot of material on line about App Inventor and Android development as well.