

# Introduction to App Inventor



**MIT**

**APP INVENTOR**

APP INVENTOR

WII



VCZ

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September 2017

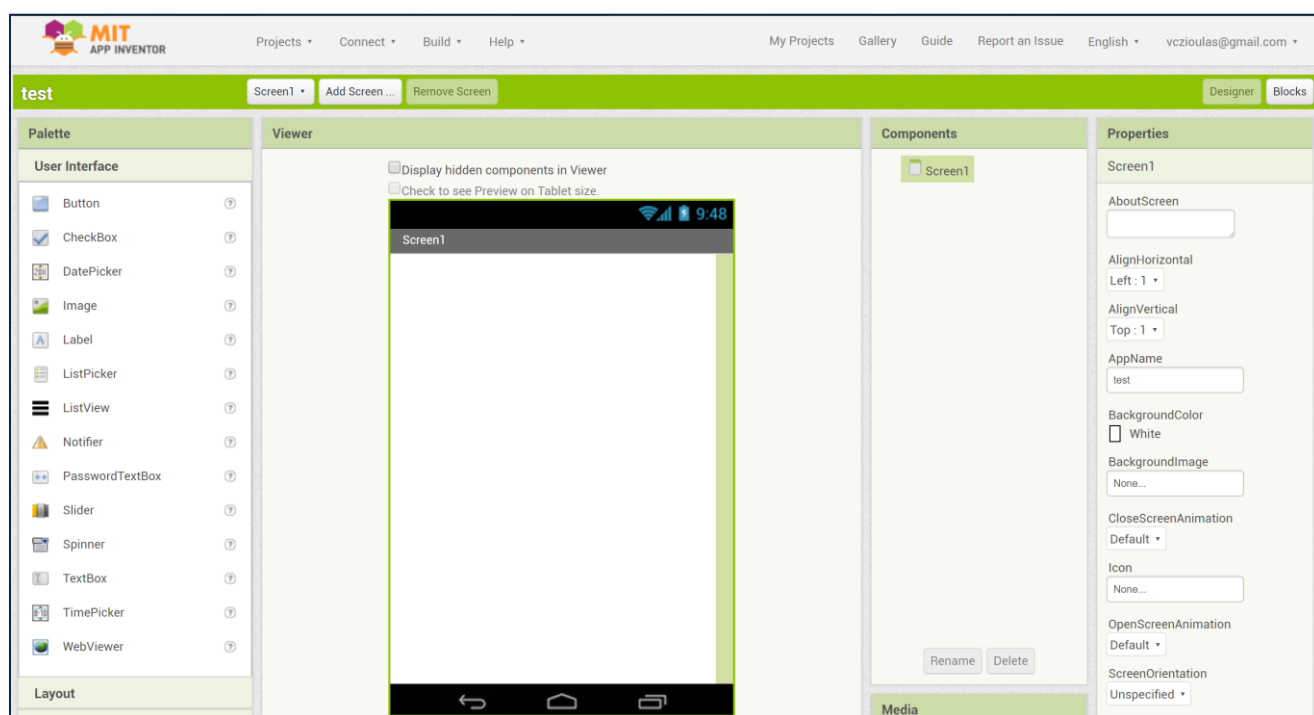
## Chapter 1 – Setup Instructions

### INTRODUCTION TO APP INVENTOR 2

App Inventor for Android is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT).



It is a programming environment that allows newcomers to computer programming to create software applications for the **Android** operating system. It uses a graphical interface, very similar to **Scratch**, which allows users to drag-and-drop visual objects to create an application that can run on Android devices.



### SETTING UP APP INVENTOR 2

We can set up **App Inventor** and start building apps in minutes. The **Designer** and **Blocks Editor** run completely in the browser.

To see our app on a device while we build it (also called "**Live Testing**"), we have three options:

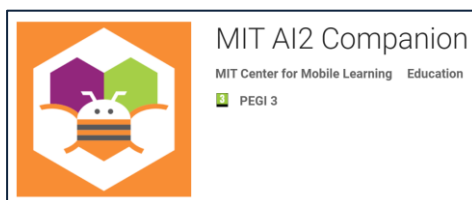
- We use an **Android Device** (with **WiFi** Connection)
- We use an **Android Device** (with **USB** Connection)
- We use the **Emulator** of App Inventor

## Build apps with an Android device and WiFi Connection (preferred method)



If we are using an **Android** device and we have a wireless internet connection, we can start building apps without downloading any software to our computer. We will develop apps on the website: [ai2.appinventor.mit.edu](http://ai2.appinventor.mit.edu).

To do live testing on our Android device, we must install the **MIT App Inventor Companion** app on our **Android** phone or tablet. Once the Companion is installed, we can open projects in App Inventor on the web, open the companion on our device, and we can test our apps as we build them:



The following steps will drive us through this process:

### **Step 1: Download the MIT AI2 Companion App from the Play Store and install it on your phone.**

To do that, we can open our device's **QR code scanner** and scan the QR code below to download the Companion App from the Play Store.



We need to install the **MIT AI2 Companion** only once, and then leave it on our phone or tablet for whenever we use **App Inventor**.

If we are unable to use the QR code, we can still install **MIT AI2 Companion** on our phone or tablet. We use the **Play Store** app on our device to go to the Google Play Store. Then we look for **MIT AI2 Companion** in the store. Once we find Companion, we click the **INSTALL** button for the Companion app.



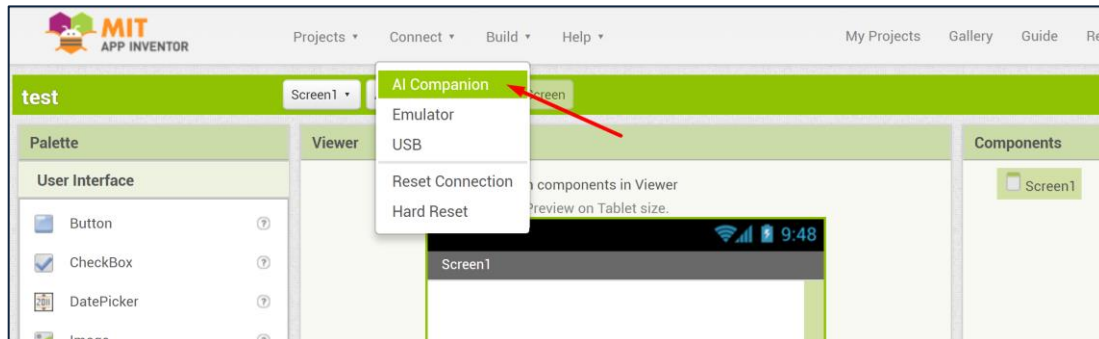
### **Step 2: Connect both your computer and your device to the SAME WiFi Network**

App Inventor will automatically show us the app we are building, but only if our computer (running App Inventor) and our Android device (running the Companion) are connected to the same WiFi Network.

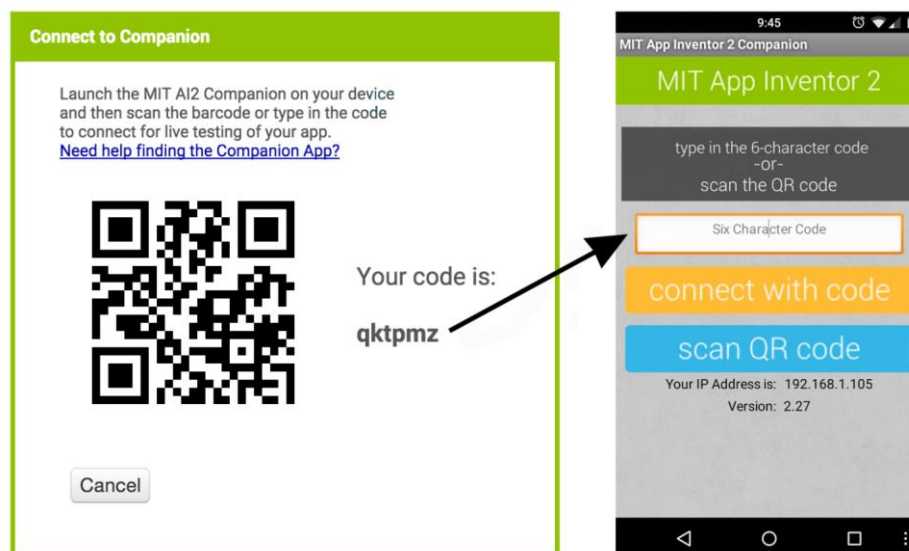
### Step 3: Open an App Inventor project and connect it to your device

We go to App Inventor and open a project (or we create a new one by using **Project > Start New Project** and give our project a name).

Then, we choose "**Connect**" and "**AI Companion**" from the top menu in the AI2 browser:



A dialog with a QR code will appear on our PC screen. On our device, we launch the **MIT App Companion** app just as we would do any app. Then, we click the "**Scan QR code**" button on the Companion, and scan the code in the App Inventor window:



Within a few seconds, we should see the app we are building on our device. It will update as we make changes to our design and blocks, a feature called "**live testing**".

If we have trouble scanning the QR code or our device does not have a scanner, we type the code shown on the computer into the Companion's text area on our Android device exactly as shown.

The code is directly below where the screen on our PC shows "**Your code is**" and consists of six characters. We type the six characters and choose the orange "**Connect with code**". We should not type an **Enter** or carriage return. We type just the six characters followed by pressing the orange button.

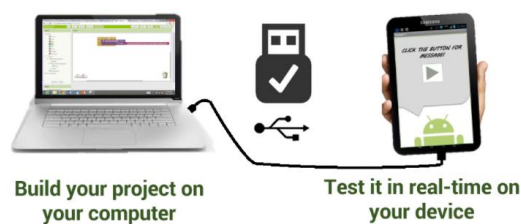
If our app does not appear on our device, the most likely problems are:

- We may have an outdated version of the App Inventor Companion App. So, we download the latest Companion App for App Inventor 2.

- Our device may not be connected to wifi. So, we make sure we see an IP address at the bottom of the **AI Companion App** screen on our phone or tablet.
- Our device may not be connected to the same wifi network as our computer. So, we make sure both devices are connected to the same wifi network name.

### Build apps with an Android device and USB Cable

Some firewalls within schools and organizations do not allow the type of WiFi connection required. If WiFi doesn't work for us, we try **USB**.



When we use **App Inventor** with a phone or tablet, that device communicates with the App Inventor software running in our computer's browser window. This communication is managed by the **AI2 Companion** App running on the device. The Companion can communicate with our computer over a wireless connection. This is the method strongly recommended by the App Inventor team. It does not require any additional software to be installed on our computer.

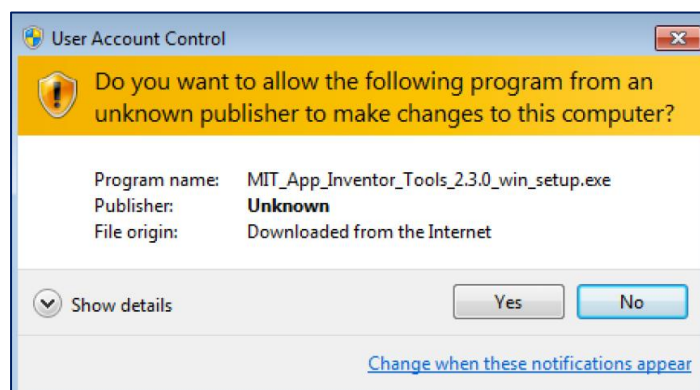
There are, however, some environments where wireless connections won't work. These include some hotels, conference centers, and schools, that configure their wireless networks to prohibit two devices on the network from communicating with each other.

Setting up a **USB connection** can be awkward, especially on Windows machines, which need special driver software to connect to Android devices. (This is not the case with Mac or Linux, which do not need special drivers.)

The following steps are needed to use App Inventor with the USB cable:

#### **Step 1: Install the App Inventor Setup Software**

To connect with USB, we need to first install the **App Inventor setup software** on our computer. (This is not required for the wifi method). Based on our operating system, we install the App Inventor Setup software package (e.g. for Windows the installer is called **MIT\_Appinventor\_Tools\_2.3.0** and it is almost 80 MB).



## Step 2: Download the MIT AI2 Companion App from the Play Store and install it on your phone.

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## Step 3. Launch aiStarter (Windows & GNU/Linux only)

Using the emulator or the USB cable requires the use of a program named **aiStarter**. This program is the helper that permits the browser to communicate with the emulator or USB cable.

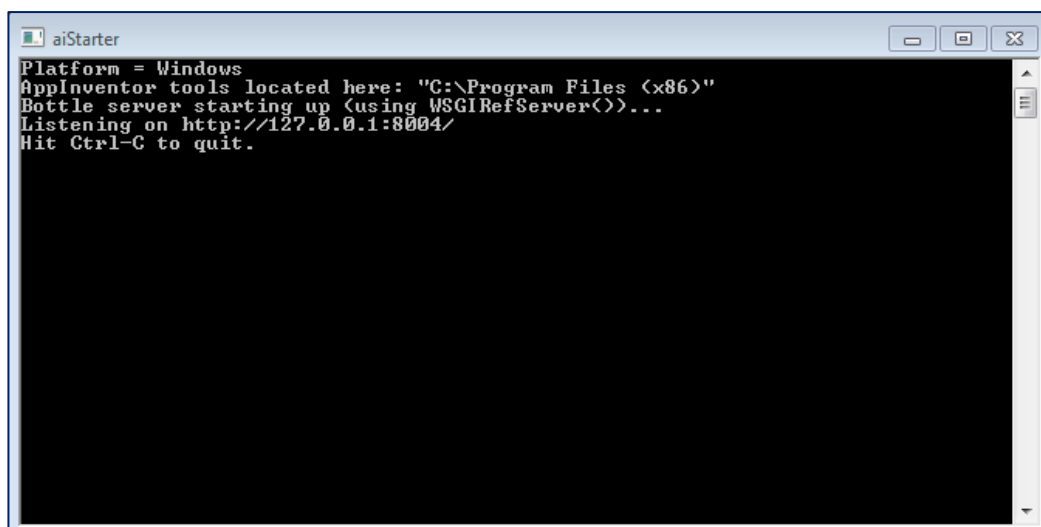
The **aiStarter** program was installed when we installed the **App Inventor Setup** package. We do not need aiStarter if we are using only the wireless companion.

On a **Mac**, aiStarter will start automatically when we log in to our account and it will run invisibly in the background.

On **Windows**, there will be shortcuts to aiStarter from our Desktop, from the Start menu, from All Programs and from Startup Folder. We can start aiStarter this by clicking the icon on our desktop or using the entry in our start menu.



To launch aiStarter on Windows, we double click on the icon (shown above). We will know that we have successfully launched aiStarter when we see a window like the following:



```
aiStarter
Platform = Windows
AppInventor tools located here: "C:\Program Files (x86)"
Bottle server starting up (using WSGIRefServer())...
Listening on http://127.0.0.1:8004/
Hit Ctrl-C to quit.
```

#### Step 4: Set up your device for USB (Turn USB Debugging ON)

On our Android device, we go to **System Settings**, **Developer Options**, turn them on, and be sure that "USB Debugging" is allowed.

On most devices running **Android 3.2** or older, we can find this option under **Settings > Applications > Development**.

On **Android 4.0** and newer, it's in **Settings > Developer options**.

Note: On Android 4.2 and newer, Developer options is hidden by default. To make it available, we go to **Settings > About phone** and tap **Build number** seven times. Then, we return to the previous screen to find Developer options, including "USB Debugging".

#### Step 5: Connect your computer and device, and authenticate if necessary.

We connect our Android device to the computer using the USB cable being sure that the device connects as a "mass storage device" (not "media device") and that it is not mounted as a drive on our computer. This may mean that we have to go to the Finder (on a Mac) or My Computer (on Windows) and disconnect any drive(s) that were mounted when we connected your Android device.

On **Android 4.2.2** and newer, our device will pop up a screen with the message **Allow USB Debugging?** the first time we connect it to new computer. We press "OK". This authenticates the computer to the device, allowing the computer to communicate with it. We'll need to do this for each computer we want to connect to the device, but only once per computer.

#### Build apps with the Emulator

If we do not have an Android phone or tablet, we can still build apps with App Inventor. App Inventor provides an **Android emulator**, which works just like an Android but appears on our computer screen. So, we can test our apps on an emulator and still distribute the app to others, even through the **Play Store**.

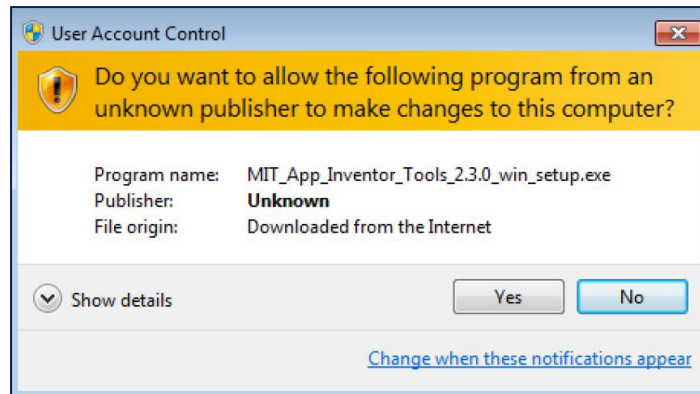


The following steps are needed to use App Inventor with the Android Emulator:

#### Step 1: Install the App Inventor Setup Software

To connect with emulator, we need to first install the **App Inventor setup software** on our computer. (This is not required for the wifi method). Based on our operating system, we install the App Inventor Setup software package (e.g. for Windows the installer is called **MIT\_Appinventor\_Tools\_2.3.0** and it is almost **80 MB**).





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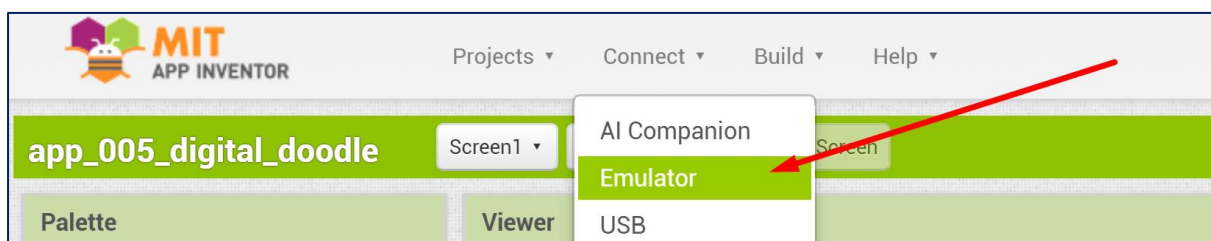
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Bottle server starting up (using WSGIRefServer<>>)...
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Hit Ctrl-C to quit.
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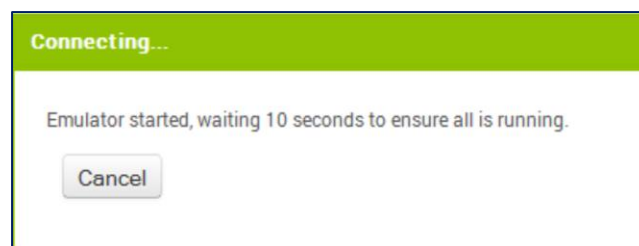
### Step 3. Open an App Inventor project and connect it to the emulator

First, we go to App Inventor and open a project (or create a new one -- use **Project > Start New Project** and give our project a name).

Then, from App Inventor's menu, we go to the **Connect** Menu and click the **Emulator** option.



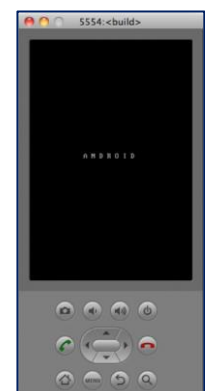
We'll get a notice saying that the emulator is connecting. Starting the emulator can take a couple of minutes. We may see update screens like the following as the emulator starts up:

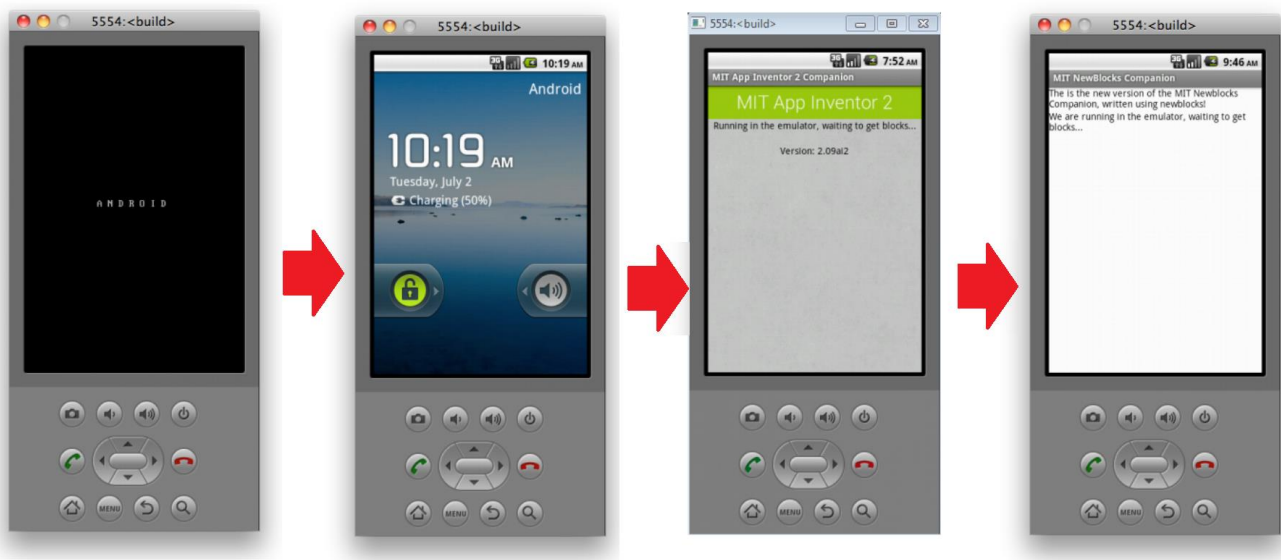


The emulator will initially appear with an empty black screen. We should wait until the emulator is ready, with a colored screen background.

Even after the background appears, we should wait until the emulated phone has finished preparing its SD card: there will be a notice at the top of the phone screen while the card is being prepared.

When connected, the emulator will launch and show the app we have open in App Inventor.





Note: If this is the first time we are using the emulator after installing the App Inventor Setup software, we will see a message asking us to **update the emulator**. We follow the directions on the screen to perform the update and reconnect the emulator. We will need to do this kind of update whenever there is a new version of the App Inventor software.

### **COMPUTER AND OPERATING SYSTEM REQUIREMENTS**

Macintosh (with Intel processor): Mac OS X 10.5 or higher

Windows: Windows XP, Windows Vista, Windows 7, Windows 10

GNU/Linux: Ubuntu 8 or higher, Debian 5 or higher (Note: GNU/Linux live development is only supported for WiFi connections between computer and Android device.)

### **BROWSER REQUIREMENTS**

Mozilla Firefox 3.6 or higher

(Note: If we are using Firefox with the NoScript extension, you'll need to turn the extension off.)

Apple Safari 5.0 or higher

Google Chrome 4.0 or higher

Microsoft Internet Explorer is not supported

### **PHONE OR TABLET REQUIREMENTS**

Android Operating System 2.3 or higher.

## Chapter 2 – Designer & Blocks Editor

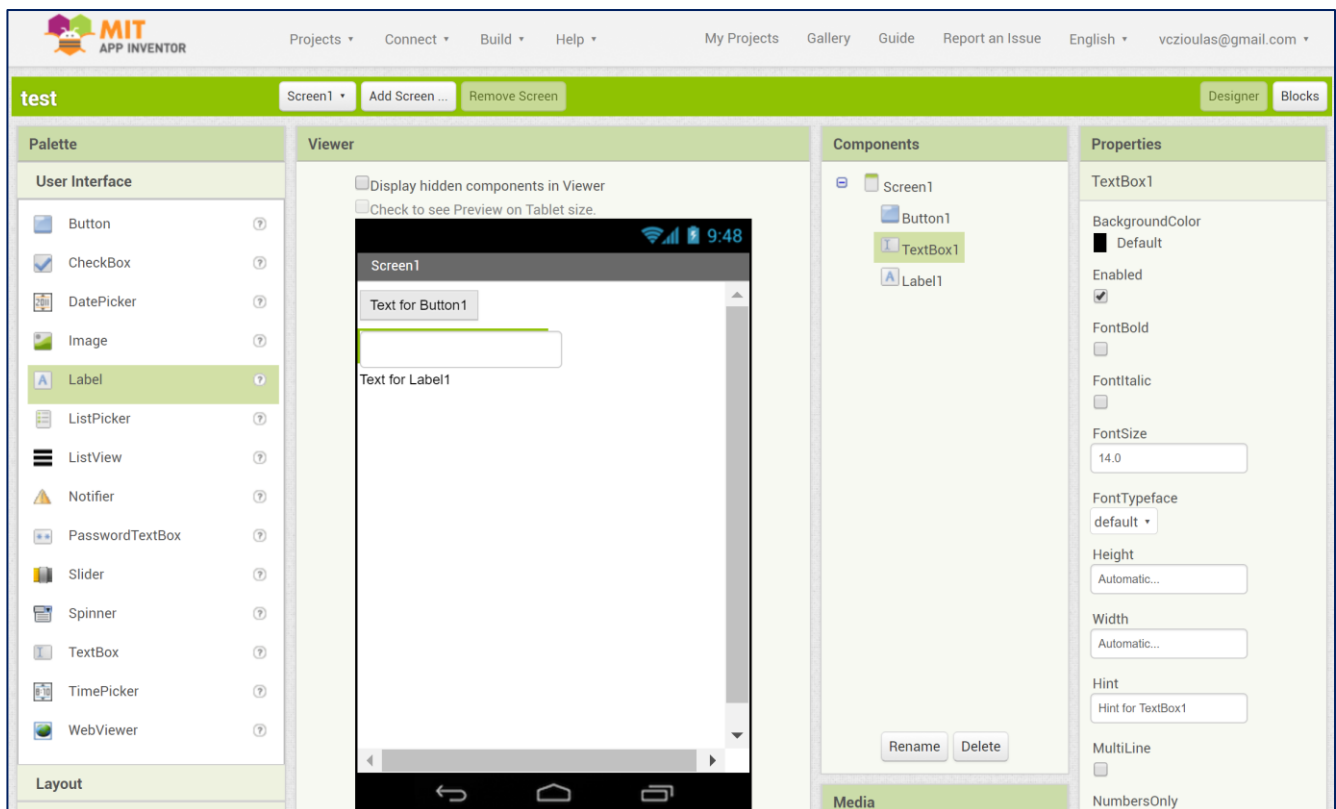
### APP INVENTOR 2 INTERFACE

App Inventor consists of the **Designer** and the **Blocks Editor**. These are different areas inside the interface that are described in detail below.

#### DESIGNER

It is the area into which we can design the App's User Interface by arranging both on- and off-screen components. It consists of 4 sections:

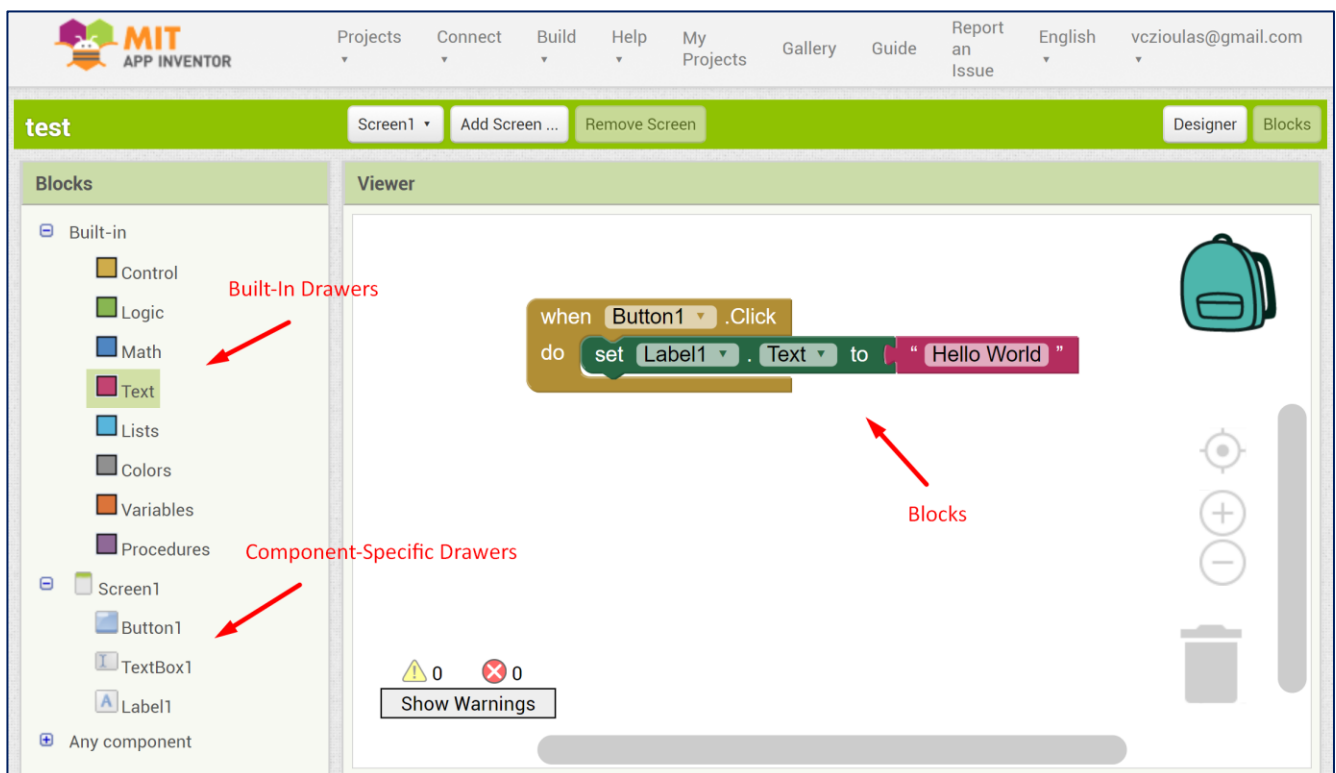
- **Palette:** Here, we find our components and drag them to the Viewer to add them to our app.
- **Viewer:** Here, we can drag the components from the Palette to see what our app will look like.
- **Components:** Here, we see a list with all the components we have added inside our app.
- **Properties:** Here, we can change the properties of any component selected from the list.



## BLOCKS EDITOR

It is the area into which we can program the app's behavior by putting blocks together. It consists of 2 sections:

- **Blocks:** Here, we find our blocks needed to program the app. These blocks are classified into 2 categories: Built-In Drawers and Component-Specific Drawers.
  - **Built-In Drawers:** Here, we find blocks for general behaviors we may want to add to our app and add them to the Blocks Viewer.
  - **Component-Specific Drawers:** Here, we can find blocks for behaviors for specific components and drag them to the Blocks Viewer.
- **Blocks Viewer:** In here we drag the blocks from the drawers to build relationships and behavior. We should snap blocks together to set app behaviors.



## Chapter 3 – Sharing & Packaging Apps

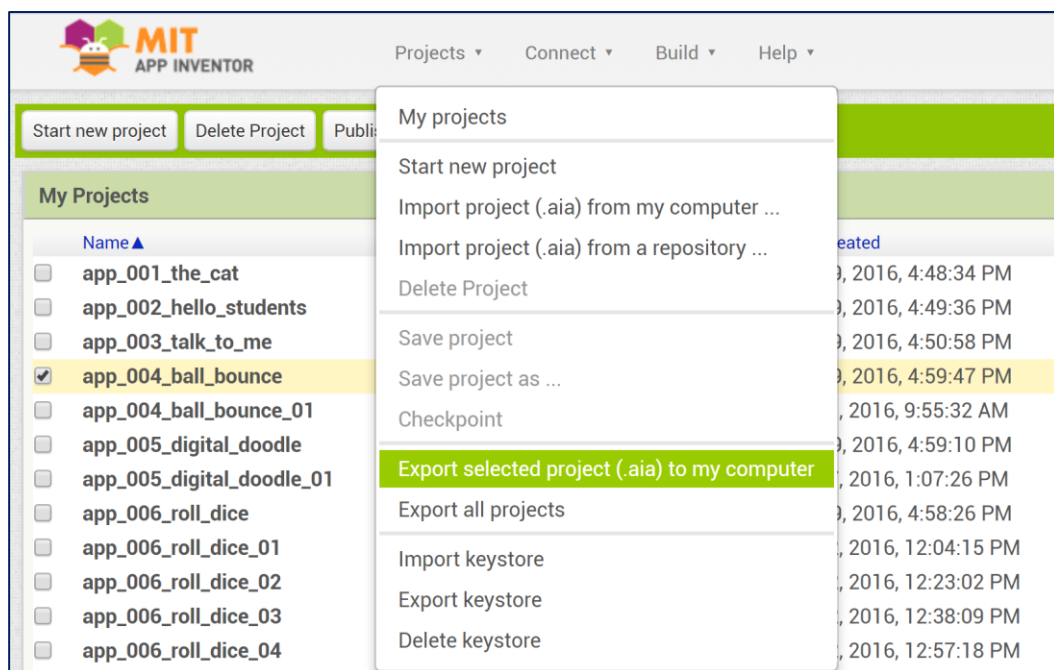
### SHARING APPS

We can share our app in an **executable form (.apk)** that can be installed on a device, or in **source code form (.aia)** that can be loaded into App Inventor and remixed. We can also distribute our app on the **Google Play Store**.

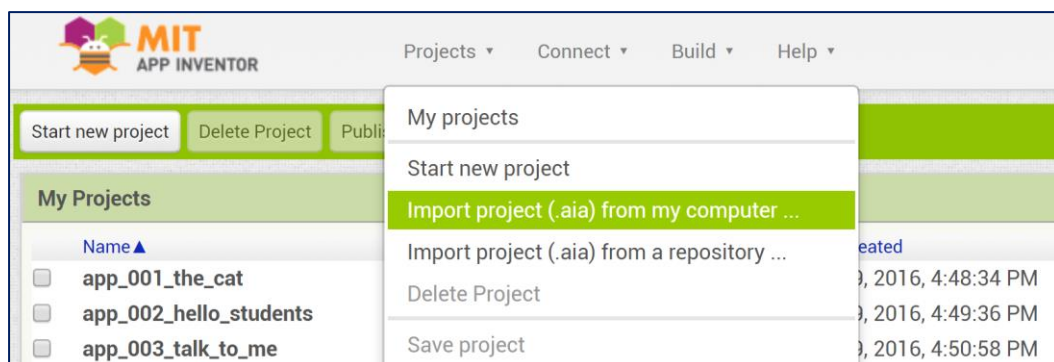
#### Sharing our Source Code (.aia file)

First, we choose from the menu **Projects > My Projects** to view the list with all our projects. Then, we select the project we wish to share by checking the box next to it.

Then, we choose **Project > Export selected project (.aia) to my computer** to export the source code (blocks) for our project. The source code is downloaded in a **.aia** file.



If we send that file to a friend, they can open it with **Project > Import project (.aia) from my computer**.



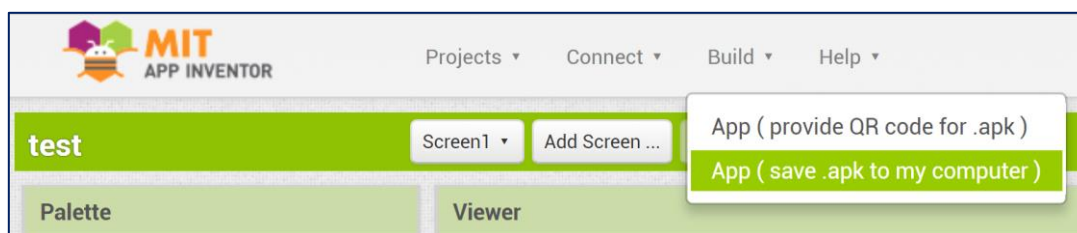
### Sharing our Executable Form (.apk file)

We can share our app for others to install on their phone/tablet. We can package the app (.apk file) by going to the **Build** menu on the App Inventor toolbar. Here, we have two options to export the app:

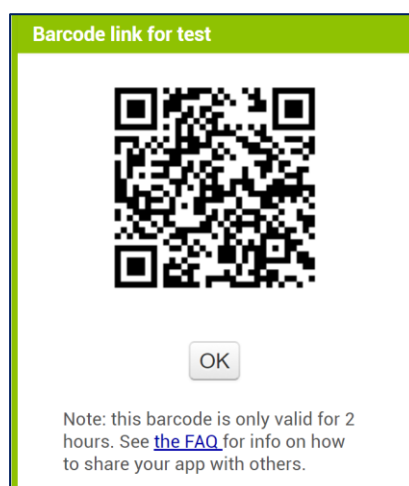
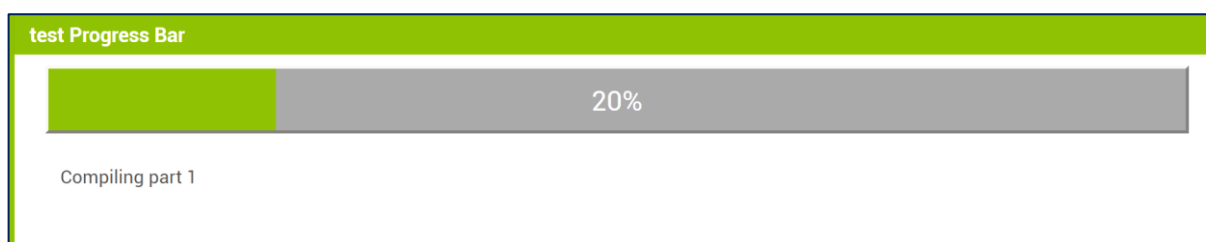
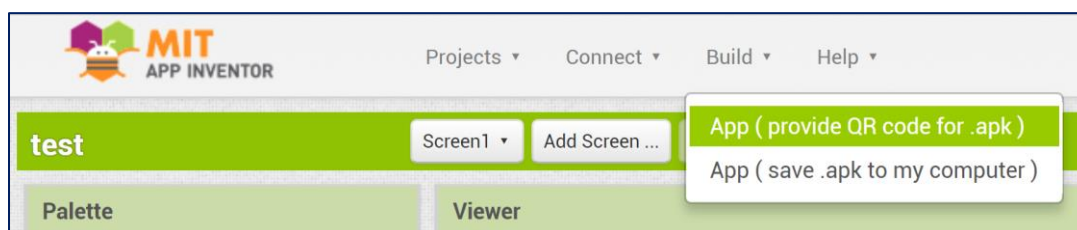
If we select **App (save .apk to my computer)**, a pop-up box should alert us that our download has begun. The file will be downloaded into the "Downloads" folder of our hard disk.

Once the build completes, we can email the app (".apk" file) to our friends who can install it by opening the email from their phone.

If we want to distribute it more widely, we can upload it to a website that both us and our friend can access. We can also distribute our app on the **Google Play Store**.



The other option **App (provide QR code for .apk)** produces a scannable QR code that will download the app for two hours. We can share this code with others, but they must use it within 2 hours of our generating it.



NOTE: Anyone installing our app (which is an ".apk" file) will need to change the setting on their phone to allow installation of non-market applications:

To find this setting on versions of **Android prior to 4.0**, we go to [Settings > Applications](#) and then check the box next to [Unknown Sources](#).

For devices running **Android 4.0 or above**, we go to [Settings > Security](#) and then check the box next to [Unknown Sources](#) and confirm our choice.

