



The Chartered Institute for IT
Enabling the information society

BCSWomen Android programming (with AppInventor) Family fun day World record attempt



Let's break a record!

- Counting people and the world record stuff
 - The official world record runs from 10:30-11:30
 - We'll start it with a whistle, and end it with a whistle
 - Everyone will do the same thing (across the UK)
 - After that we'll have a coffee break then get on with designing your own apps
- Introductions
- Wifi setup & power
 - Get everyone connected
- Fire exits & Toilets

Overview of the day

- **Intros**
- Hello Android!
- Downloading resources
- Overview of AppInventor
- Making your first app
- What's special about mobile?
- Changing an app
- Getting your app on your phone
- Getting into groups
- Ideas for apps
- Planning your own app
- Q&A
- Coding your app
- Showing it all off
- Next steps

About the day

- This is a hands-on intro to programming phones
- It'll be a mix of talk, play, programming and thinking
- If you have a question, go ahead and ask it, any time.
 - There are lots of us, and we're here to help
- I'll try not to talk for more than 10 minutes at a time
 - If anything isn't clear let me know



A bit about what you've got here

Hands up if

... you have brought a windows laptop

... you have brought a mac

... you have brought a linux laptop

... you have brought something else

... you've got an android device



We'll be working in small groups (so if you haven't got anything, don't panic, we can share)

A bit about what you've done before

Hands up if

... You like computer games

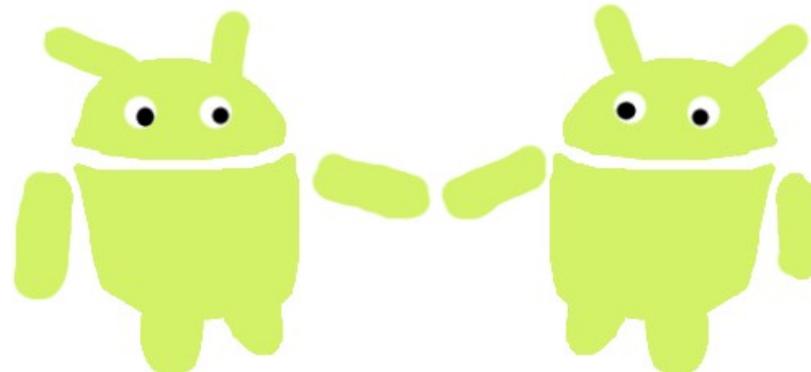
... You like using computers for drawing and art

... You have used Word

... You have written a webpage

... You have programmed using Scratch

... You have programmed using Java or something like that



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Hello Android!

- Mobile operating system
 - Phones
 - Tablets
 - Things like that
- Open
 - Anyone can write programs for it
- You don't need an android to write android programs



Do you have an android?

- You do if you have a phone made by Google, HTC, Sony, Dell, Intel, Motorola, Qualcomm, Texas Instruments, Samsung Electronics, LG Electronics, T-Mobile, Sprint Nextel, Nvidia, or Wind River Systems...
- This is the Open Handset Alliance



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Downloading resources

The resources you will need today can be downloaded from USB sticks.

You should all have these.

The resources contain pictures and sounds you might want to use in your apps.



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AppInventor

- Provides an easy and quick way to build apps
 - Can build apps for yourself
 - Can share apps with friends
- Lets you use
 - Screen, Phone, Camera, SMS, GPS, Accelerometer...
- You can (now) publish your apps to Google Play
 - Instructions at the end of the handout – you have to pay \$25 though



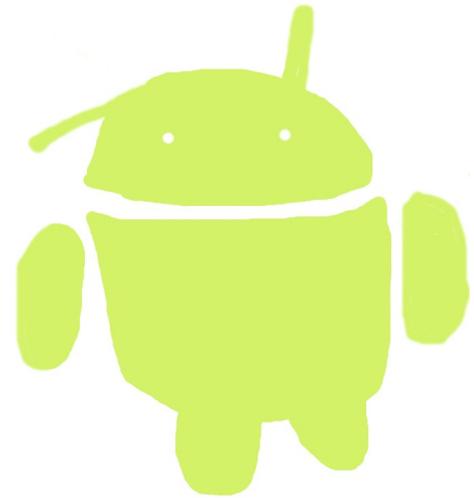
Opening AppInventor

To open app inventor go to:

<http://ai2.appinventor.mit.edu/>

using a web browser

Here you can click on “Create” in the top right hand corner. You'll have to log into your Google account to start making apps





AppInventor has 2 parts

Main window

- Has a menu of things you can choose to include in your app
- Lets you lay out things on the screen
- Lets you set the colour or position

Blocks editor

- Lets you program what goes on behind the things on the screen
- Has options for connecting to phones and tablets

Main Window (“Designer”)

The image shows the main window of the LEGO MINDSTORMS Designer software. The interface is divided into several panels:

- Project:** Located at the top, it includes a dropdown menu for "Screen1", buttons for "Add Screen ..." and "Remove Screen", and tabs for "Designer" and "Blocks".
- Palette:** On the left, it lists various user interface components under the heading "User Interface". These include Button, CheckBox, Clock, DatePicker, Image, Label, ListPicker, ListView, Notifier, PasswordTextBox, Slider, Spinner, TextBox, TimePicker, and WebViewer. Below this are sections for "Layout", "Media", "Drawing and Animation", "Sensors", "Social", "Storage", and "Connectivity". At the bottom of the palette is the "LEGO MINDSTORMS" logo.
- Viewer:** The central area displays a preview of the screen. It contains a header bar with a status bar showing signal strength, battery, and the time "9:48". Below the header, the text "Screen1" is displayed. A large text overlay in the center of the viewer reads "This is the screen".
- Components:** On the right side, it shows a list of components for the current screen, "Screen1". A text overlay reads "This is where you will see a list of things on the screen". Below the list are "Rename" and "Delete" buttons. A "Media" section at the bottom of this panel includes an "Upload File ..." button.
- Properties:** On the far right, it displays the configuration options for the selected component, "Screen1". The text overlay reads "This shows the options for the things here". The properties include:
 - Screen1 (text field)
 - AlignHorizontal: Left (dropdown)
 - AlignVertical: Top (dropdown)
 - BackgroundColor: White (checkbox)
 - BackgroundImage: None... (text field)
 - CloseScreenAnimation: Default (dropdown)
 - Icon: None... (text field)
 - OpenScreenAnimation: Default (dropdown)
 - ScreenOrientation: Unspecified (dropdown)
 - Scrollable: checked (checkbox)
 - Title: Screen1 (text field)
 - VersionCode: 1 (text field)
 - VersionName: 1.0 (text field)

Blocks Editor

MIT App Inventor 2
Beta

Projects ▾ Connect ▾ Build ▾ Help ▾ My Projects Gallery Guide Report an Issue English ▾ handee20001@gmail.com ▾

showandtell Screen1 ▾ Add Screen ... Remove Screen Designer Blocks

Blocks

- Built-in
 - Control
 - Logic
 - Math
 - Text
 - Lists
 - Colors
 - Variables
 - Procedures
- Screen1
- Any component

Viewer

if 1 < 5 then set to

← Drag the blocks you want to use here

They fit together just like a jigsaw

Show Warnings 1 1 ← If there are any missing bits, you'll get warnings here

17

About those blocks



Brownly coloured blocks are about **control**. They let you decide what makes things happen in your program.



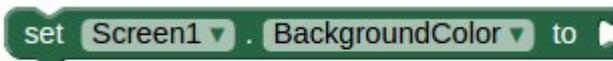
Greeny coloured blocks are about **logic**. They let you test whether things are true or false.



Blue coloured blocks are about **maths**. They let you do sums.

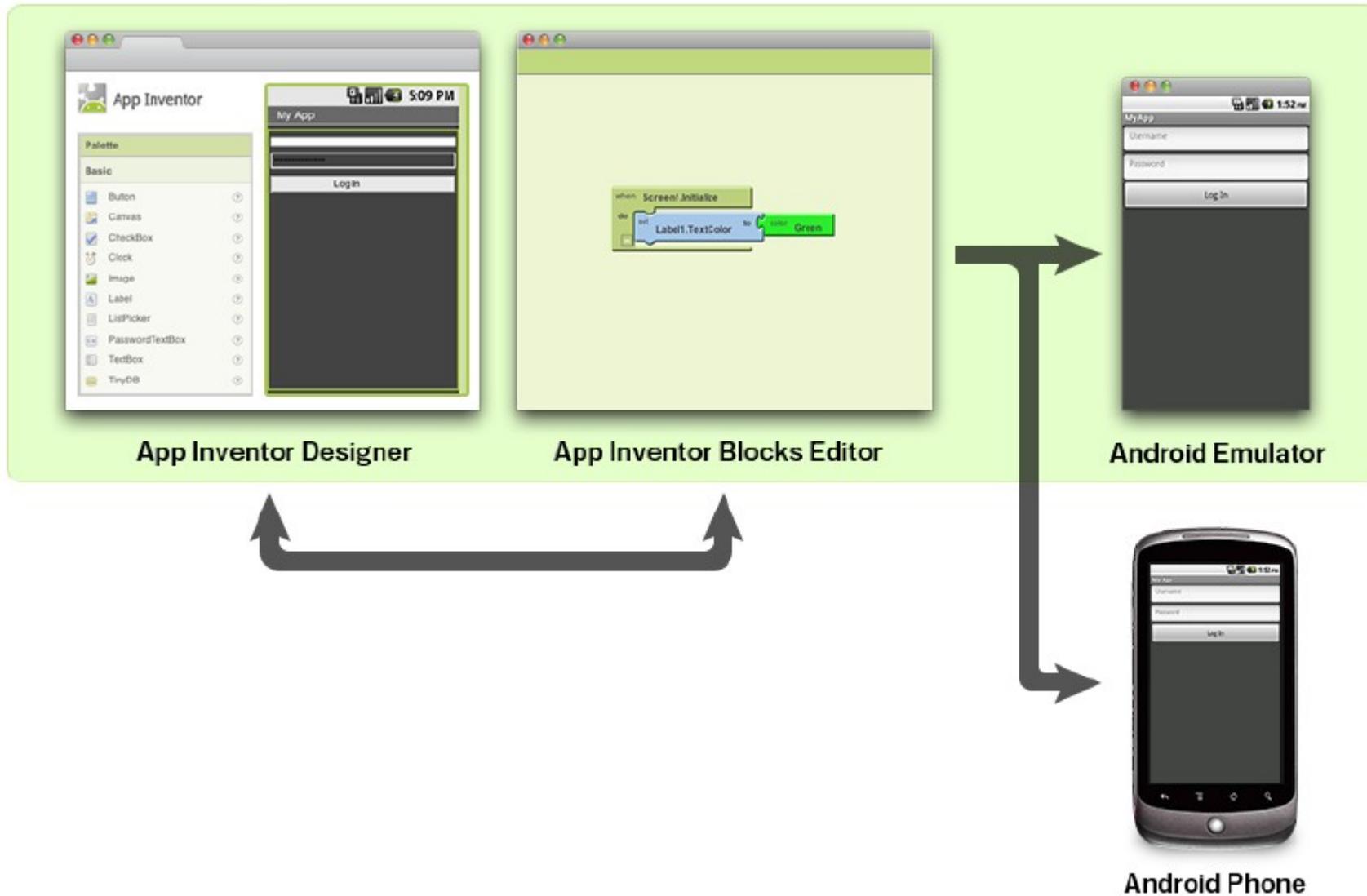


Orangey coloured blocks are about storing things – in computing, we call these **variables**. They let your programs remember what's happened.



There are other coloured blocks you'll come across, like dark green ones, (which are to do with the *properties* of stuff like buttons). You can probably guess how to use them, and if you can't, just ask one of the helpers.

How it fits together



AppInventor

- You should now all have a window in your browser with some AppInventor stuff in it
- And the blocks editor
- If you've got both, great, we're ready to go!
- If not, put up your hand...
...and we'll come round and try to sort it out



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Making your first app

- We're all going to make the same first app



- There are detailed instructions in the handout
- And all the photos & sounds you need are in the folder 1st_activity

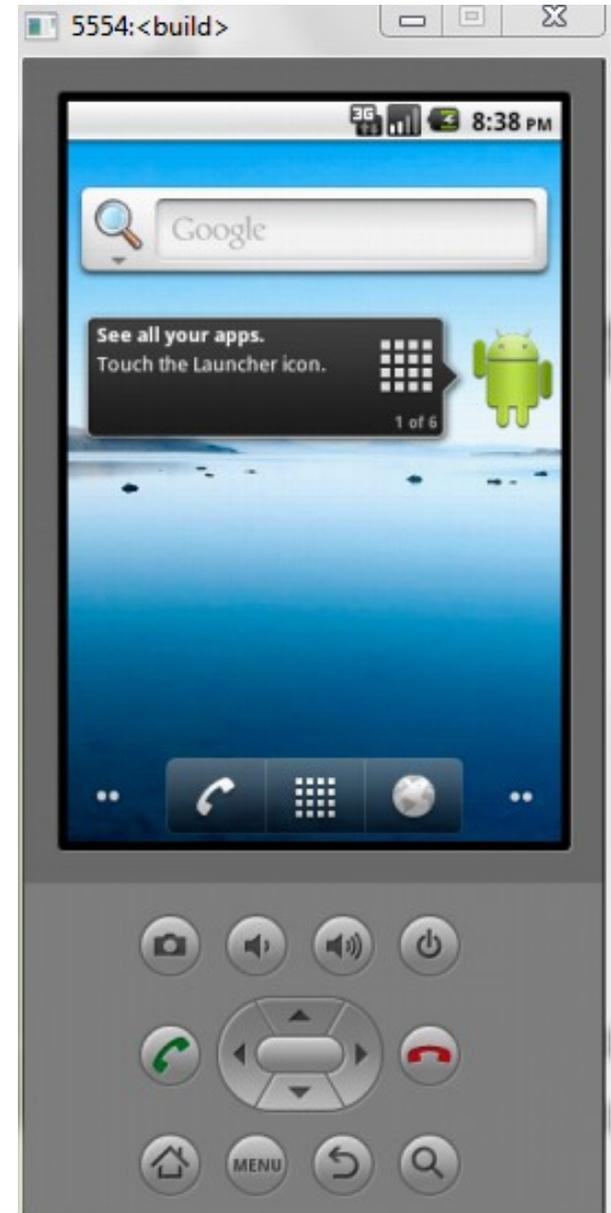
Running your first app if you don't have a phone

- On the Blocks Editor, click “connect” then “Emulator”
- This will start up an emulator
 - Like an android phone, but running on your laptop rather than on its own
- You can then connect to the emulator, and your app should appear on it



Running your first app if you do have a phone

- Click “build”
 - Then “App: (provide QR code for APK)” if you have a QR code reader
 - Or “App: (save APK to my computer)” if you don't have a QR code reader, then email the saved file to your phone
- Then you can install it on your phone



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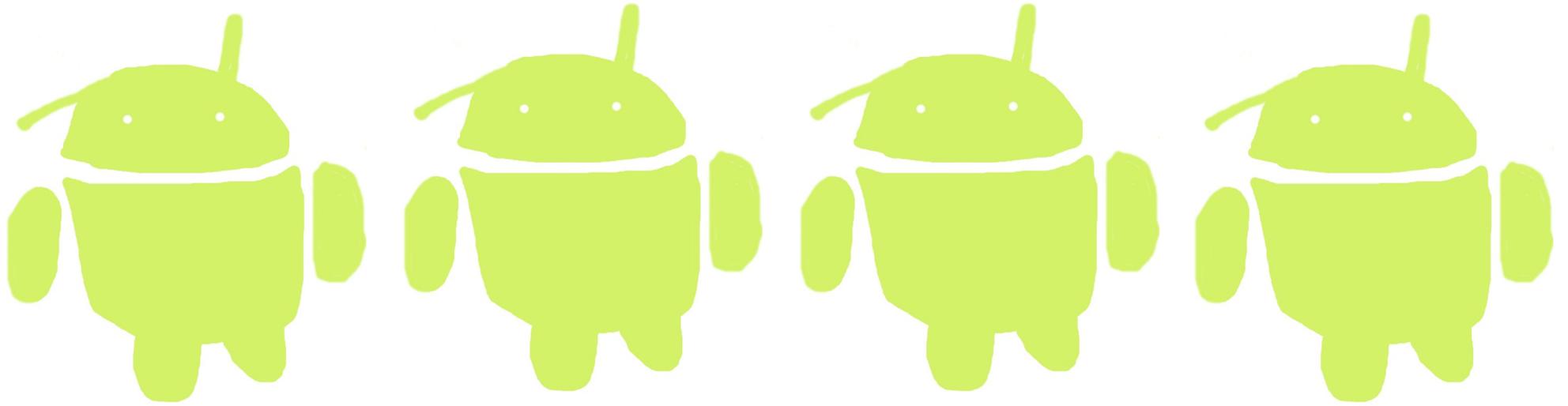
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What's special about mobile?

- Emulator is OK if you want to see buttons clicking and sounds going *Meow!*
- But the fun thing about mobile is that it's **mobile**

- A mobile phone is a computer with all sorts of other stuff attached





What does a phone have that a normal computer doesn't?



Some special things about mobile ...

- Small screens and big fingers
 - Also, no mouse pointer...
- Moves around a lot
- (Probably) contains a camera
- Has other sensors like GPS, compass,
- Has wireless
- (Probably) can vibrate...
- ALSO IT IS A PHONE

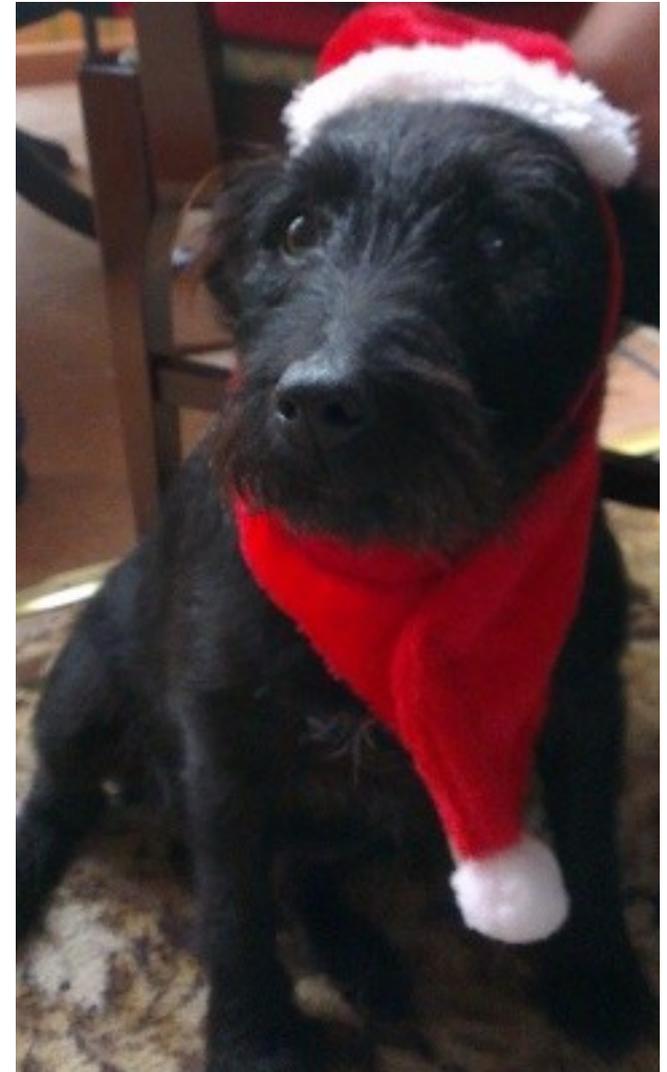


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Changing an app

- Let's make our “Meow” app different, and let's make it more mobile
- Change the photo so it's BenDragon ---->>>>>>>>>
 - You'll find him in 2nd_activity, along with a woof sound
- Change the app so it's more mobile: vibrating, and shaking



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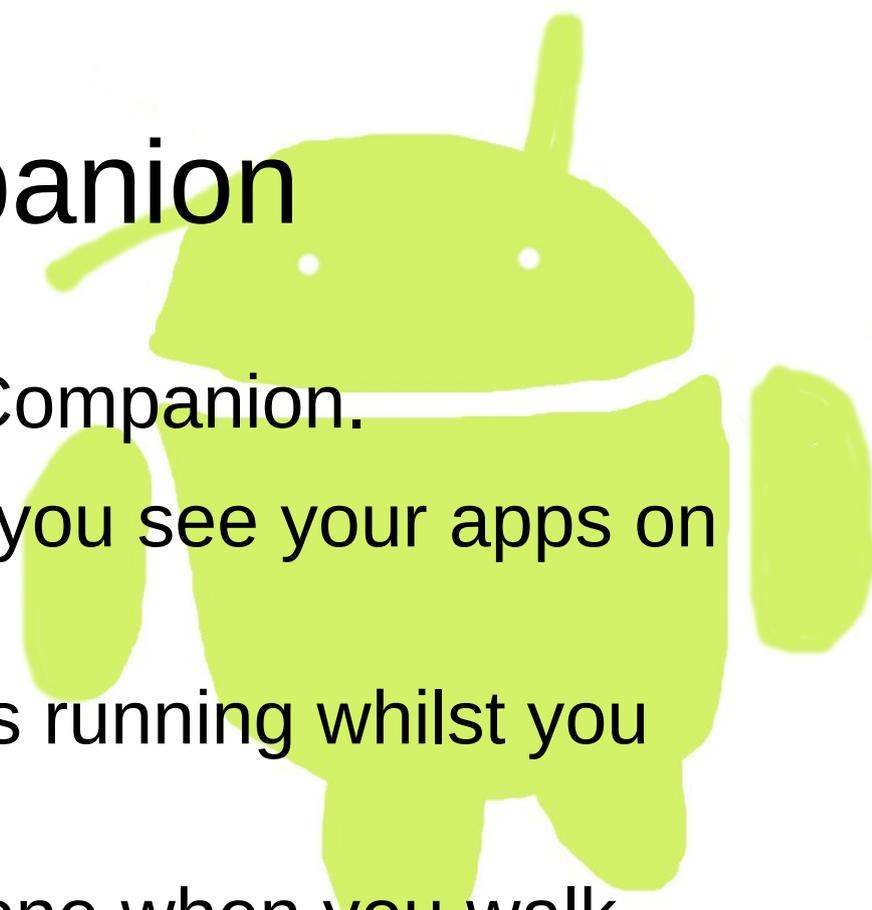
Getting the app on your phone

- There are two main ways to get the app on your phone
 - MIT AI Companion
 - Downloading it
- You can also use USB connect; this can be quicker and is useful if you're doing lots of AppInventor work, but it's more complex so we won't cover it here.



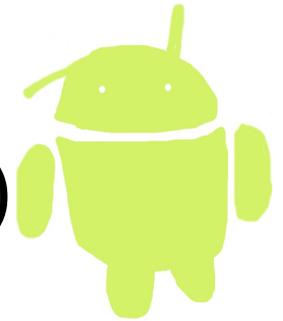
MIT AICompanion

- In Google Play look for MIT AICompanion.
 - it's a small app which will let you see your apps on the phone using wifi
 - This is great for seeing things running whilst you are building them
 - But it won't still be on the phone when you walk away
- You do this by starting the app on your phone (or tablet), then clicking on “Connect” then “AICompanion” in AppInventor then entering the code it gives you.



Recap!

- So!
- It's been a busy morning. You've...
 - Installed AppInventor
 - Made an app by following instruction
 - Edited that app
 - Seen it working on an emulator
 - Seen it working on a phone (probably)

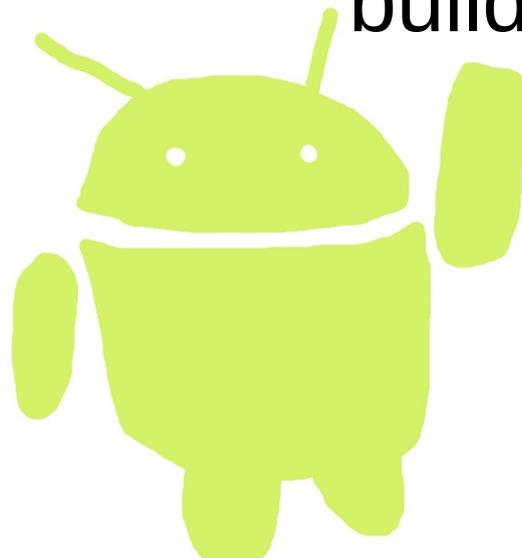


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The rest of the day...

- We're going to get into little groups
- We'd like each group to have 1 computer, and 3-6 people
- (Some of you have been working in groups already)
- In these groups, you're going to come up with an idea for an app
- And then we're going to help you try and build it



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AppInventor ideas

- There are lots of different things we can do with AppInventor
- I'm going to talk you through some ideas –
 - If you want to take any of these further that's fine
 - Really I just want to show you what can be done
- You can find details of some of these in the handout if you want to look again...



Drawing dots

This involves...

Renaming blocks

Putting things on a canvas

Layout of screen elements

Drawing dots

Canvases have a lot of drawing options.

The screenshot shows a Scratch 'Viewer' window with the following code blocks:

- when Canvas1 .Touched**
 - do **call Canvas1 .DrawCircle**
 - x: **get x**
 - y: **get y**
 - r: **5**
- when Red .Click**
 - do **set Canvas1 . PaintColor to** [Red]
- when Blue .Click**
 - do **set Canvas1 . PaintColor to** [Blue]
- when Green .Click**
 - do **set Canvas1 . PaintColor to** [Green]
- when Yellow .Click**
 - do **set Canvas1 . PaintColor to** [Yellow]

Here we use circle. To draw a circle you need the centre (x,y) and radius (r).

To change the colour of a drawing you have to change the paint colour.

There are four buttons in this app. I've labelled them red, blue, green and yellow so it doesn't get confusing.

Moustache man (or woman!)

This involves...

Using the camera

Dragging things around

Using an ImageSprite

Moustache man (or woman!)

Viewer

```
when Button1 .Click
do call Camera1 .TakePicture

when Camera1 .AfterPicture
image
do set ImageSprite1 .Picture to get image
set ImageSprite1 .Width to Canvas1 .Width
set ImageSprite1 .Height to Canvas1 .Height

when ImageSprite2 .Dragged
startX startY prevX prevY currentX currentY
do call ImageSprite2 .MoveTo
x get currentX
y get currentY
```

Button -Takes picture when clicked due to the .TakePicture command on the camera block.

After the picture has been taken it appears as the image sprite, which makes it easy to move around.

This other image sprite has the image of the moustache to be moved around.

Show Warnings



Counting

This involves...

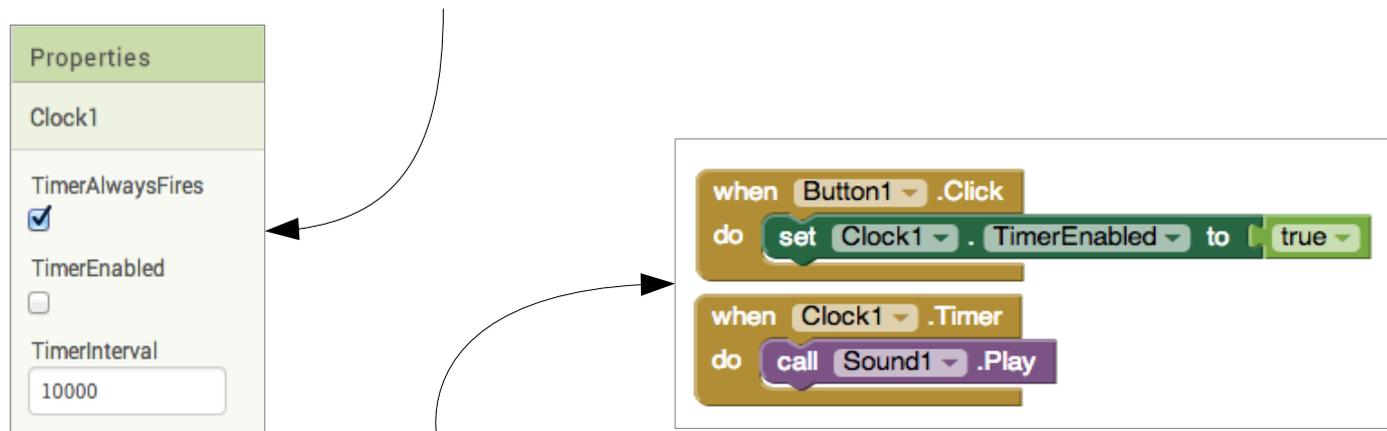
Using a clock

Having a variable

Doing sums

Counting

In properties for the clock on the design page, you should set time interval to 10000 (10 seconds) and untick the TimerEnabled box.



The image shows two parts of a development environment. On the left is a 'Properties' window for an object named 'Clock1'. It has three visible properties: 'TimerAlwaysFires' with a checked checkbox, 'TimerEnabled' with an unchecked checkbox, and 'TimerInterval' with a text box containing the value '10000'. On the right is a code block with two event handlers. The first handler is triggered by 'Button1 .Click' and contains a 'do' block with 'set Clock1 . TimerEnabled to true'. The second handler is triggered by 'Clock1 .Timer' and contains a 'do' block with 'call Sound1 .Play'. Arrows point from the 'TimerEnabled' checkbox in the properties window to the 'set Clock1 . TimerEnabled to true' block, and from the 'TimerInterval' text box to the 'call Sound1 .Play' block.

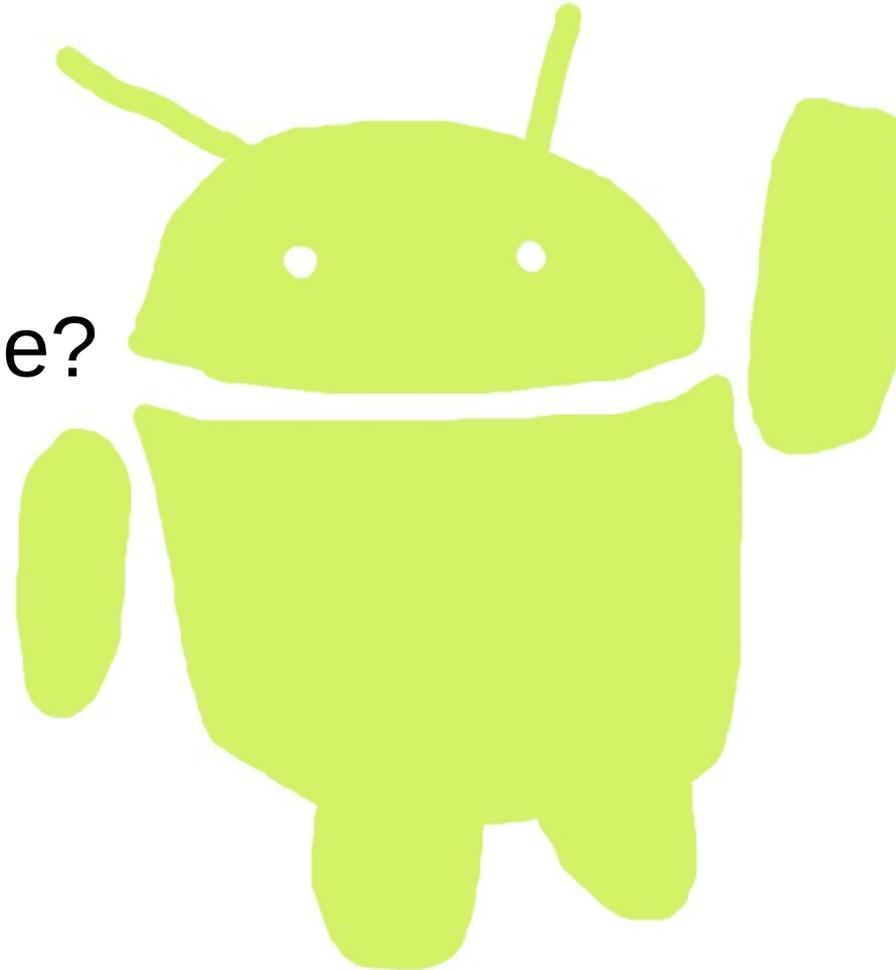
The blocks for this app are relatively simple, you should set them up like this.

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Planning is important

- What will your app do?
- What will your app need?
- Sounds
- Pictures
- Anything else?



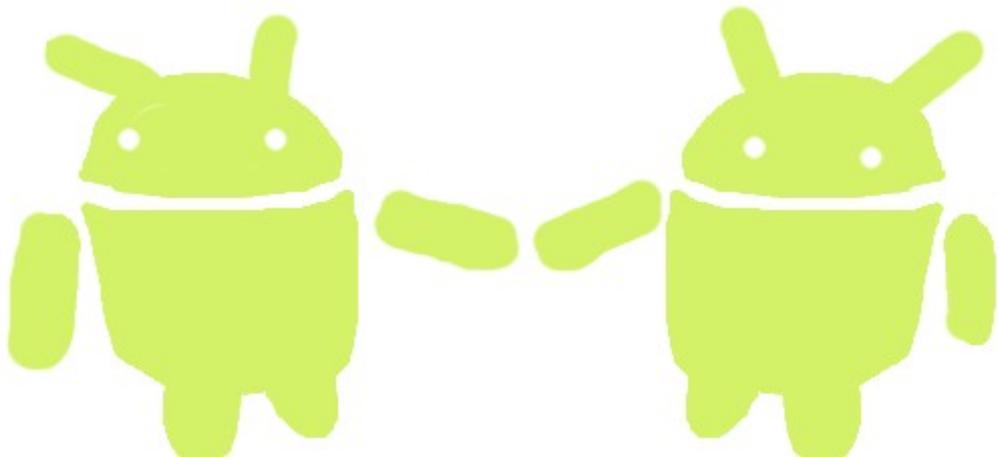
Animal noises, and bangs!

- There are some noises, photographs and sounds in the “resources” folder
 - Animal noises...
 - Drum sounds...
- But you have your own imagination and the entire internet to call on
 - so do not feel you have to make a farmyard app or a drum machine



Planning your app

- Draw what you want your app to look like
- Work out what you want to happen
 - Will it do something when you shake it?
 - Will it do something when you press a button?
- Work out what it needs
 - Colours? Pictures? Sounds?

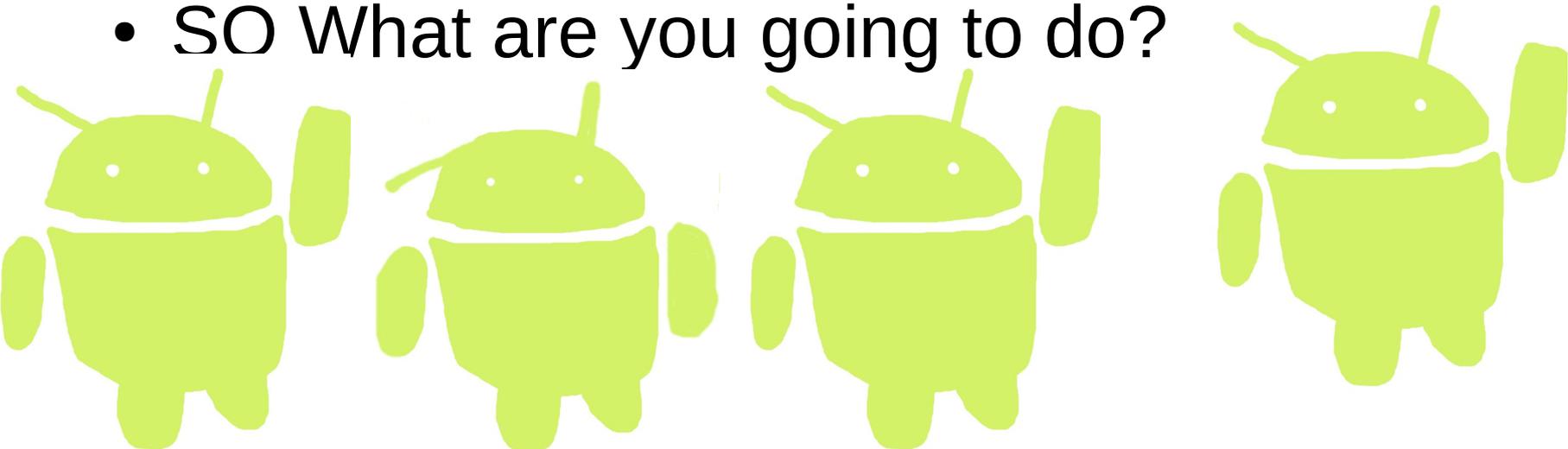


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Questions and answers

- Now you've all hopefully come up with an idea for an app, I want to know what it is...
 - Some ideas might be too hard to do in an afternoon
 - We don't mind you starting it and carrying on at home, but we don't want anyone to get stuck...
- SO What are you going to do?



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Time to make your app!

- We're here to help,
if you need a hand,
just stick up a hand.

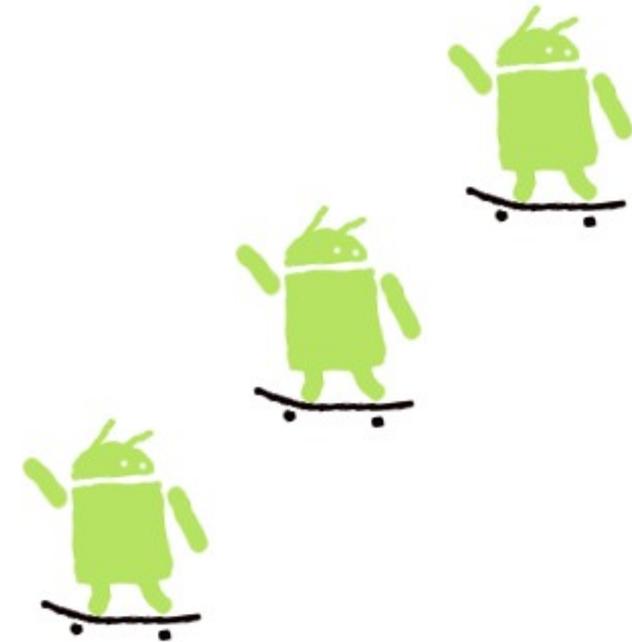


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Showing it all off

- Let's all see what you've managed to build
- We'd like to take some short videos of apps
 - It doesn't matter if they're not finished
 - We might run this day again and it'll be good for future attendees to see what you got up to
 - But if you don't want to be videoed, just say



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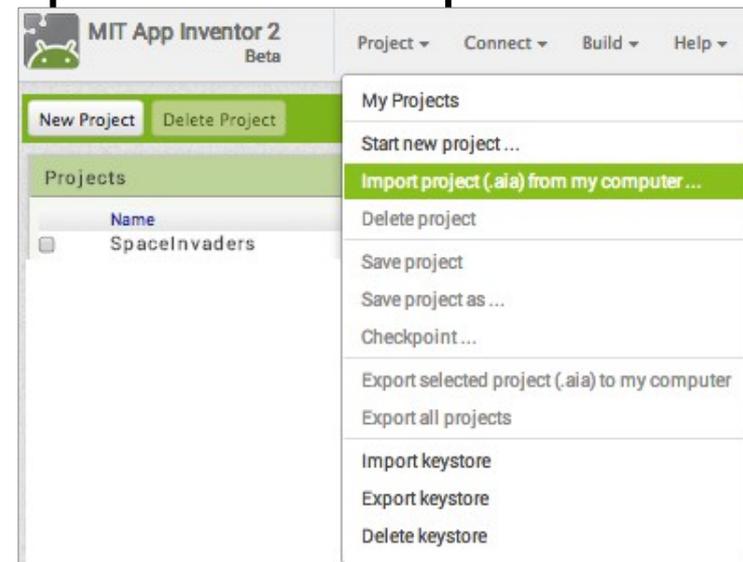
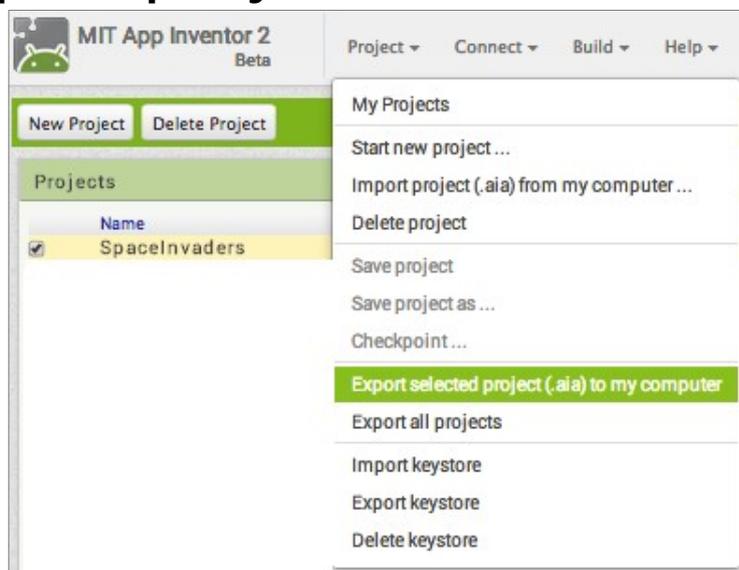
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Sharing code

You can share your code with your friends who can then edit or “remix” it. Select the project you want to share in the list of projects, then click “Project” and then “Export selected project (.aia) to my computer”.

You can then send this to friends via email or using a USB stick.

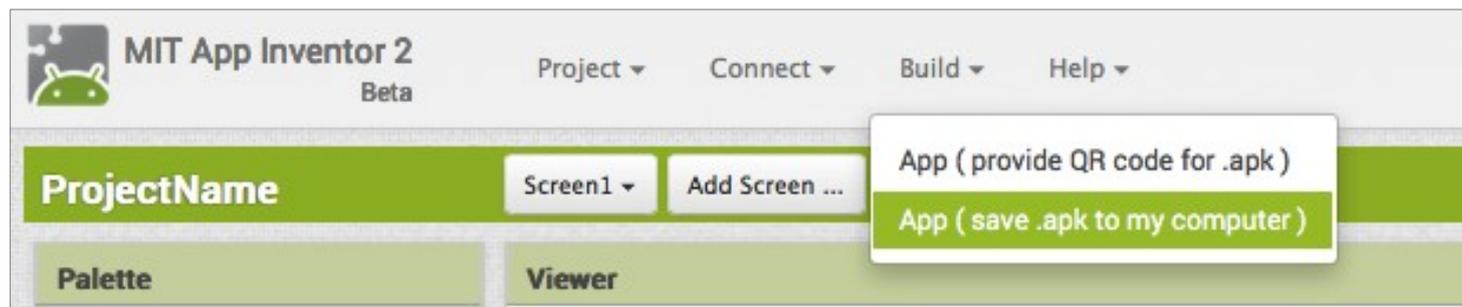
Your friends can download the file then click on “Project” then “Import project (.aia) from my computer” and upload the file.



Sharing the App

Want friends to download your app to play? Open the project you want to share with friends and click on “Build” here you can select “App (save .apk to my computer)” and then email the .apk file to whoever you want to download it.

This can be downloaded by accessing the email and downloading it straight onto there phone or tablet, but first they should change some settings in there device (these are in your handout!)



Google Play Store?

You can now upload your apps to the Google Play store for everyone to download! To do this you should:

- Download the .apk file to your computer.
- Register for a “Google Publisher account” (this will cost you around £15 to register)
- Uploading your app is a long process - ask for help from a parent if you need to.
- There's more information about this on your handout



Other things to try



- Scratch

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

Great for playing around, uses blocks like AppInventor

- Greenfoot

<http://www.greenfoot.org/>

Good for older learners (14+?), teaches real Java

- Both of these have a really active community



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AND WE'RE DONE!

Make sure you check out with the GWR monitors so it'll count for our world record!



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<http://creativecommons.org/licenses/by-sa/3.0/>

This is version 2: written by Hannah Dee and updated for AppInventor 2 by Tilly Horsley. The current version will be kept at <http://www.hannahdee.eu/appinventor> along with all other materials.