AppInventor

Mobile App Creation with MIT AppInventor

An i2 Camp-MIT STEM Exploration



***i2 App Inventor Camp***

***By Diane Brancazio, MIT Edgerton Center, 2016***

***Smartphones and tablets have changed computing and the world. Apps are a great way to get into the exciting world of coding, be creative, and solve a problem in your own life. Wish there was an app for that? Create it! In this course you will design and develop Android apps using MIT App Inventor. Students learn basics through video tutorials, try out and customize existing apps, come up with new ideas, then program your own apps. Course work includes collaboration and individual activities.***

Welcome to the Teachers Guide for the i2 camp “AppInventor” and the world of mobile app development!

We hope that you enjoy your experience as an instructor and that you cultivate your own inner programmer/tinkerer/designer throughout the course. Along with your campers, you will develop coding skills, ideas for your own projects, an appreciation for mobile app design, and the ability to seek out resources and learn on your own.

Encourage the students to experiment with ideas and code, and to be playful. Hopefully they will use each other as sounding boards, providing valuable opinions and feedback on app ideas.

The guiding philosophy of this course is that everyone is challenged and everyone succeeds. AppInventor is a tool that can be used at many levels, and mobile apps are used by all types of people. Use the tool appropriately and allow people to work at a level where they can be successful and challenged, not overwhelmed. A common pitfall in a design course is to ask participants to come up with their “ideal”. This often brings up something that is not possible to create with the given tools. An alternative way to inspire creativity is to give a simple starter piece and ask participants to improve upon or customize it. Yet another way is to give a number of possible components and ask participants to use several in an idea. Participants in this course will have opportunity to take giant steps and create a groundbreaking app if they choose, and they will also have the opportunity to take small steps as they make satisfying progress in their learning.

On Days 1 and 2, students will learn how to use the app-building application MIT App Inventor, following video tutorials but having an opportunity to customize the apps. The exercises are starting points that help campers get energized with quick successes and facilitate the learning of tools and techniques. On days 3 to 5 they will plan apps of varying levels of complexity and refine/create them. The projects are open-ended and there is no best app. The tablets have enough functionality that a wide variety of fun, engaging apps can be created. While AppInventor has the ability to access the web, databases, and phone networks, this course focuses on apps that run on the tablet and need no external connections.

The completion of this course will hopefully be a beginning for the campers. They are now Mobile-App developers, and have taken steps in to the world of coding! Have fun and go create!

***Note that this document contains specific instructions for AppInventor. It should also be viewed as a guide, which can (and should) be modified at the instructors discretion according to the needs and situations in individual classrooms.***

**The i2 Camp Philosophy**

The program at i2 Camp has been developed with the goal of engaging middle school children in the fields of science, technology, engineering and math, broadening a child's exposure to STEM with a wide variety of new, innovative courses not seen in traditional middle school education. The fun and intimate hands-on activities of these courses strive to excite and inspire campers about STEM, creating enthusiasm that will spill over to their schoolwork and school choices in future years.

We want to invent & inspire, imagine & innovate, investigate & inquire, and initiate & improvise. And we want to smile, laugh, and have fun!

**i2 Camp Daily Schedule:**

09:00 – 11:45          Morning Session

11:45 – 01:30      Lunch and Recess

01:30 – 03:45          Afternoon Session

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**Introduction and Course Overview**

**Course Description**

*Smartphones and tablets have changed computing and the world. Apps are a great way to get into the exciting world of coding, be creative, and solve a problem in your own life. Wish there was an app for that? Create it! In this course you will design and develop Android apps using MIT App Inventor. Students learn basics through video tutorials, try out and customize existing apps, come up with new ideas, then program your own apps. Course work includes collaboration and individual activities.*

**Skills that campers will develop skills in several areas**

This course emphasizes tinkering and discovery in addition to technical skills.

When students are playing with technological tools in an unstructured manner (tinkering) they are developing understandings for themselves (constructionism). Within a course structure there is also a timeline to follow, and we want to make sure that campers get the satisfaction of completing projects. Some activities help campers develop specific skills that will enable them to be more intentional and effective in their tinkering by themselves or working with a group.

Goals are broken into 3 categories, and each activity is cross-referenced to a stated goal:

1. **Course Goals** are the overall takeaways
2. **Design, Problem Solving, and Collaboration Skills** are skills that can be generalized to many content areas
3. **Programming Skills** are specific to the content of this course

**Course Goals**

Campers will:

* Be introduced to computer science in a fun, engaging way
* Develop skills in computational thinking and problem solving
* Have a joyful experience at camp, and leave with a feeling of accomplishment and satisfaction
* Experience tinkering, design, iteration, and collaboration as effective engineers
* Experience some challenges/frustrations in the learning process and overcome them
* Create something that they feel is uniquely their own
* Strengthen their learning and social skills by sharing the learning and doing in a supportive peer group
* Be inspired to continue learning and doing app creation and/or coding
* Be empowered by the process of learning new skills and developing mastery

**Design, Problem Solving, and Collaboration Skills**

Campers will:

D1. Brainstorm multiple creative solutions to open ended problems

D2. Collaborate effectively with peers, discussing ideas offering suggestions and incorporating feedback

D3. Create detailed plans to communicate their ideas

D4. Formulate questions and research coding solutions on their own

D5. Reflect on their own learning and acknowledge personal and team accomplishments

**Programming Skills**

Campers will:

P1. Use the AppInventor computer environment to create, store, revise, and publish apps. Use the MIT AI2 Companion app on a tablet to emulate and install apps on Android devices

P2. Program an app to take in and present content in a variety of media: drawings, images, animations, audio, and video

P3. Handle device events (shake, touch, drag, tilt, collisions, timers, etc.) and program appropriate response behaviors

P4. Create code using standard programming tools: logic, conditionals, variables, lists, procedures

P5. Analyze existing code and use it as a starting point for new projects

P6. Create and communicate algorithms for a desired app performance

P7. Research coding resources as needed

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| **DAY 1** | | |
| Name | Description of activity | Time |
| Activity 1.1:  Introduction to Camp, Kids, Instructor | Introduce Logistics, Goals, and Plans  Show a Code.org video for inspiration “What Most Schools Don’t Teach”. Discuss process for an effective learning process and a friendly supportive environment. Campers assemble a set of cards and personalize them. Ice breaker activity with apps installed on tablets. | 60 min |
| Activity 1.2:  Introducing MIT App Inventor | Campers tour the interface for MIT App Inventor, get a tablet connected as an “emulator”, and build their first app using the video tutorial: Talk to Me Part 1 | 60 min |
| Activity 1.3:  Shakes, Text-to-Speech, and Customizing | Campers improve upon their first app, and learn more about the App Inventor environment using the Talk to Me Part 2 tutorial. | 30 min |
| Activity 1.4:  ImageSprites and Screen-Flings | Campers learn new components and how to handle new events by following the Ball Bounce Tutorial and extensions. | 45 min |
| Activity 1.5:  Screen-Drawing and Clearing | Campers learn how to “draw” on the screen, clear it by shaking the tablet, and brainstorm ways to combine concepts from the 3 introduction exercises. | 45 min |
| Activity 1.6:  Code a Human Robot | Campers write “code” for a human robot and practice iteration and debugging. They practice writing code precisely as for a robot or other computer application. | 45 min |
| Activity 1.7:  Wrap-Up, Reflection | Campers reflect on their new understanding of App Inventor and the coding process | 15 min |

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| **DAY 2** | | |
| Name | Description of activity | Time |
| Activity 2.1:  Welcome and App Inventor Review | Campers review what they did on Day 1 and prepare for Day 2 by setting up tablets and computers. Walk through App Inventor environment (again) noting Designer/Blocks tabs, locations of components, colors of code blocks, etc. | 30 min |
| Activity 2.2  Install Apps on Tablets | Upload and install apps on tablets using the MIT AI2 Companion app. | 30 min |
| Activity 2.3:  PaintPic App: Draw on a Photo | Campers continue to develop drawing app by following the PaintPot Tutorial on AppInventor.org. They can take their own picture with the tablet camera, then draw over it | 90 min |
| Activity 2.4:  What Makes a Good App? | Campers visit the AppInventor Gallery where apps are published and shared. They try out a variety of given apps. They discuss the apps from the Gallery, the ones they just built, and favorite apps they recall from their own lives. Campers compile a list of what qualities make a good app. | 80 min |
| Activity 2.5:  Brainstorming 1.  Sorting concepts and mixing up new ideas | Campers review the components and logic that they now know how to use. They play a game to mix the ideas and create crazy app ideas. Also list components they want but don’t know how to use yet. | 20 min |
| Activity 2.6:  Brainstorming 2. Individual idea generation and peer review | Campers come up with ideas for at least 2 apps that they will work on for the week and write them out on a template. At least one must be easy enough to start today. | 20 min |
| Activity 2.7: Share App ideas and Reflect | Campers share their app proposals to the entire group. Peers share their likes, questions, and suggestions. Discuss each campers “easy” idea before moving onto the “hard” app ideas. Campers clean up and reflect on what they learned and/or completed today. | 30 min |

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| **DAY 3** | | |
| Name | Description of activity | Time |
| Activity 3.1:  Welcome and Quick Review | Campers prepare for Day 3 (set up tablets and computers). They review how to upload to tablet. Campers briefly share plans for their apps, highlighting how they changed them from class feedback. | 30 min |
| Activity 3.2:  Try out AppInventor Resources | Campers get familiar with coding resources and ways to answer questions on their own. Go to AppInventor.org and see how to use the “How do you?” section. Use set of cards. Use detailed cards. | 30 min |
| Activity 3.3:  Create App 1 | Campers work on their easy app per their plans. | 90 min |
| Activity 3.4:  App 1 Preview | Students share their app with the group, no matter what stage it is at. Peers may offer encouragement, suggestions. | 30 min |
| Activity 3.5:  App 1 completion | Campers finish work on app 1 as needed, adding refinements as desired. | 30 min |
| Activity 3.6:  Publish to Gallery and Present App 1 | Campers upload completed apps to Gallery and present their apps to the group. They acknowledge others for help and suggestions, and present plans for their next app. | 45 min |
| Activity 3.7  Begin App 2 | Campers work on their next app per their plans. | 30 min |
| Activity 3.8: Wrap-Up and Reflect | Campers clean up and reflect on what they learned and/or completed today. | 15 min |

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| **DAY 4** | | |
| Name | Description of activity | Time |
| Activity 4.1:  Welcome and Setup | Campers prepare for Day 4 (set up tablets and computers). Watch short videos about coding | 15 min |
| Activity 4.2:  Technical Review of Other Apps | Review apps from 2-3 other students and “diagram” them on a template. Discuss how this process can be a useful learning tool | 45 min |
| Activity 4.3:  Review App Ideas | Campers go back to their ideas for the harder apps, review on their own, refine, then share with group. Peers share their likes, questions, and suggestions. Students come away with a clear idea for their next app. | 60 min |
| Activity 4.4:  Idea Refinement | Campers refine their plans for App 2 based on feedback. Plans can still change, but these plans are a roadmap for now. | 30 min |
| Activity 4.5: Create the Apps | Campers work on their apps. Campers will be available to others as “testers”, with their feedback helping the development of the app. | 135 min |
| Activity 4.6: Wrap-Up and Reflect | Campers clean up, reflect on what they learned and/or completed today and make plan of work for last class. | 15 min |

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| **DAY 5** | | |
| Name | Description of activity | Time |
| Activity 5.1:  Welcome and Setup | Students review what they did on Days 1 to 4 and prepare for Day 5. | 15 min |
| Activity 5.2:  Finish Apps and Publish | Campers finish apps, publish to the Gallery, and prepare a presentation to the camp group. | 75 min |
| Activity 5.3:  App 2 Presentation | Campers present their apps to the class. | 60 min |
| Activity 5.4: Surveys and Classroom Cleanup | Campers take evaluation surveys and do a final cleanup of the classroom. | 30 min |
| Activity 5.5: Presentations/Parent Showcase | Campers showcase their experience at the camp and the apps they have built. | 120 min |

**Class Room Requirements/ Set-up**

This classroom needs to be thought of as a combination computer lab/workshop and set up accordingly. Students need sufficient space to work individually and in groups. It is best for campers and course leaders to be able to move around freely to share ideas and collaborate. However, computers may be locked to tables. It would be good to arrange frequent breaks away from computers for campers to gather in groups.

**Classroom/Workshop Set-up**

* Classroom/Workshop Rules posted clearly
* One computer/laptop per student
* Room near computers for tablets
* Room for students to talk together without being at computers
* Space for leader to address the class as a whole
* Places to store materials so they can easily be accessed by campers

**Equipment Needs**

* White board or chalk board
* Document projector

**Classroom/Workshop Rules**

* Be kind to each other
* Listen to each other, talk in turn – do what works in the classroom
* Phones are not for recreation. They may be used to research or to document your project.
* Take care of the space, your classmates, and yourself.
* Help others be safe – remind others to use safety glasses, or hold tools appropriately
* If you see something, say something! Let an instructor know about unsafe situations

**Safety Concerns**

* See the Appendix for a summary on lab safety
* All other First Aid – see a leader immediately
* Keep a First Aid kit in the classroom
* Injured campers should be sent to the nurse