THE EDUCATION FUND

FOR EXCELLENCE IN MIAMI-DADE PUBLIC SCHOOLS

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Ideas With IMPACT

idea packet

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CodeBot! The Cool Coding Robot!

Project **CodeBot! The Cool Coding Robot!**

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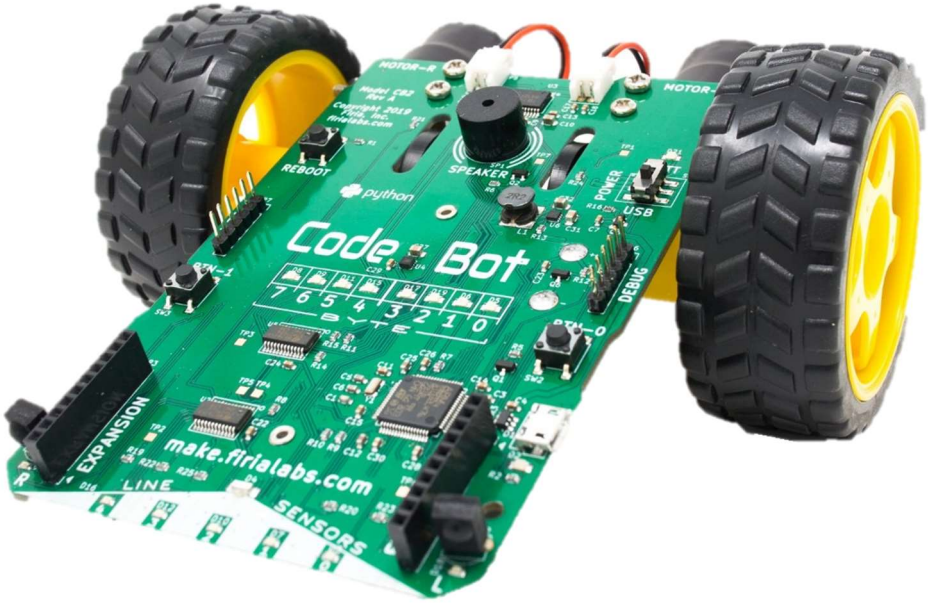

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Sample Florida Common Core/CTE Standards

01.0 Demonstrate proficiency using specialized computer coding software.
02.0 Develop an awareness of programming languages.
03.0 Demonstrate proficiency using common software applications.
04.0 Demonstrate knowledge, skill, and application of information systems to accomplish job objectives and enhance workplace performance.
05.0 Demonstrate comprehension and communication.
06.0 Demonstrate knowledge of different operating systems.
07.0 Demonstrate proficiency in basic programming.

LAFS.910.RI.4.1 & LAFS.910.SL.1.2

By the end of grade 9, read and comprehend literary nonfiction in the grades 9–10 text complexity band proficiently, with scaffolding as needed at the high end of the range.

By the end of grade 10, read and comprehend literary nonfiction at the high end of the grades 9–10 text complexity band independently and proficiently.

LAFS.1112.RI.4.1 & LAFS.1112.SL.1.2

By the end of grade 11, read and comprehend literary nonfiction in the grades 11–CCR text complexity band proficiently, with scaffolding as needed at the high end of the range.

By the end of grade 12, read and comprehend literary nonfiction at the high end of the grades 11–CCR text complexity band independently and proficiently.

Disclaimer/Notation: *The above standards are specific to 9th, 10th, 11th and 12th grades; however, this project meets standards for all grade levels (K-12) in reading/language arts, social studies, visual arts, and many other content areas that integrate to a STEAM initiative. A multitude of Common Core standards are easily met across the curriculum using the following plans and lesson ideas*.

Goals, Objectives and background

The idea came to mind after much success with a 2020 EdFund Innovator Grant I was fortunate enough to be awarded during the previous year and had much success with. The grant was "Bot! The Engineer That Could Code" and students have come beyond excited and ready to work on projects that continue to evolve from the grant, as well as resources that spark interest!)

The coding robot allows students to learn the very basics to python coding language by actually seeing the robot move in all directions that are entirely dictated by the user's programs. Students will learn trial and error debugging technique as well as how to code larger programs. Student activities include but are not at all limited to 'line follow' which allows the robot to move around an entire room without any touch on its own (self-driving car). Also, activities such as feedback interaction based on if/else statements in coding.

The number of students working on the project with one robot can range from induvial or as many as a small group of 4-5 students at one time. Whole group assignments can work well with the class by having students submit code and then the educator choosing whose code to run at a given time- onto the robot. This allows students to eagerly see their creation come to life one by one. Peer feedback is also valuable during this time. the age range can be from 8/9/10 years old in elementary school all the way to high school as the python code base package has many levels to work with and can be stopped when younger learners hit a wall that may be- beyond that scope of pedagogy. All levels of learners from ESE to GIFTED to regular population can enjoy this project as it allows a wide understanding of programming in a tangible and fun way.

Materials

One of the great things about this project is the adaptation level. Educators need only their classroom space and a computer to get started. The more adaptation the better, however with just a little bit of floor space, the robot can move around and beyond that, creativity is key. There are no books needed, the online curriculum has all needs covered and the only add on would be batteries to keep the unit going after long runs. I have also used carpet take and markers and posterboard to add to the experience for students. Beyond those materials, creativity with students is key as well.

Resources

The internet is always a wealth of information, however, can be a vast black hole of too much; and so I caution educators to allow students to only look up information that specifically pertains to the project being administered. Guest speakers are a FANTASTIC way to bring more connections to this project and a list of virtual guests can be included in the package to educators as well.

How has this project benefited your students' academic achievement?

(ie. test scores, attendance, attitude changes, student projects, etc.)

The CodeBot project has greatly improved not only student participation and overall attendance (due to students actually WANTING to be in the lab for this), however it has also afforded students to learn the rudimentary levels of coding, which in turn allows students to do far better on more advanced coding project (JS/HTML/C#/Java) which is required for our curriculum. Allowing students to first grip coding with a hands-on creative manner removes many barriers that often shun students away. I love that these program grant has opened many avenues that parents and students did not know existed.

Teachers Outcomes and Takeaways From Workshop

1) Meet CodeBot and learn many different 'avenues" the robot can drive through! 2) See how simple (not stressful) the curriculum is for them as well as their students! 3) View the different levels that students can be in and still LOVE to get into Python coding language as well as other languages! 4) Learn how to adapt these lessons and activities within not only their own class labs, however also around the school within other general education areas! 5) being in community guest speakers/leaders and peers, who can build upon the FUN, engaging methods of this curriculum and project base!

Overall Value

CodeBot is a FUN, EXCITING, and ENERGETIC way to get kids to code! Not just for fun, you will see complete engagement, rigor and response from your students! Want to help your students reading and math scores? Introducing a coding language project will aid your students skills by allowing their brain to expand in different ways never thought of before! Parents LOVE to see their kids doing something innovative and your school will stand OUT from the rest! Teams that program and code, show huge gains general education areas (I have seen data for years and can show you!)

Estimated cost for a teacher to adapt the project

At the LOW end = $150 for each robot unit (a total of 2-4 units) therefore $300-600 would be a average.) Adding the cost of batteries and other incidentals will add about $25-50 and so $700 is High-end.

Curriculum Area(s)

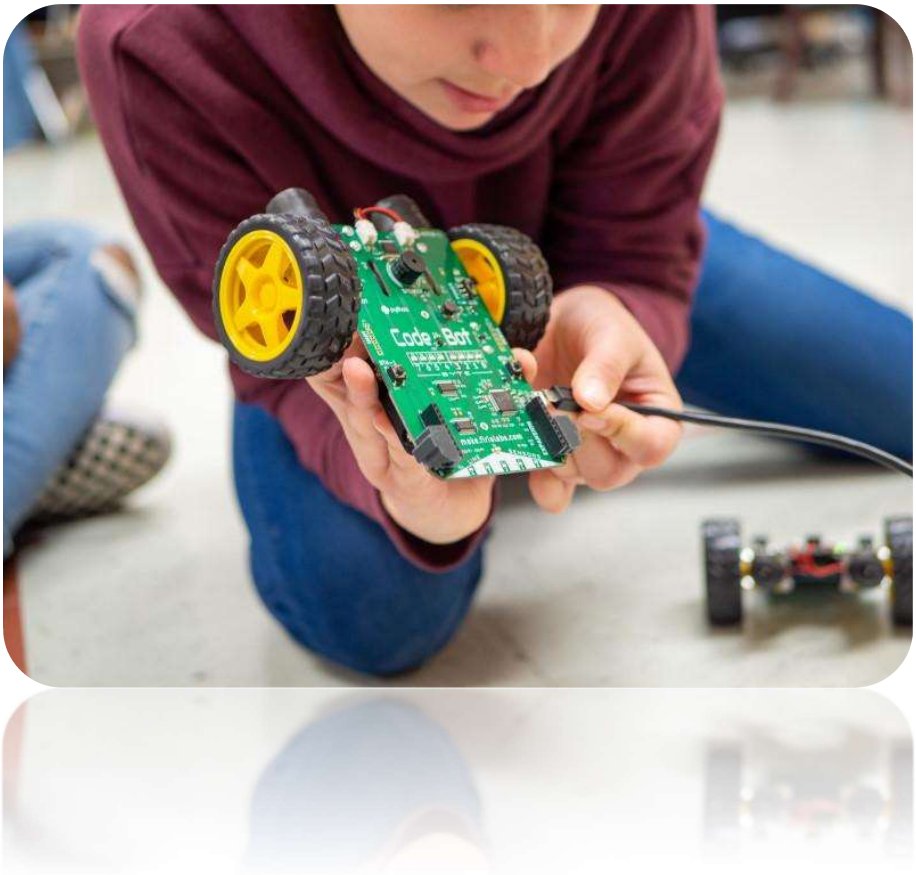
Math/Science/Engineering/Robotics/IT-PC Tech

Project Overview

Educators can and should take liberty to customize the project experience for all levels of learners and how students will best have the opportunity to work with real components and parts that are easy to manipulate. Having said this, the following is a simple project that students can easily connect with and may have a great time learning at the same time.

The project "Line Follow" is as simple as having students log in to the "Code Space" web-based platform to enter the Python code interface for the "Code Bot." From here students can follow on screen step by step instructions to 'code' the robot to actually follow a dark or light color line. Once the online coding is complete and the code is deployed/implemented onto the robot, the students can

then really have fun applying tape or line material to the floor or a suitable flat surface of the teachers approval. The possibilities are endless, and students watch their CodeBot come to life with a path to follow!



Step-By-Step Lesson Plan/Guide (For Teachers)

1) Do not be afraid to appreciate the fact that many of your students will grasp this activity with ease, while others will find this quite challenging; there are over-achievers and those who will need a boost.

2) Do not be afraid to realize that some students will know more than you do about the system, how parts work, and how to configure different options. Just as how some students become teacher-aids in the class, you will soon find advocates within your class setting to help you with this project – this is a power up!

3) For one day or each class period, unpack pieces of the Code Bot, including power batteries, USB, and all other incidentals you may gave purchased to grow on the average. Have your students all see if they are

able to identify individual components and which they may know about or have some concern or question about. The less students understand from the initial planning stage, means there is room to learn.

4) On day two or next block/class, students will gain a foundation of the parts to the kit and what you have set up. With your aid, students assemble parts, create road maps, and have a hands on feel with the CodeBot. This is merely a timeline for shorter block classes and can be catered to meet your specific schedule needs. You may want to start with a single class period and possibly record for future students to see the progress. This step may also be gratefully accomplished during an afterschool club or event.

5) On a third-class day, one the initial design and layout has taken form, and students understand the components and why everything came as needed, your students can begin to log in to the CodeSpace platform to understand a sense of how the CodeBot will interact with simple Python code. Step by step module instructions are presented for you, however it will behoove you to pre-hand try the platform for yourself to make sure it will run smoothly at your school site, as well as for you to be able to anticipate possible questions your students will inevitably have for you. Of course you will not be able to answer all questions, and so you and the students will for sure have fun exploring and learning together.

6) Either the following class period or a timeline of your choosing, once students have worked through the self-paced modules and made way to implementing their code onto the CodeBot, you may start with either one student project as a deployment or use your own "pre-made" to get the students attention and understanding. This will be a huge leap for students to see how their code brings the CodeBot to life, the ease of use for the platform, as well as the actual unit will entice student engagement and all students to look past the goal of making the line follow project, to push creativity to their limits. There are built-in activities and steps on the CodeSpace platform which may help scaffold learning for emerging bilinguals as well as ESE populations.

7) After students exhaust many activities beyond the modules and your own custom ideas, students may now want to research and gain ideas to how this can be applied to their everyday lives – an example I have used with high school students includes the early stages of "Self-Driving Cars," which started a huge debate with the growing world of AI and its relevance

and ability to take over the world if we would allow it. The sky truly is the limit, and your success will show with student success.

8) A final summary from each student could take place either in small groups or individual presentations to showcase their findings and where their interests are. students may want to present a PowerPoint to the class or turn in an essay, or a small, short movie with photos even. The possibilities are endless, and each project will be vastly different.

9) A grading rubric to follow along the way has been provided for your aid that can be altered for your own individual needs and class setup.

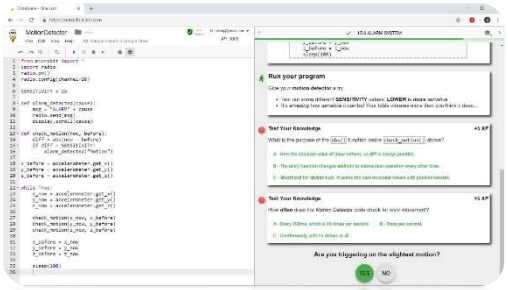
10) A great resource for educators once in the "CodeSpace" platform is the "CodeSpace Teacher Dashboard" ! This is a fantastic resource for educators to use to monitor student progress, keep track of classes, and so much more! Click here for additional notes on the Teacher Dashboard.

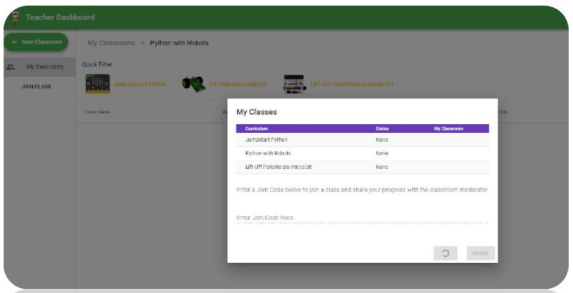
How-To Guide (For Students)

For the CodeSpace program, the very best "How-To Guide" is offered at the following website and shows step-by-step instructions, guides and implementation for all aspects of the aforementioned project(s).
https://make.firialabs.com/

Going Virtual?! That's Great Too!

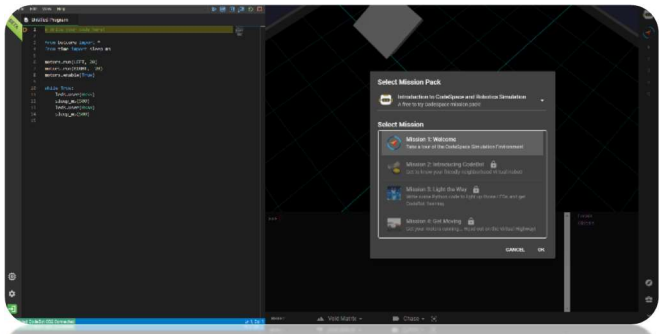
There are many different modalities to learning - as we have learned in the past year and a half - and to that point, Firia Labs has developed an amazing "Virtual Simulation Environment" for educators working remotely or need to accommodate students whom are remote learners! This also helps accommodate for those who do not yet have a CodeBot, or the number of units for all classes/students. Click this link or go to sim.firialab.com ! Student can and should create and account, however, to look around and start coding from the ground up, you need only to click the link! Enjoy.

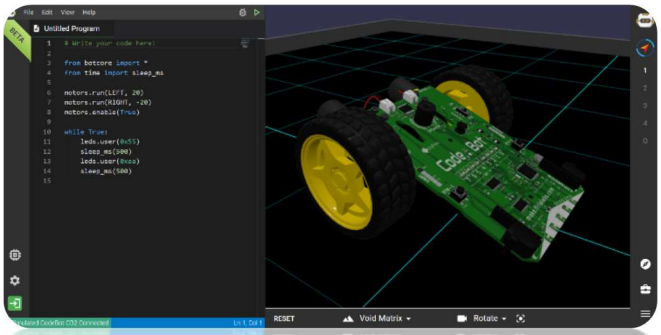




Sample Project Scoring Rubric

Category	Points Possible	Excellent (Above & Beyond)	Very Good (80%)	Good (70%)	Fair (65%)	Points Received
Coding Concept (*Students will understand basics to coding*)	30	25-30 Points	20-24 Points	15-19 Points	0-14 Points	
Career Ideas (*Students research and present findings for possible programming careers*)	30	25-30 Points	20-24 Points	15-19 Points	0-14 Points	
CodeSpace Python Interpretation (*Student able to identify Python Syntax*)	30	15-20 Points	10-14 Points	5-9 Points	0-4 Points	
Participation (*Time and effort well spent well all project tasks*)	10	15-20 Points	10-14 Points	5-9 Points	0-4 Points	
Total Possible:	**100**	**80-100**	**60-79**	**40-59**	**0-39**	
Grade Equivalent:	**A+**	**A**	**B**	**C**	**D**	





Websites/Learning Ideas/Resources

https://www.youtube.com/watch?v=qKZeIYZIk4c
Firia Labs – Where Will Code Take You? (CodeBot)

https://www.youtube.com/watch?v=bXYsj09I9IY&feature=youtu.be
Firia Labs – CodeX

https://www.youtube.com/watch?v=GjSy5eCJ7T4
Firia Labs – CodeSpace Simulation Environment

https://www.youtube.com/watch?v=dAf3RofwhEk
Firia Labs – Product Compilation Video

https://repl.it/talk/learn
(Repl.it web-based IDE site used to actually type and run simple computer programs that students themselves can learn from. Many tutorials, too!)

https://www.careeronestop.org/ExploreCareers/Assessments/interests.aspx
(Career exploration site which includes a 'career exploration' survey/assessment for all ages; to help determine where in the IT/STEAM world interests may be!)

https://www.w3schools.com/python/
(Learn Python! You and your students can do it with easy to follow steps!

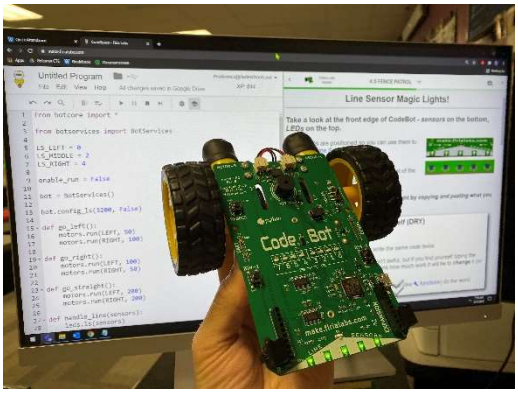
http://steam.dadeschools.net/#!/fullWidth/1860
(Is your school interested in getting a STEAM designation? It is a lot easier than you think! Check out this page for more!)

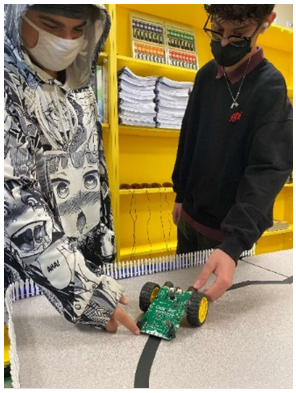
http://compute-it.toxicode.fr/
(A colorful take on understanding coding from a different type of perspective – a gaming mechanism as well!)

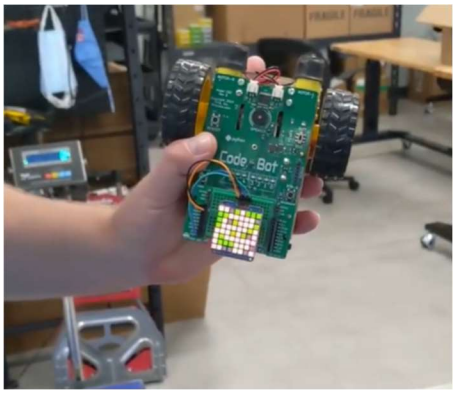
https://www.khanacademy.org/computing/hour-of-code/hour-of-code-lessons/hour-of-drawing-code/pp/project-self-portrait
(Student can create ART by using JAVA with Khan Academy's easy to use and script interface! Fantastic for all ages and levels!)

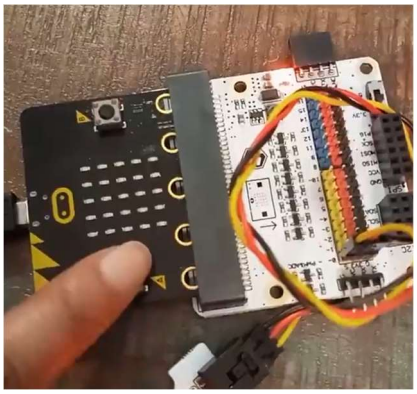
http://earsketch.gatech.edu/landing/#/
(Music and coding come together with this amazing resource from Georgia Technical Institute of Technology!)

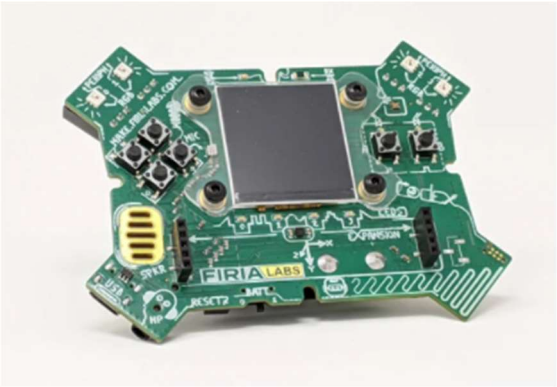
Project Kit Resource Samples / Student Work Samples











Firia Labs Unique Educational Approach

"Our educational program creates real-world learning experiences for students. This is achieved through the use of:

Open-ended physical hardware, used to implement meaningful projects
Open-ended software, integrating development tools with instructional content
Python, the fastest growing major programming language used in Industry"

Please visit the following to read Firia Labs entire educational design/framework!
https://firialabs.com/pages/innovative-curriculum

About Firia Labs

"We are technologists, and teachers. Entrepreneurs, and makers. We genuinely love building software and hardware products that delight users.

We founded Firia Labs to share our "passion for creating" with makers everywhere. We build curriculum and tools that demystify technology so people can be creators and not just consumers in our increasingly tech-driven world."

SBA Certified Woman Owned Small Business

Please visit the following to read more about *Certified Woman Owned Small Business*, with a grand mission!
https://firialabs.com/pages/about-us

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