WhiteHat Jr
Live online Coding for Kids

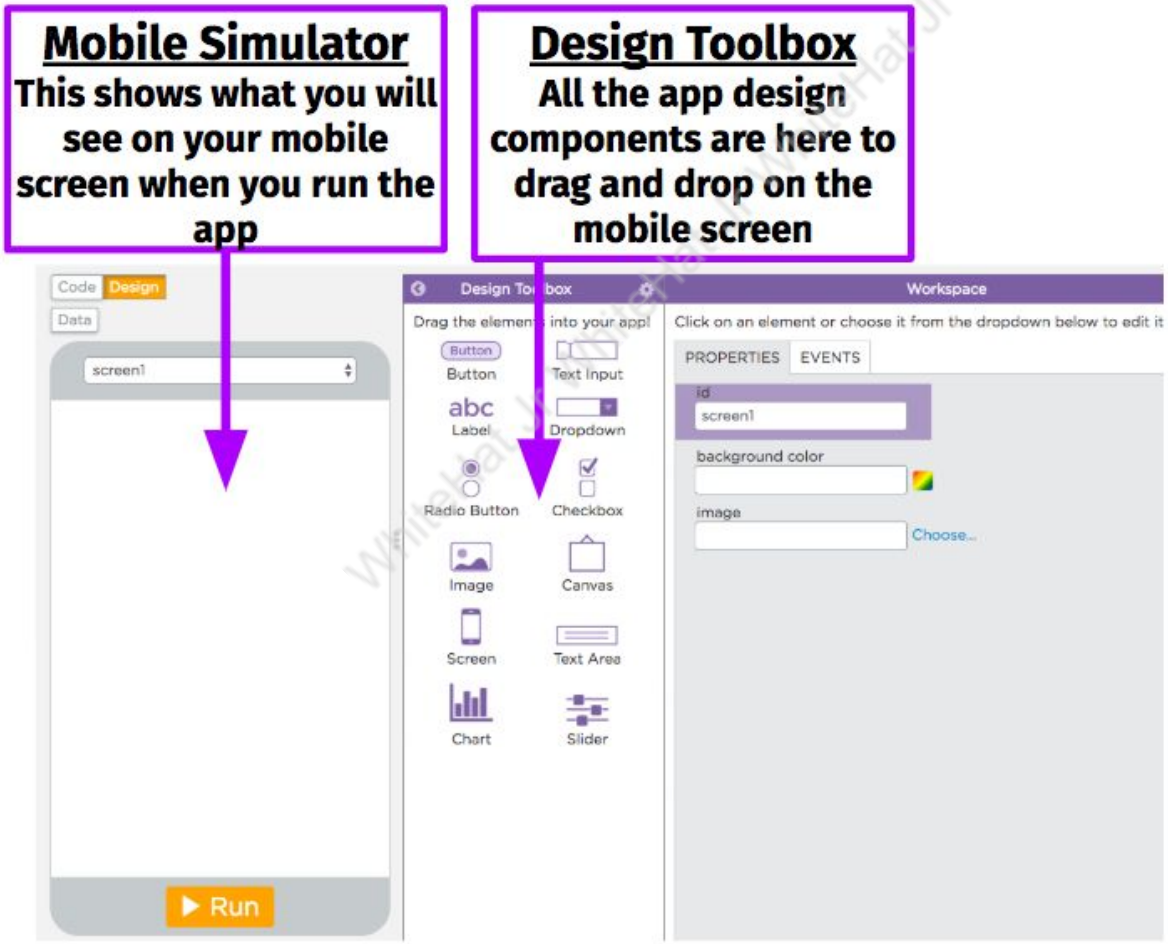
Topic	APPLICATION DESIGN
Class Description	**We start by de-constructing advanced app creation into sequential process elements. Kids create the first real-world app using code and design to gain creation confidence.**
Class	**ADV-T**
Class time	**45 mins**
Goal	• Understand the process of creating real world apps

Resources Required	• **Tips for Teachers**
	  ○ **If the student seems quick you can ask the kid to switch to TEXT MODE.**
	  ○ **Invite Parents in the class to showcase the products.**
	
	• Teacher Resources
	  ○ Code.org login: **It is advisable for teachers to create 2 dummy gmail ids of their choice beforehand and share the same with trial class students for smooth code.org login**
	  ○ Earphones with Mic
	  ○ Notepad and Pen
	  ○ Teacher Activity 3 -APPETIZE OR USE YOUR PHONE
	The teacher is expected to Signup using her gmail and expected to go through the Teacher Reference 1 Youtube Tutorial. She should create Appetize links for all apps from Teacher Activity 2 and 3 to share with the students via Chat after Student Activity 2.
	***Note:If Appetize doesn't work install the apps in your phone and showcase them on your phone via webcam**
	  ○ Teacher Reference 1 -YOUTUBE TUTORIAL
	The teacher can Refer to this tutorial and generate APPETIZE LINKS for trial students. This is one time job as links once generated don't expire and can be used for all trial classes.
	• Student Resources
	  ○ Code.org login
	  ○ Earphones with Mic (Optional)
	  ○ Notepad and Pen

Class structure	Warm Up Teacher-Led Activity Student-Led Activity Wrap-Up	5 Mins 17 Mins 15 Mins 8 Mins
Start the video call from H2H		
Class Steps	**Say**	**Do**
Ask the student to get into Fullscreen mode.		
Step 1: Warm up (5 minutes)	Hi, my name is_____. May I know your name? I would like you to call your parents to join in as this is your first class. <Say to the Parent> Hello, I am <Teacher Name>, It would be great if you can also join the class to understand the class format we follow, I will also be presenting the course structure and student outcomes which will help you know what exactly we offer. **Today we will learn to make a basic mobile app.** What do you typically do using your parents phone? Yeah! You are using many apps on the phone. For example: Camera is an app, which lets you take pictures.	**INVITE THE PARENTS TO THE CLASS.** Encourage students to share examples. ***Sample Answer:*** *Youtube video, Games, Music, Click pictures*

	Music is an app which lets you play music. We create **APPS** for a purpose. Today, we will create an app to change the color of a screen when a button is pressed.	
Step 2: Teacher Activity 1 (10 minutes)	Our big goal is **APP CREATION.** There are 4 steps we will follow to do this. **Step 1: Define a Purpose:** What the app should do. **Step 2: Design the App:** We select the design components we want in our app. **Step 3: Code the App:** Use required code blocks. **Step 4: Run the App:** Run the app and check if it works. Now, let's discuss these steps for the app that we want to create right now.	 Click this icon in the bottom left of the screen. This is the Chat Window. Copy Paste the following lines **one by one** into the Chat Window (if you copy paste all the four steps together, they will be sent as a paragraph): **Step 1: Define a Purpose:** What the app should do. **Step 2: Design the App:** We select the design components we want in our app **Step 3: Code the App:** Use required code blocks **Step 4: Run the App:** Run the app and check if it works

	Step 1:Define a Purpose: Q What did we say is our purpose for the app? A When I click the button the color of the screen should change to my favorite colour “green”. Which means: **A: When I click the button** **B: Color of the screen should change to green.** Q Now can you give me some examples of things that work by the click or press of a button? A To switch on/off a light, we press a switch button. Similarly, for TV switch on off, we use the power button on Remote/TV So, **Step 1** is now complete. I will share my screen and show you the rest.	Encourage the student to reply with the purpose of the app. Encourage the student to respond.
Teacher Initiates Screen Share		
• When you open the Activity link, it will prompt for sign-in. • After login, press Create New in the top menu bar.		
		Teacher Activity 1: APP LAB Go to **Design Mode** on top left**.**

	Step 2: "Design the App Choose the design elements we want." This is our **design** environment.	**Design Mode**  Explain panels as shown in the image below. • **Mobile Screen** • **Design Toolbox**
 		
	The design elements we will use are **SCREEN** and **BUTTON.**	

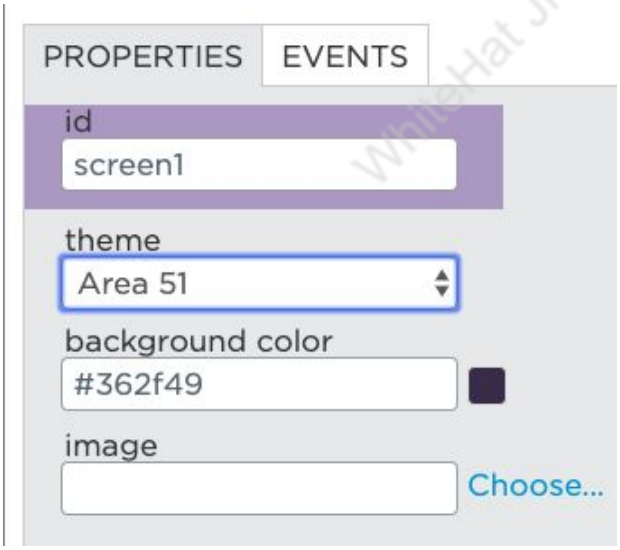
	We already have a screen which we will use. Let's **set a theme** for our Screen. **Themes** are prebuilt design templates that get applied to your screen. Now from the **DESIGN TOOLBOX,** I will select and drag **BUTTON** and drop it into the **MOBILE SCREEN.**	**Click on Screen** Drag **Button** on Screen.

Let's Design The Screen

1. **Toggle to 'Design'** 

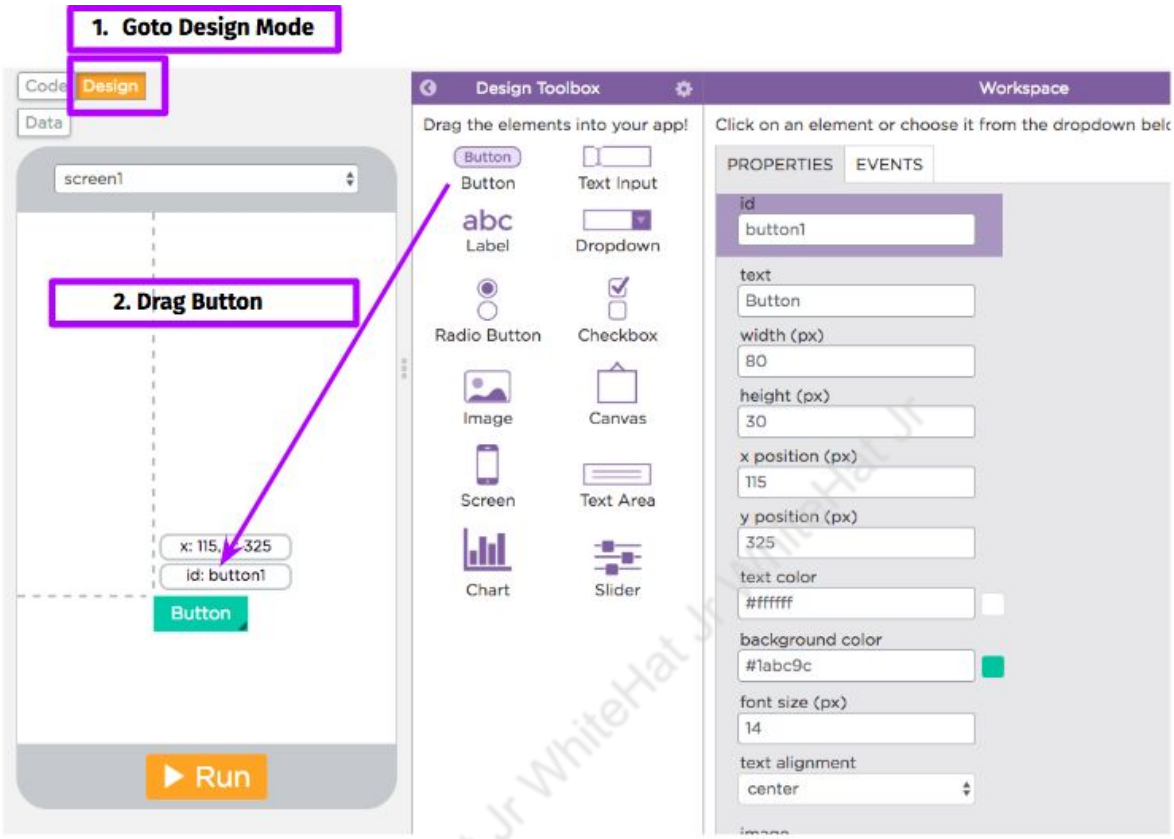
and click on Screen1.

2. **On the right, in the Properties section, select any THEME of your choice.**

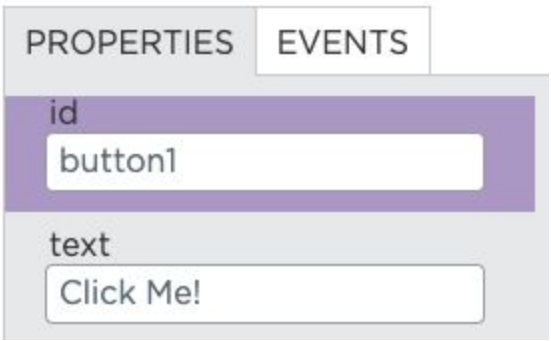


Output with Theme applied on the Screen:

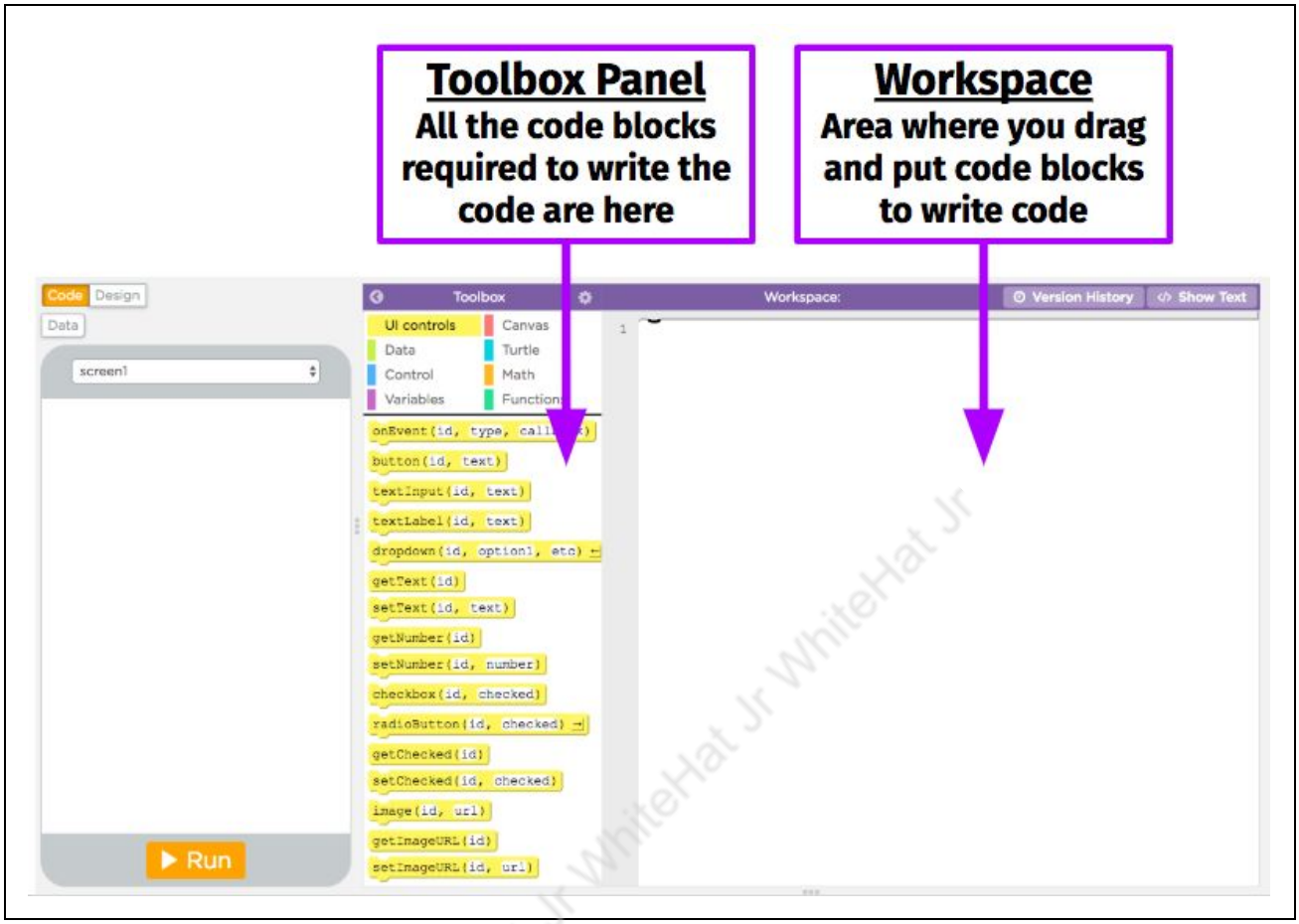
Now let's **add Elements** on Screen.



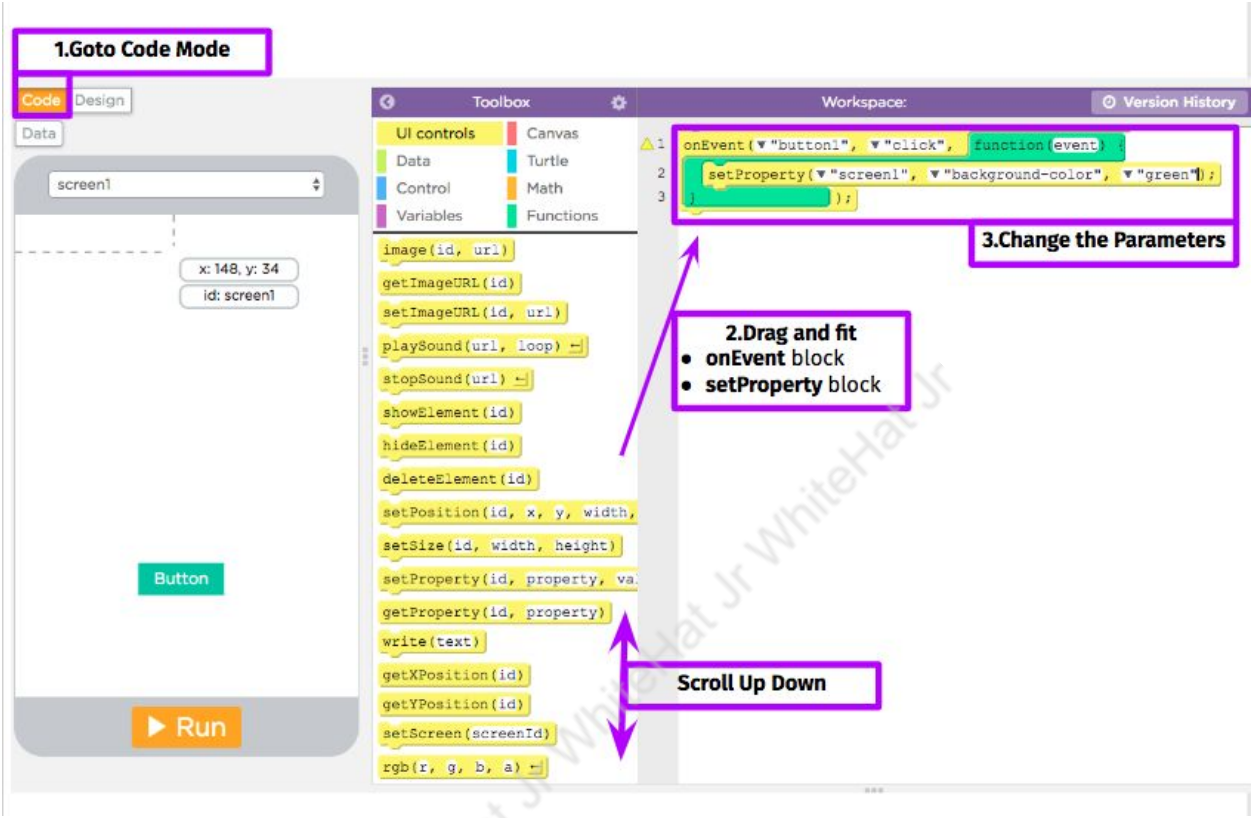
You can change the text of the button in the Properties section.

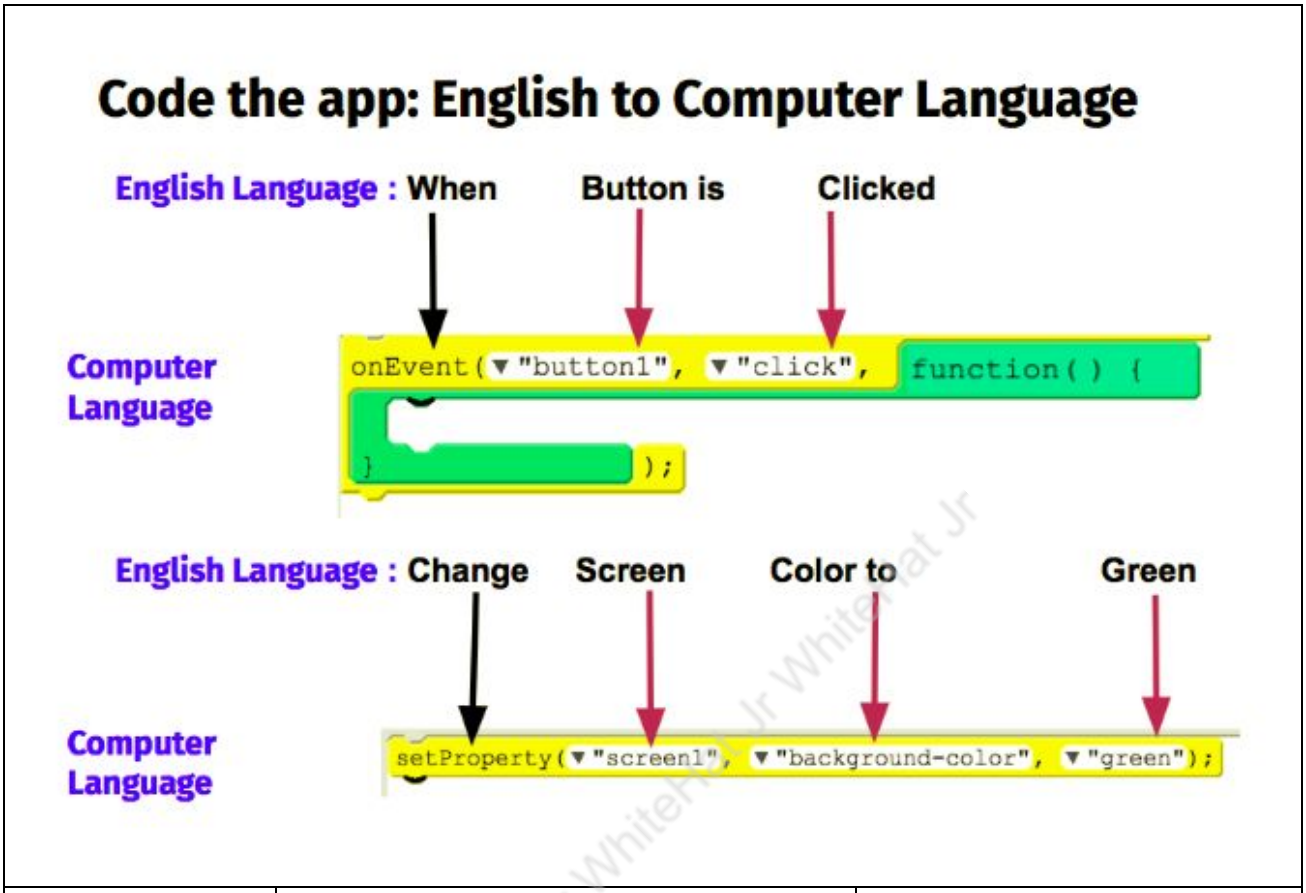


	Now we will discuss the **3rd step** which is to **Code the App.** We will use code blocks to code our app. The Computer Language we are using to make this app is called **JAVASCRIPT.** This programming language is used to build apps and websites. Nearly 99% of all internet websites use **Javascript.** This is what our **CODING ENVIRONMENT** looks like.	Go to to **Code Mode**  Explain panels as shown in the image below: • **ToolBox** • **Workspace**

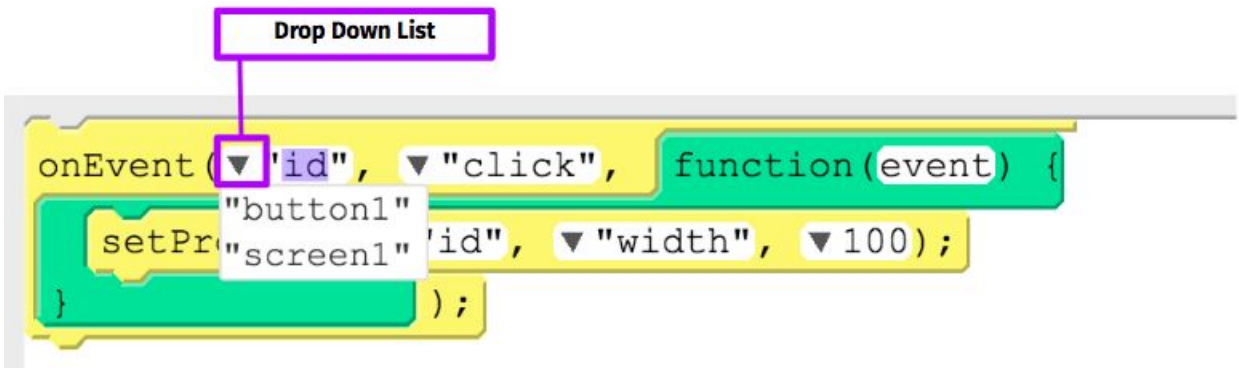


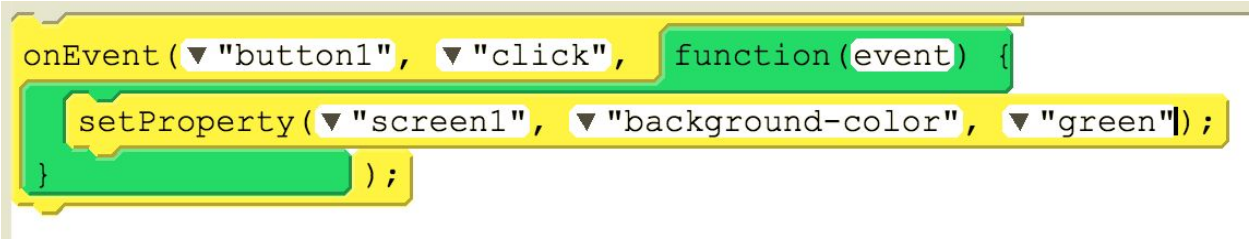
	Now there are 2 ways in which we can write our program or code. 1. **Block Based Coding:** In this type of coding the commands are already present in the form of blocks. You just have to drag and drop these commands.This is an easier and faster way to code. 2. **Text Based Coding:** In this type of coding, you have to type the commands. This is how most programmers program - by typing the program. In this course we will be learning both the methods of coding. We will start with block coding and then when you feel confident we can switch to text so that you can code like professional programmers. Let me show you how we can switch between Block Mode and Text mode. I am going to first code in blocks and then in text.	
		Select required code blocks from the **TOOLBOX PANEL** and drag them into the **WORKSPACE** area. To see the full list of all events, scroll in the **Toolbox area**.

		Drag the ***onEvent*** block. Drag the ***setProperty*** block.
		
	Based on our purpose, **A:** When I click the button **B:** Color of the screen should change to green. For a computer to understand it, we need to translate the purpose of the app into computer code. “**When**” in english translates into “**OnEvent**” in coding language. “**Change**” in english translates into “**SetProperty**” in coding language.	

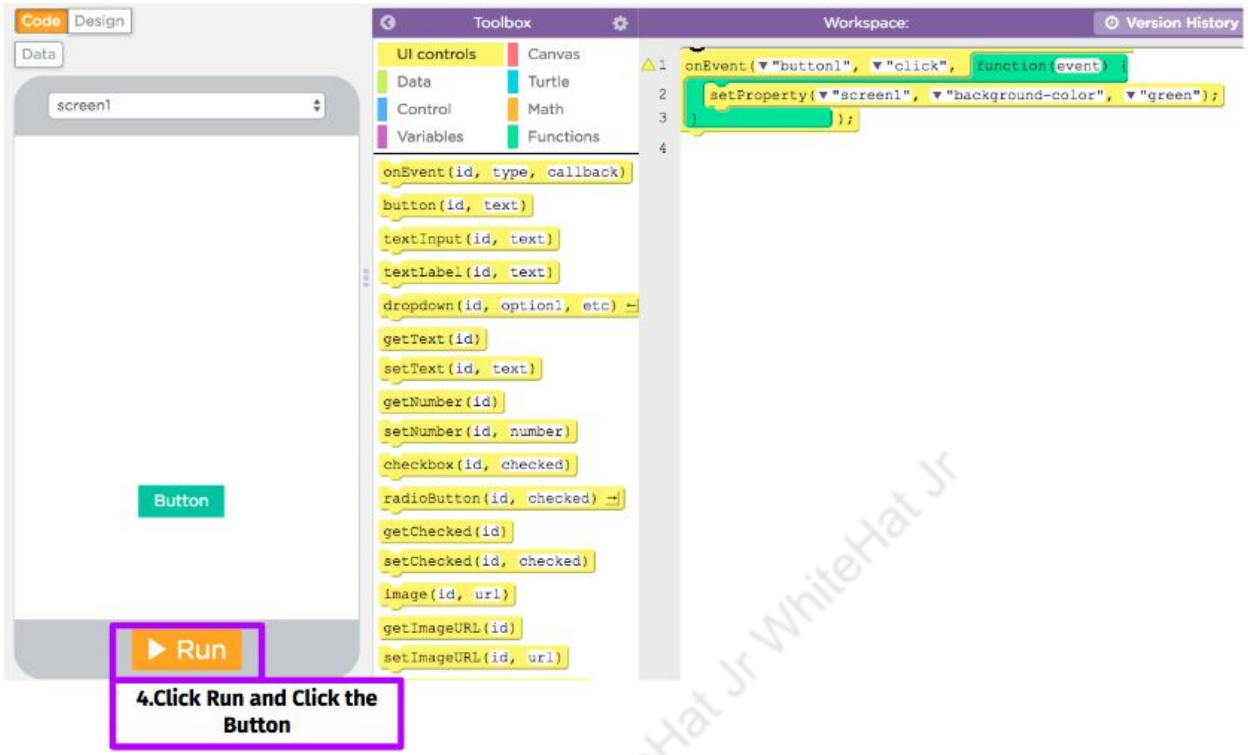


	So, we have dragged exactly these two code blocks. Now, let's set proper values in the blocks.	

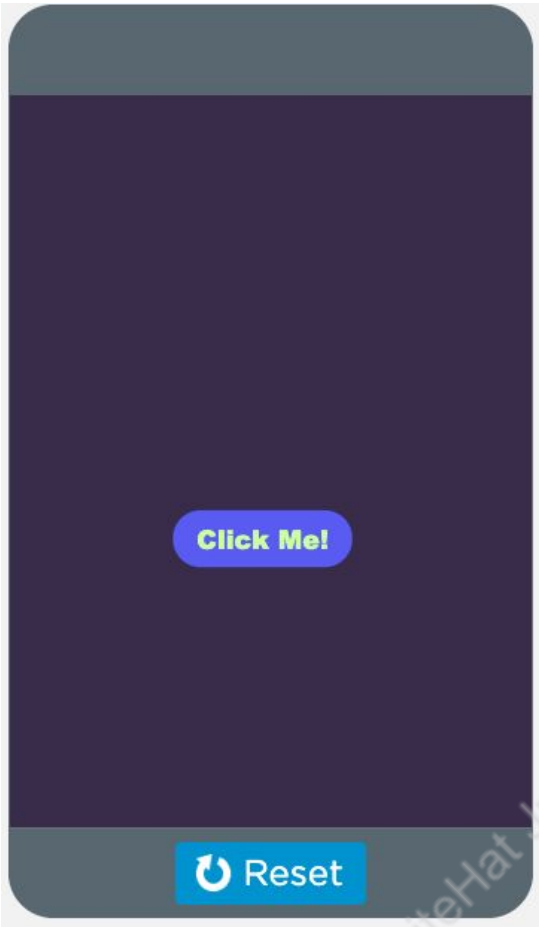




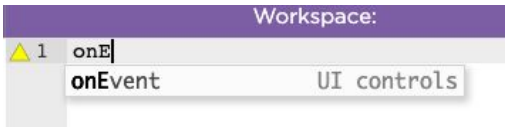
	"When I click the button" Now reads as **"onEvent, button1** is **click"** "Change color of the screen to green" now reads as **"setProperty** to **screen1** **background-color** to **green"**	Change the values of parameters from the drop-down list as shown in the screenshots below.
	We are done with Step 3 which is the coding part. Now we will do the fourth and the final step - Run the App. **Step 4: Run the App** Now, I will click the **BUTTON** on screen to see if it works.	Click on  Press the **Button** on the mobile screen to see the code working.



Output:



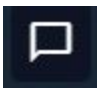
	Wow! Did you see that the app works and it changes the screen color. Now let me delete all the blocks and write the code in text. Let's see how it works.	Drag all the blocks back to **ToolBox** to clear the workspace and click on </> Show Text on the top right corner to switch to text mode.

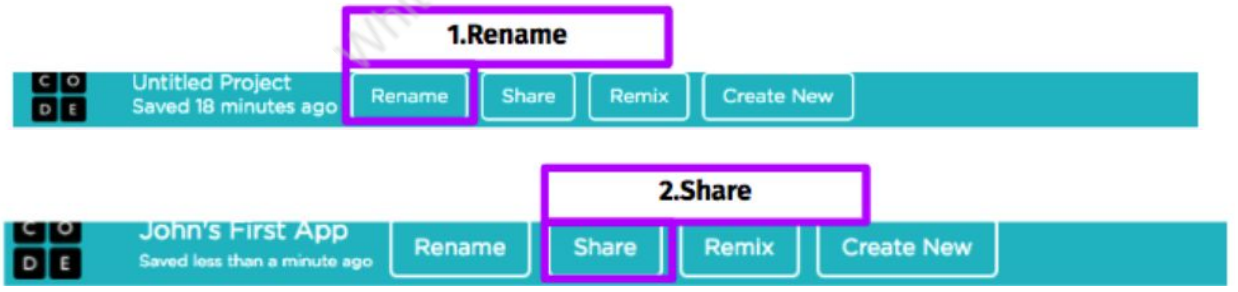
	You see as I am typing, the code shows me options. This feature is called autocomplete. This helps programmers to program faster. You can press the down arrow key to choose from the options.
	
	 
	
	Since textmode is more strict than block mode you have to follow the rules of the javascript language.
	
	See here - the yellow triangles indicate a warning. Here it is showing the warning because we did not put a semicolon.
	
	A semicolon tells the computer that the code line ends here as the computer executes the code line by line.
	
	Exactly like how a period or a full stop indicates the end of a sentence in english language, similarly even computer languages have grammar rules which are called Syntax.
	
	We will learn more of this in detail as the course progresses.
		Type the same code.
		
		**onEvent("button1", "click", function( ) {
		setProperty("screen1", "background-color", "green");
		});**
		
		Point to the Yellow triangle.

	Okay now lets run and see if the app works. Did it work? What colour did the mobile screen turn into? Green? Yes! It worked.	Click **Run** and press **Button** on the mobile screen to see the code working.

```
onEvent("button1","click", function(){
  setProperty("screen1","background-color","green");
});
```

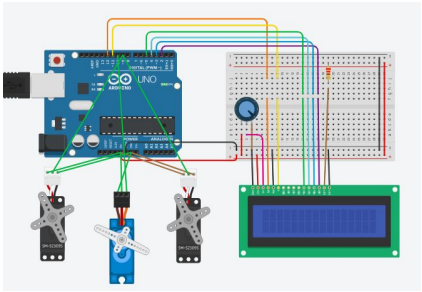
	Let me explain the code to you again. In coding “Function” means “do this”. It is a way of telling the computer to do something. So **OnEvent** means **When** **Function** means **Do this** **setProperty** means **Change.** This code in text form reads exactly what our purpose is - **When** button1 is clicked **Do This.** **Change** screen1 background-color to green.	
Teacher Stops Screen Share		
	Now, please do all this at your end and change the colour of a screen to one of the following colors - Red, or Blue or Yellow.	

	Key points to remember: **What was our PURPOSE**? When the button is clicked, change screen colour. **How to DESIGN?** Drag and drop the button on screen **What is our CODE?**: When **button1** is **clicked**; change **screen1 background-color** to **COLOR** Now reads as: **"onEvent, button1 click"** **"setProperty, screen1 background-color green"** Finally **Run** to see it work Now it's your turn.	
• **Ask the student to press ESC key to come back to panel** • **Guide the student to start Screen Share** • **Teacher gets into Fullscreen**		
Step 3: Student led Activity (10 minutes)	In the Student Panel, click the link for Activity 1. Use the email and password I shared with you in the chat window to login. Also open **Student Activity 2** for Reference. **I want you to code in block mode for now as this is your first class and as we progress we will learn to code in text.**	Student Activity 1 - APP LAB It will prompt for sign-in  Copy Paste the Login and Password in the chat window. Student Activity 2 - CODE DIAGRAM

		Let the student code in Block mode only. As the student does the activity, use encouraging remarks like “Great”, “You are doing good” “Good Job”. Student has to repeat all **4 steps** and do the entire activity with their selected colour Guide the student as required using the steps above.
	Great Job! Now that you have built an app, give it a name and Share it. Click **Rename** and name your project. Give it a special name as this is the first app that you have created. Click **Share** to share your project.	
		
	Copy the project link and paste it in the **Project Link Field** on the student panel and click **Submit Button.**	

	This app is not downloaded. To convert this app into a downloadable app we need to perform a few more steps which you will learn later in this course. **However, the link of your app will be shared with your parents via email.** **Don't forget to open the link on any mobile to see how it appears.** Excellent! Your app is working.	
	Click on Student Activity 3 to see the many apps created by other students published on Play Store. I am going to share 2 apps links via chat. You can checkout these apps in your browser. Can you open your chat and click on the links? I will give a short Description about the apps: Along the course you will learn how to make advanced apps to be published on google play store and apple app store. Pager Chat App.apk	Let the student see the playstore list of published apps. To get the kid excited SHARE the 2 Appetize links with the student via chat to get the students checkout 2 apps. 1. Pager Chat App 2. Sun-Earth Simulation ***Note:** Only one Appetize link should be opened at one time. ***Note:If Appetize doesn't work install the apps in your phone and showcase them on your phone via webcam**

	This app is like whatsapp which lets you chat with your friends anywhere in the world. Sun-Earth System.apk A Space Tech App like this one is an accurate simulation of the sun and earth system. You will see the sun is **150 Million km** from earth and therefore earth takes 365 days to complete one revolution. Move the earth using your cursor and you can calculate the days it would take for one complete revolution.	Teacher Reference1- Youtube Tutorial to create appetize links Student Activity 3 - PLAYSTORE +APPETIZE LINKS **INVITE THE PARENT TO SEE**
	Not just apps, let me show you Chatbots with Artificial Intelligence (AI) created by students for themselves Can you click on Student Activity 4?	Student Activity 4-CHATBOT **INVITE THE PARENT TO SEE** Prompt the student to type a few questions on the chatbot For example: Which sports do you like?
	In this course we will learn to make circuits like the ones used in mars rover and other space robots. You will learn the basic electronics of microcontrollers like Arduino and how to control these chips with code using C++ language. Here is a quick video creating an internal circuit of any robot.	Student Activity 5-ROVER CIRCUIT SIMULATION **INVITE THE PARENT TO SEE.**

	As you can see in the video we will learn to add different components to our robot or rover and connect them to the arduino chip and code. Imagine you need to pick up soil from the surface of planet mars to study it. Here I am adding 4 motors to control the forward and backward movements of the rover arm to collect soil samples. Once the motors are selected you need to power them by connecting them to the circuit and now the motors are connected to circuit. Still they won't work. We need to code and make them work, so I am going to set the motor speed by changing values. Now imagine your rover is on mars and you are on earth handling the rover with a remote how would you know what the rover is doing? For that you can connect the wireless display to your rover remote which shows you if the rover arm is moving forward or backward.	
Wrap Up (8 minutes)	So, how did you like the class today? Q Can you tell me what are the 4 steps to build an app successfully?	

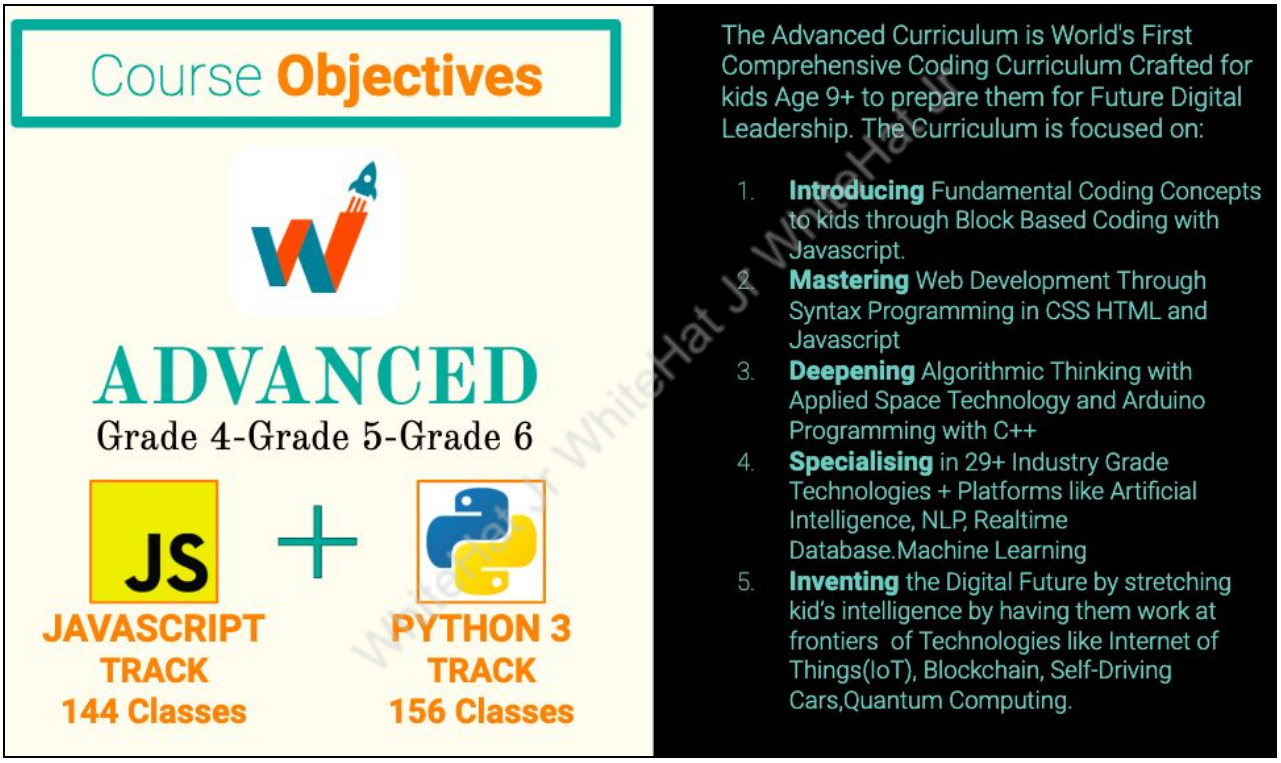
	1. Define the purpose of the app. 2. Design the app. 3. Code the app. 4. Run the app to see it working. You completed all the activities with great creativity and you deserve a Hats Off which gives you 10 Points. You also get a Hats Off for being well behaved in class and asking/answering some great question which gives you another 10 Points. You did really well in class today doing all the puzzle challenges with great concentration. So you get another Hats Off which gives you 10 more Points. Congratulations! You are among the exceptional students who get 3 out of 3 hats off in the trial class! You are really bright and I hope you join the full course where you'll create a full entrepreneur ready app which thousands across the world may download. Let me give you a quick summary of what we will be learning in the course. Our course follows a Project-based learning philosophy where kids apply the concepts they learn to build Apps throughout the course. Creating apps	Press the Hats Off Icon for ***Great Persistence***  Press the Hats Off Icon for ***Great Question***  Press the Hats Off Icon for "***Strong Concentration..***"  **Call parents to join, introduce yourself and celebrate the kid's accomplishment with the parents.**

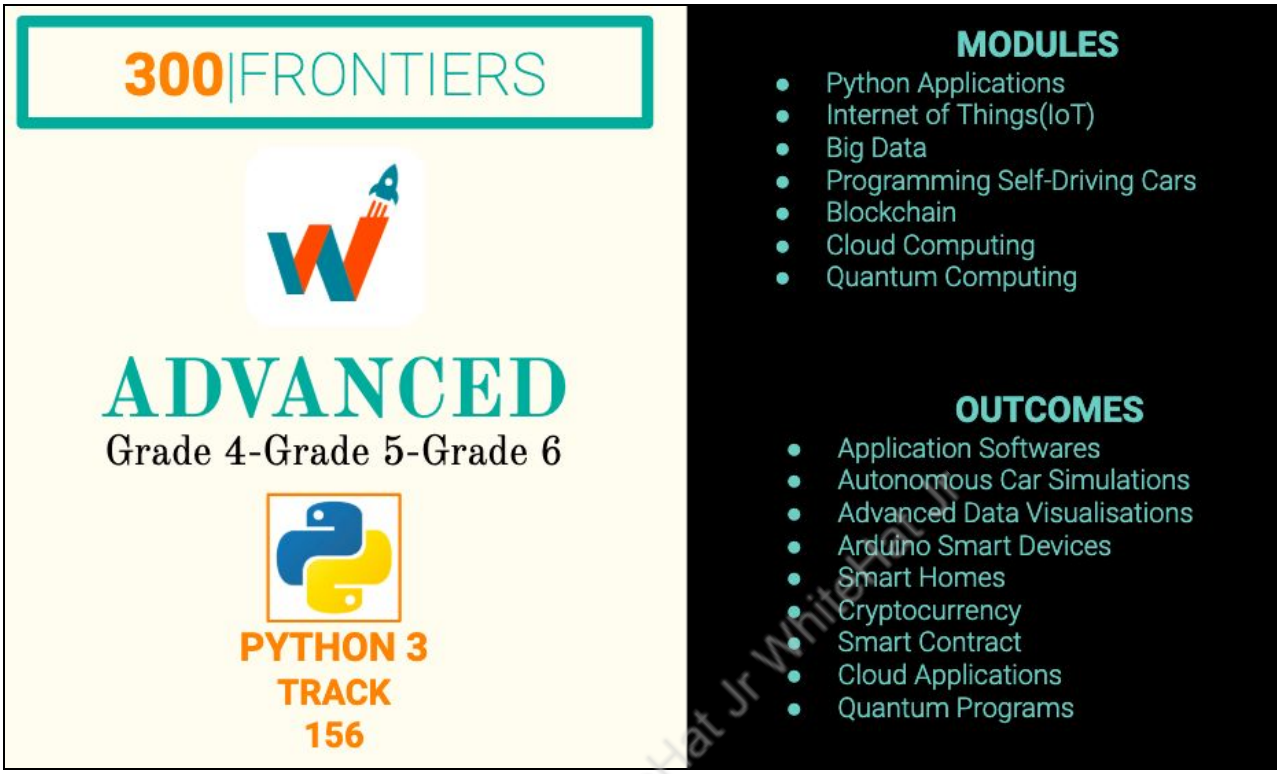
	makes their learning practical instead of theoretical. Our course is structured into 3 modules: **Game Developer Certification:** In the 1st module of 8 classes, your kid will become a certified Game Developer. Kids build games using core coding logic concepts like sequences, commands, and loops. This dramatically improves their logic and concentration. **App Development Certification:** After the 2nd module of 48 classes, your kid will become among the youngest in the world to be a certified Android and iOS App Developer. Kids learn User Interface and User Experience design to create powerful front-end app design. Every kid builds a professional iOS App Store and Android Playstore ready app after this module. I will be showcasing some of the very best Apps which kids have created in as little as 40 hours of learning to code on our platform. **AI + Space Technology:** In the 3rd module, your kid will become among the 1st in the world to learn advanced data modeling and Machine Learning, using which they'll create Space Tech simulations. Kids reach the peak of their creative imagination as they apply coding to frontier technologies like Space Technology and Driverless Cars. Top kids in the course who do the best classes and projects get a	

	chance to visit Silicon Valley where they meet top Google scientists and entrepreneurs. During these modules your kid also learns contemporary frontend programming languages like HTML, CSS, Javascript as well as backend programming languages like Python. Let me show you one of the space tech projects built in our course. Can you click on Student Activity 6? Your kid will learn 3D Space Models like 3D Launch Vehicles and 3D Satellites, manufactured by Space Agencies like NASA, ISRO, SPACEX. Can you click on  Can you see it? Great! Now, let me show you the App of one of our students, Shrey Shah. Shrey wanted to facilitate interaction between his Parents and teachers as his Parents never got the time to interact with Teachers due to their hectic work schedules. Within 3 months of learning to code with Whitehat Jr, Shrey created an app which connects	Student Activity 6-3D MODELLING **INVITE THE PARENT TO SEE.** Student Activity 7 - Shrey Shah's App **INVITE THE PARENT TO SEE**

	Students and teachers in real-time. Teachers can share homework with the students on the App and Students can ask doubts anytime. Let me show you the App. Can you click on Student Activity 7? This App has been featured widely in international media. Isn't it amazing that 8 year olds are creating apps like these within just 40 hours of learning to code! During the course your kid will also be creating full entrepreneur ready, industry grade apps just like Shrey and get a chance to visit Silicon Valley and meet top Google scientists and entrepreneurs.	
Teacher Guides Student/Parent to Stop Screen Share		
	To provide you more details about the course as well as answer any questions that you may have our academic counselor will get in touch with you. My schedule is almost full but I'd love to have your kid as my student since your kid is exceptionally bright with true entrepreneurship potential! Congratulations <kid name> again on being awarded 3 hats off! You are truly exceptional. Hope you had fun. Thank you for your time today. Kindly stay on the panel and do not close this page when I end the class--our entire	

	curriculum along with the details will be displayed on the panel.	ADVANCED Curriculum Vision is provided below for Teacher reference if required Student Activity 8-COURSE PDF Ask the parent to refer to this link to know more about the ADVANCED curriculum.



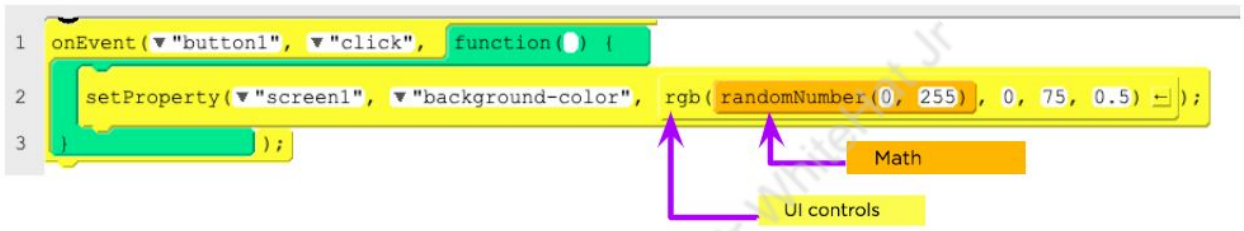


Teacher Clicks ✖ End Class

Additional Activity 1	Okay Great! We could successfully change the color of the screen when the button is pressed. What if I want to change the screen color to any random color every time the button is pressed. I will guide you to do the same. 1. Go to UI controls and Drag rgb(r, g, b, a) ↵	Ask the student to follow your instructions as the student makes the following changes.

block and drop it at the place where you selected color from in **set Property** block.

2. Now go to Math and drag `randomNumber(0, 0)` and drop it at **r** in the **rgb block.**

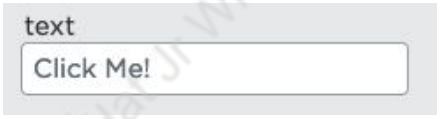
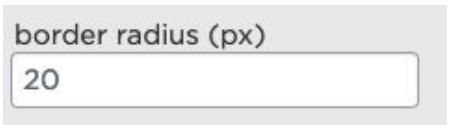


Let me explain what we did.

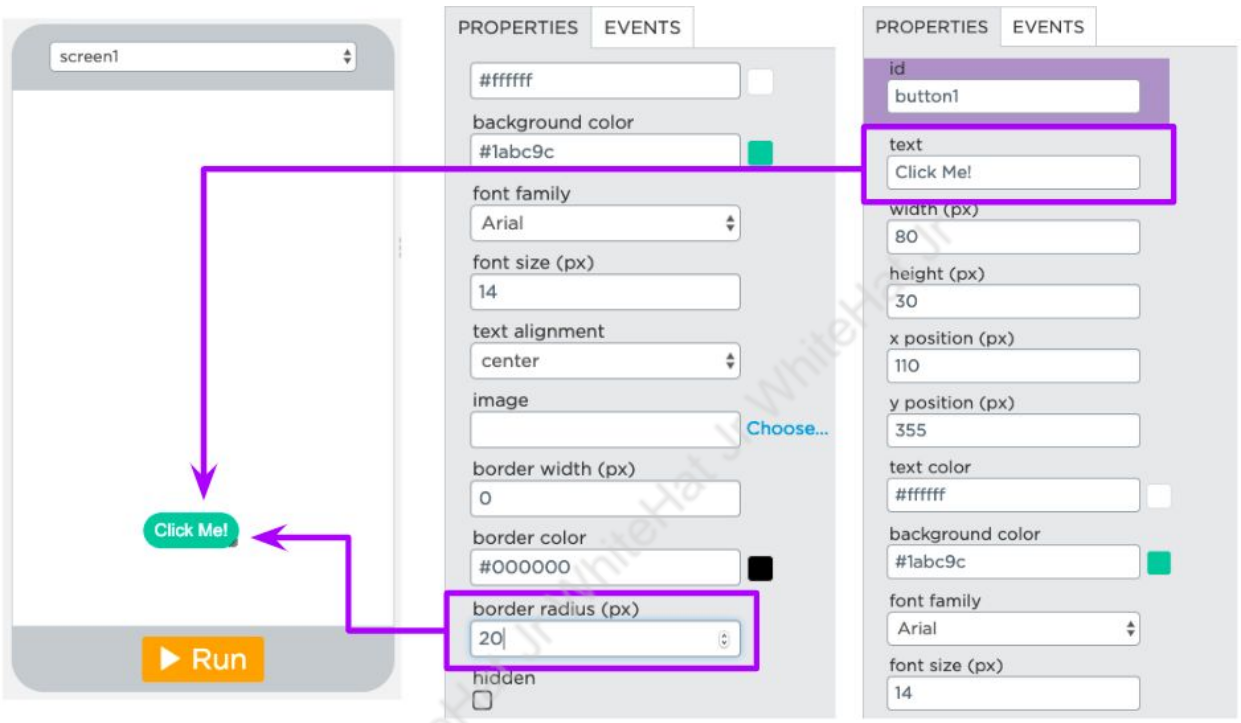
1. The **rgb** block stands for a mix of RED+GREEN+BLUE shades. The values we put are shades of red green blue. The last number indicates transparency.

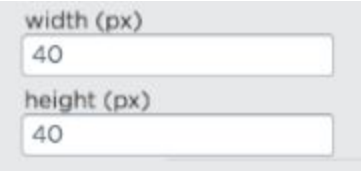
2. The **randomNumber** lets the computer select any number within the range you provided.

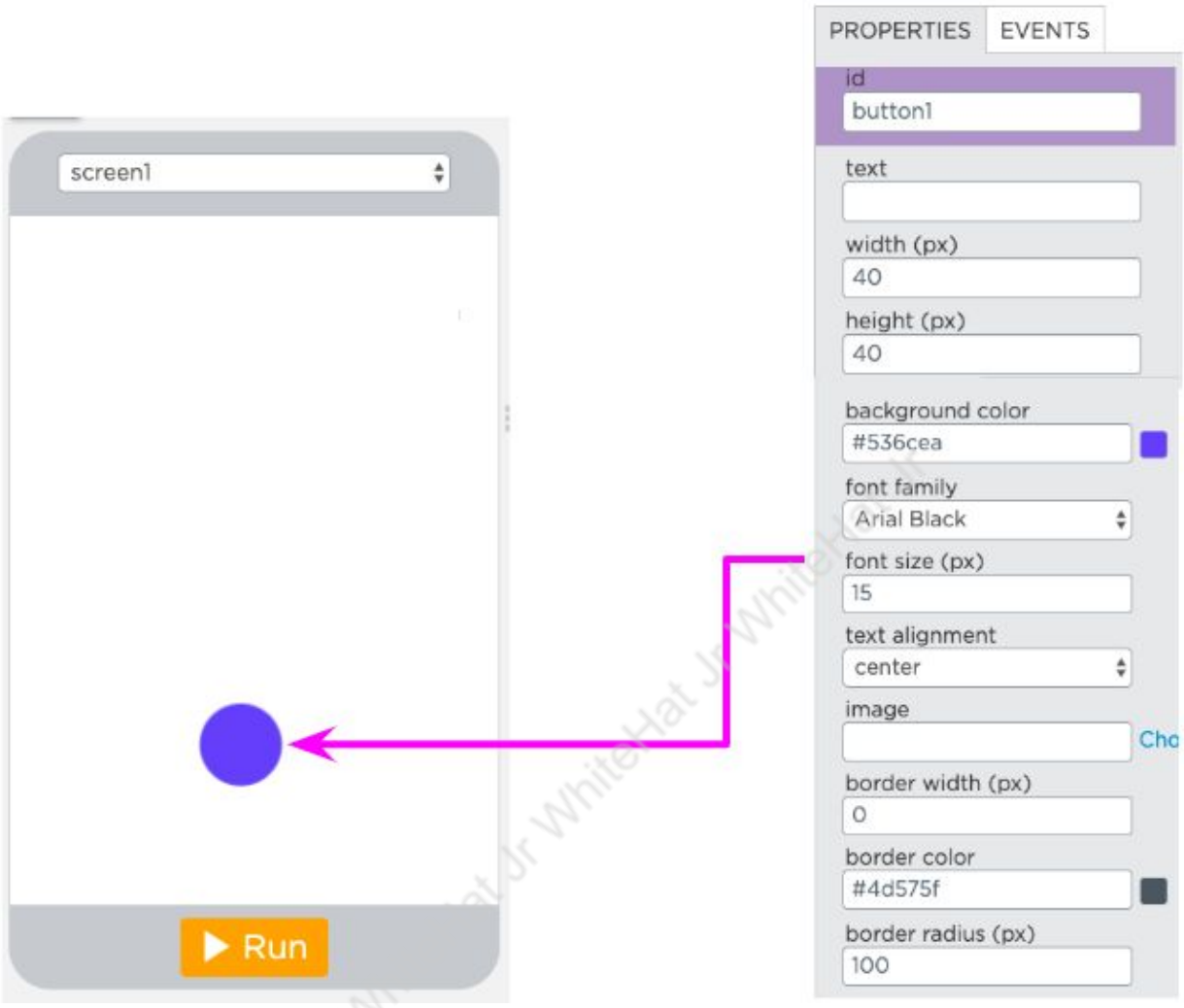
   In computer every color has 256 shades so here what we did is we let the computer choose any shade of red from 0 to 255 using randomNumber block so we get random shade of RED everytime we click the button.

	3. We are keeping shades of green and blue the same default values and also the transparency is set default 0.5. 4. Now let's click Run and click the button as many times as possible to see what happens.	Click on 
Additional Activity 2	You are doing great! To make the button look great in your app let's make some design modifications to the button. Go back to  Mode and click on the button to see its properties. Make the following changes to the button properties. 1.  Change the button text to **Click Me!** to make it appealing. This will make the user curious to press it to see what happens when the button is pressed. 2.  Change the border radius to 20. This will give your button a circular look to make it look more advanced when you open the app on mobile phone. OR You can keep the button square	Ask the student to follow your instructions as the student makes the following changes.

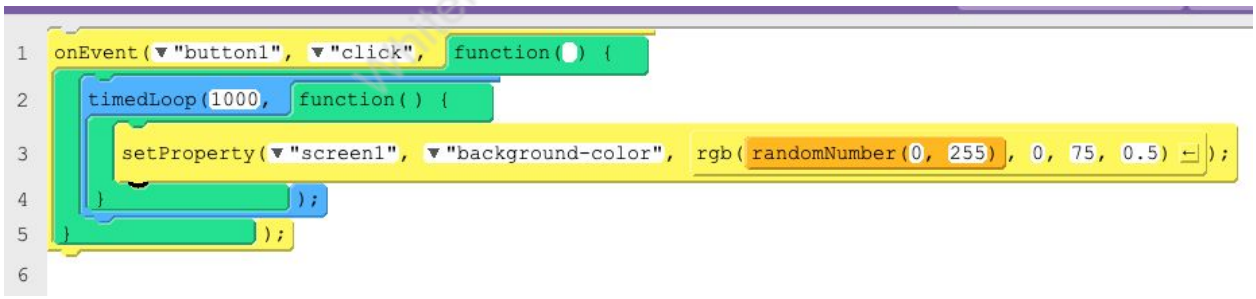
	but make sure radius should be half of the size of the button. 3. Now click on **Run** and press **Button** on mobile screen to see the code working**.**	Click 



	You can also make the button completely circular by changing the border radius to 100 and removing the button text. Make sure you set the button dimension as a square. 	



Additional Activity 3	Great! Now let's say we want to enhance the features of this app. Let's say I want to change the color of the screen to any random every second. 1. First go to Code and locate Control Section.	

	2. Lets drag the  function. This code block will execute all the code blocks we insert into it with some time interval. This is a kind of a forever loop function which runs forever. 3. So drag the block and let's drop it above the set property block.	
		
	Now let's drag the **set Property** block inside the **timed loop** block.	
		
	When the button is clicked, the **timed loop** block will loop forever or repeat forever what is inside this block. Since we have the **set Property** block inside the **timed loop** block the screen	

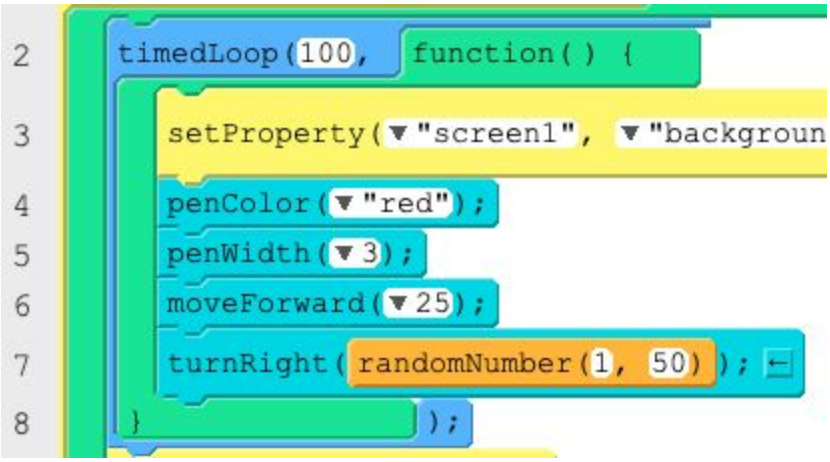
	color will change randomly every 1000 milliseconds or 1 second as you know 1 second = 1000 milliseconds. You can change the time interval and make it smaller to have rapid color change effect. Let's try and set it to 100 milliseconds. See what happens.	

Additional Activity 4	Now let's add some animation to this App. What if I want the computer to draw random shapes on the screen by itself as the background color of the screen changes?	

1. So let's go to 

and add turtle to our app inside the timed loop. This will make the turtle draw randomly on the screen. Turtle is used to draw on the screen.

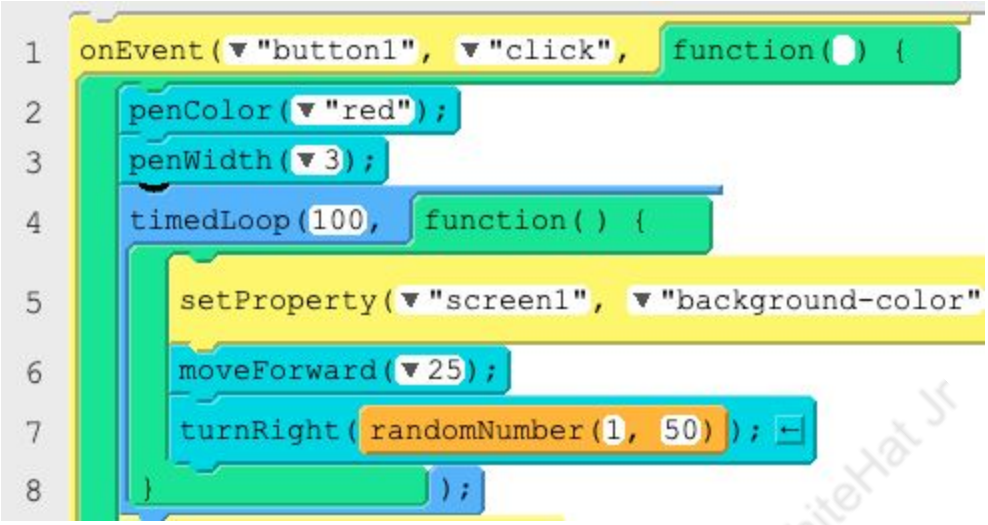
2. Now add the following code in the **timed loop** function. So every 100 milliseconds or 0.1 seconds or 1/10th of second these 5 blocks will get executed.



- **set Property** block to change the screen color to random shades of red, green, blue.
- Turtle **pencolor** block to set the turtle pen color to red. You can change it to any color.
- Turtle Pen or brush width is set to 3 pixels. You can change this as well.
- Turtle will move forward by 25 pixels: Pixels are little dots of color any computer screen or mobile screen is made up of.
- Turtle will turn right by a random angle between 1 degree to 50 degree. you can play around with this range too.

Also since we are keeping the color and width constant, we can take it out of the timed loop to keep it. That's how we make our code accurate. As we want the turtle to move forward every 100 milliseconds and turn right between 1 and 50 every milliseconds.

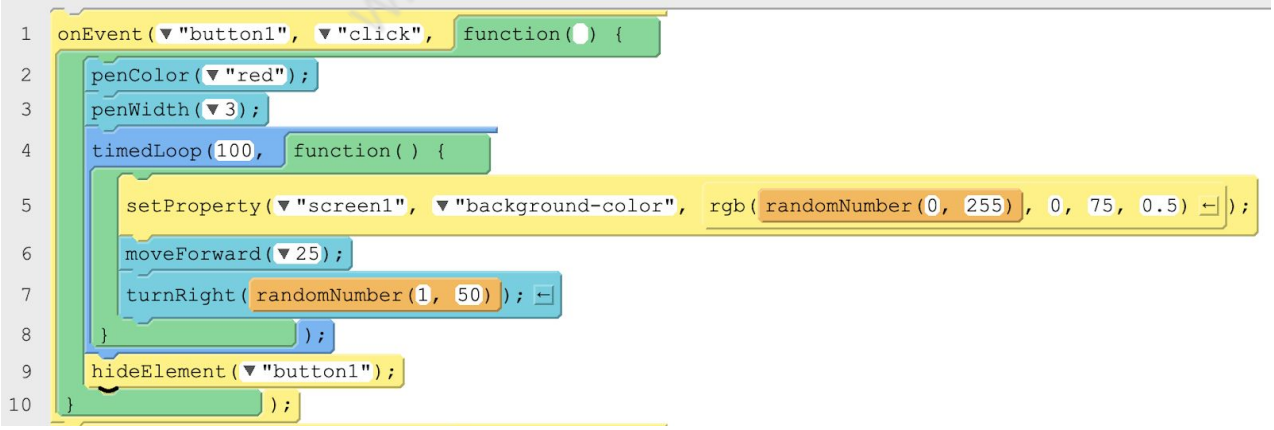
Modified Code:



3. As the Turtle moves on the screen, let's hide other elements so that we can see what shape the turtle is able to draw.

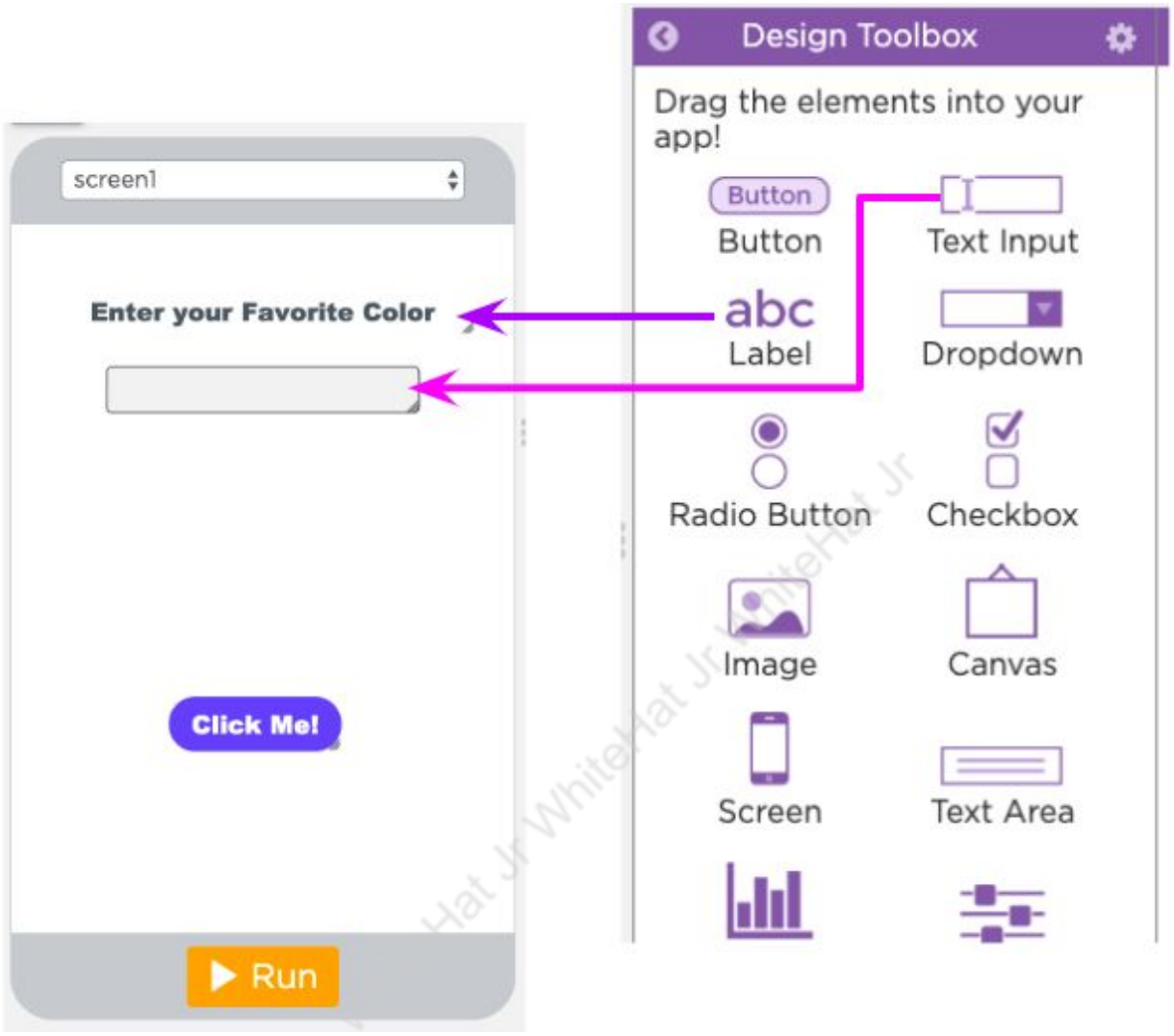
   Go to UI controls and use hideElement Function

COMPLETE CODE:

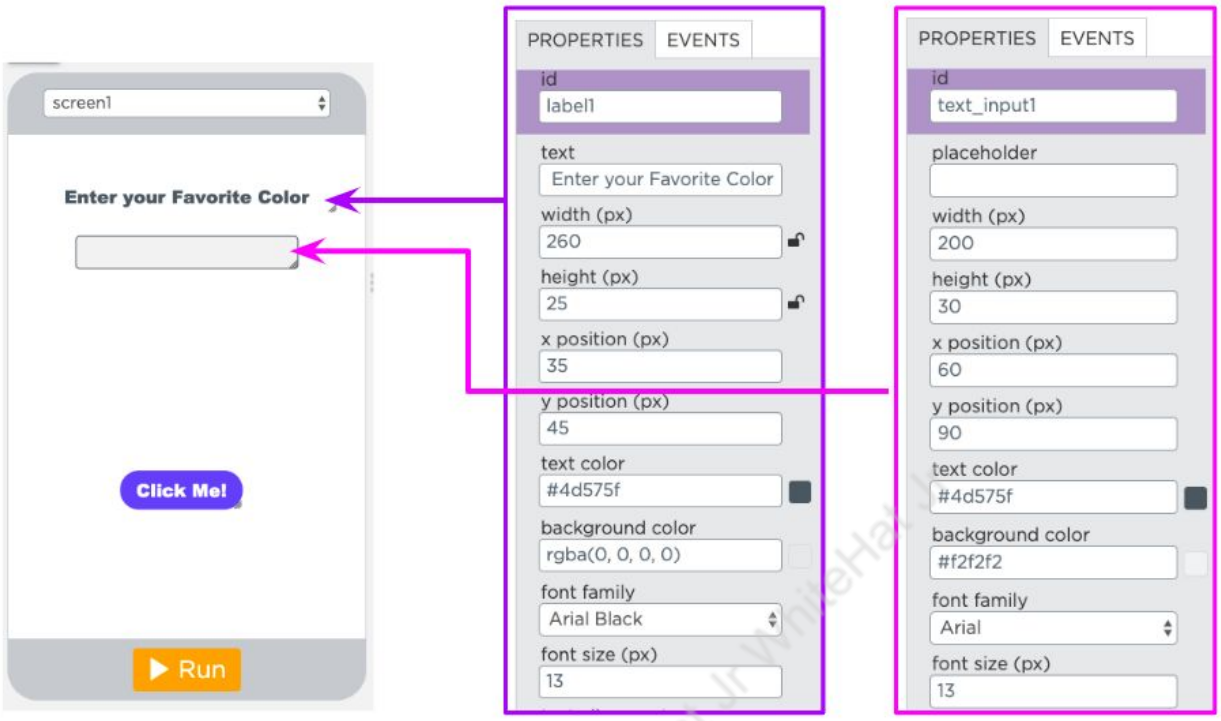


Wow! You just taught a computer to draw by itself through Code.

Additional Activity 5	Now let's extend the app to make it more interactive. Let's set the screen color to the app user's favorite screen color. So we will need a text input box where the user can type his/her favorite color We will also have to add another button. This button will be clicked to change the background colour according to the input from the person. Let's go to Design mode and add a **textinput** box to get the user input and a button. Drag a **label** and a **textinput** box. The label is used to display some text on the app and the textinput box is used to type in text.	



	Now let's set the properties of label1 and textinput1.	

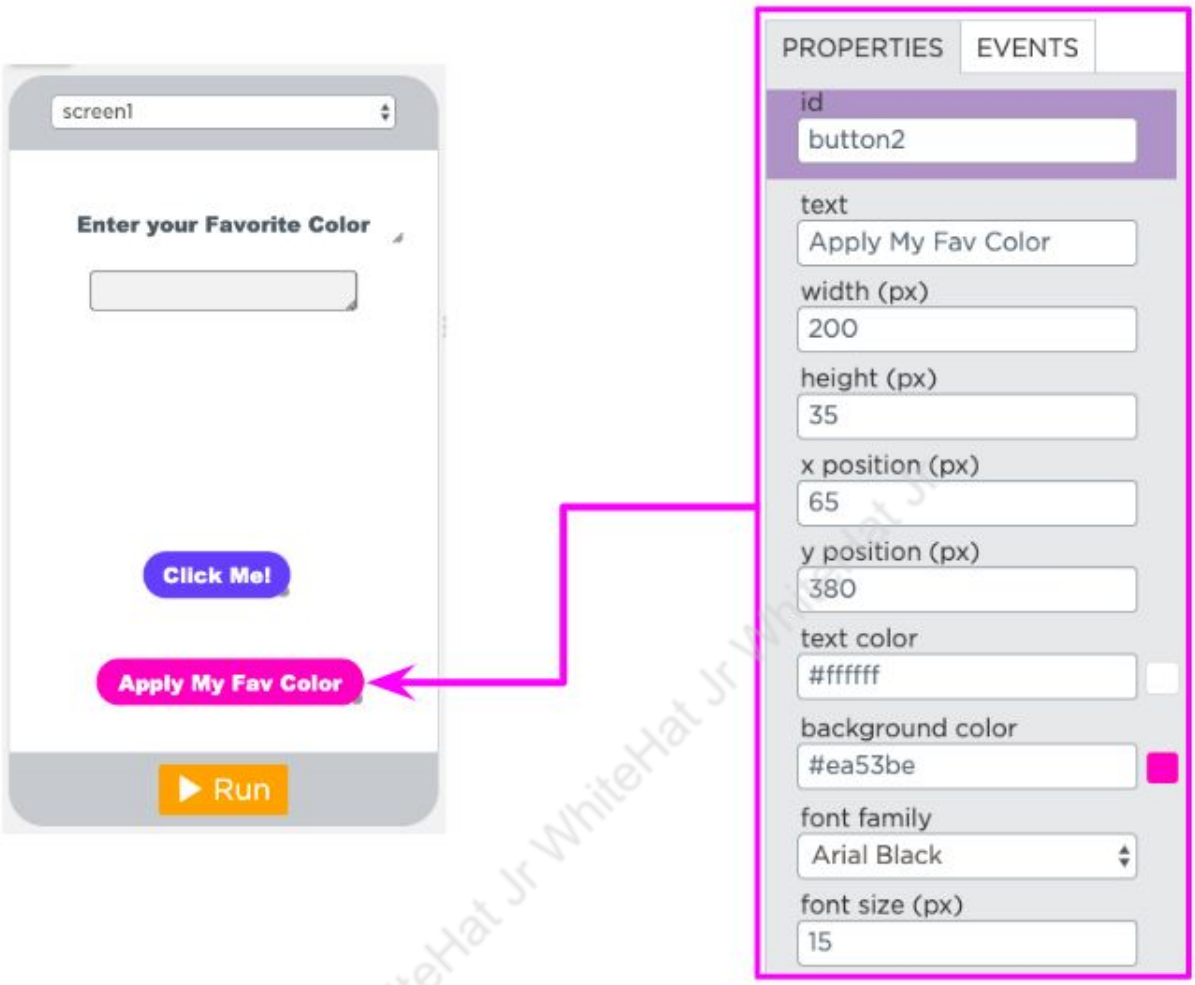


Click on the button and click on the

on the right.

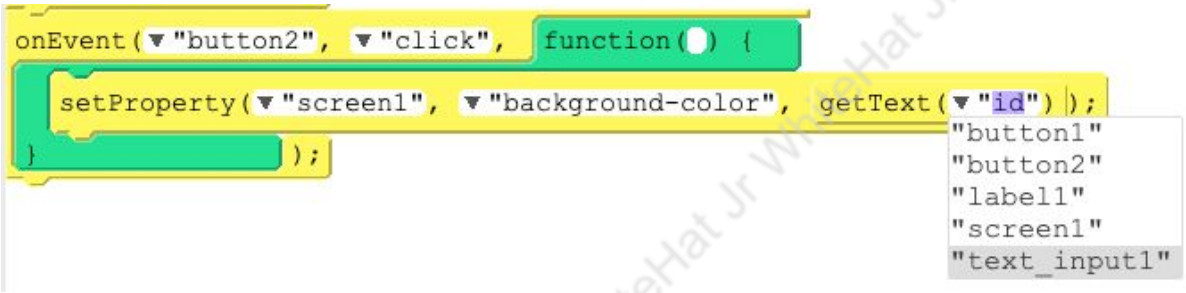
This will create another button exactly like the first one.

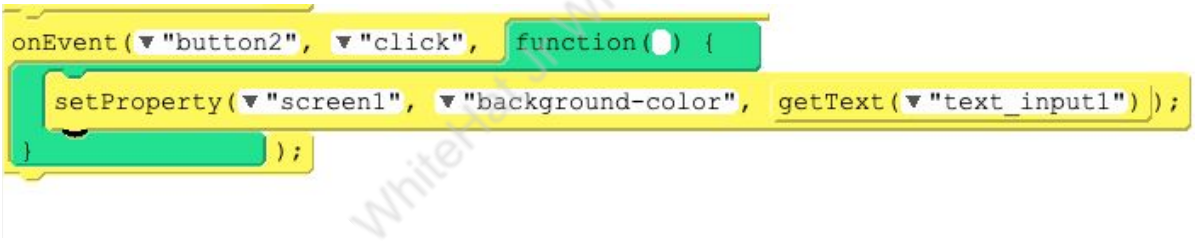
Now drag this new button and place it on the screen and set its properties as shown below.



	Remember the id of this button is button2. From UI controls add another **onEvent** block for this button and select button2.	

Use the `getText(id)` block to get the text entered by the user and drop it in the color parameter.





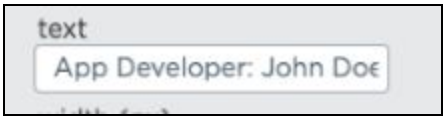
COMPLETE APP CODE

```
onEvent("button1", "click", function() {
  penColor("red");
  penWidth(3);
  timedLoop(100, function() {
    setProperty("screen1", "background-color", rgb(randomNumber(0, 255), 0, 75, 0.5));
    moveForward(25);
    turnRight(randomNumber(1, 50));
  });
  hideElement("label1");
  hideElement("button1");
  hideElement("text_input1");
  hideElement("button2");
});
onEvent("button2", "click", function() {
  setProperty("screen1", "background-color", getText("text_input1"));
});
```

So here we have added the **hideElement** function to button1 event, so that these elements hide making space for turtle to draw on the screen.

```
hideElement("label1");
hideElement("button1");
hideElement("text_input1");
hideElement("button2");
```

	So when the button2 is clicked, the app will get the text from textinput block and change the color to the color entered by the user in the text input block. So if the user types “John” in the textinput block nothing will happen as “John” is not a color. Computer knows	

	all the color names. So once it detects the color name it will apply it to the screen. For example: light green, tomato, skyblue, brown, plum. Great! You can add your name to the app as a label, as this app is developed by you. So let's go to design and add your name in the Label2 text column. 	

Activity No.	Name of the Activity	Link
Teacher Activity 1	APP LAB	https://studio.code.org/projects/applab/new
Teacher Reference 1	YOUTUBE TUTORIAL	https://youtu.be/e9lipmBbtlQ
Teacher Activity 2	ANDROID APPS	https://drive.google.com/drive/folders/1plNVpqc_hKh7EPhq7I3cDfv5DOoC4xsf?usp=sharing
Teacher Activity 3	CREATE APPETIZE LINKS	https://appetize.io/
Student Activity 1	APP LAB	https://studio.code.org/projects/applab/new
Student Activity 2	CODE DIAGRAM	https://whitehatjrcontent.s3.ap-south-1.amazonaws.com/curriculum/image16.png
Student Activity 3	PLAYSTORE+APPETIZE LINKS	https://play.google.com/store/apps/developer?id=WHITEHAT+EDUCATION+TECHNOLOGY
Student Activity 4	CHATBOT SHOWCASE	https://bot.dialogflow.com/82e2fc96-1906-4bd8-a9d2-84a17f04ea54
Student Activity 5	ROVER CIRCUIT SIMULATION	https://youtu.be/j5tRzg11cAs
Student Activity 6	SATELLITE LAUNCH VEHICLE	https://www.tinkercad.com/things/lriqDFOnu7A
Student Activity 7	SHREY SHAH'S APP	https://youtu.be/hcFhmpJ3ovw
Student Activity 8	COURSE PDF	https://cdnwhjr.s3.ap-south-1.amazonaws.com/website/curriculumpdf/10-dec-2019/ADV-300_New+Classes.pdf