

What is this programming? Scratch! Python? C++ Visual Basic? Delphi

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UNISA
CSET



Define tomorrow.

UNISA



Programming Languages, Learners & Educators

```
IDLE  File  Edit  Shell  Debug  Window  Help
ghostgame

# Ghost Game
from random import randint
print('Ghost Game')
feeling_brave = True
score = 0
while feeling_brave:
    ghost_door = randint(1, 3)
    print('Three doors ahead...')
```

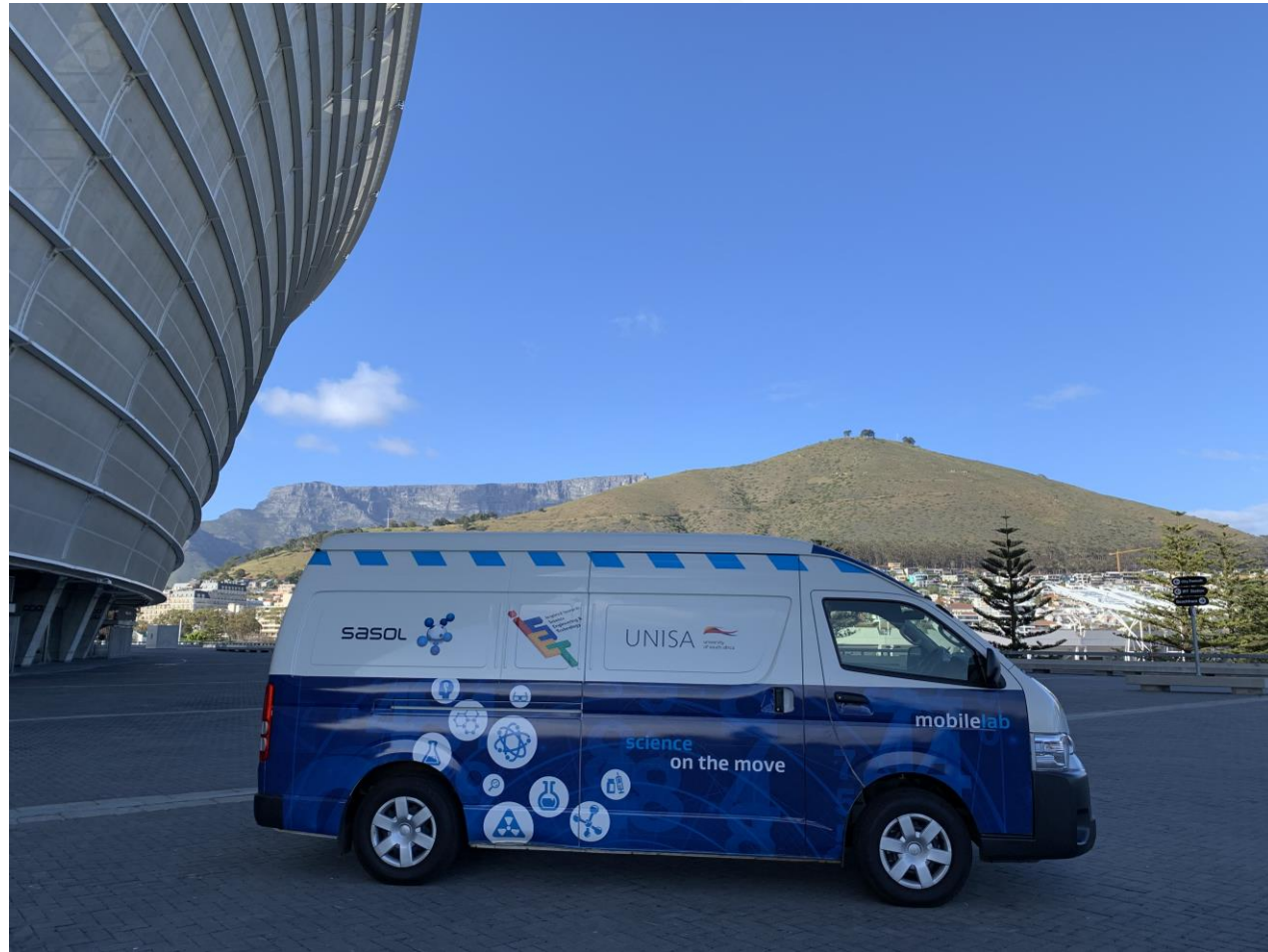


Greetings from SASOL Mobile Unit #9 (reality check! No masks, access to schools)



From on-road to on-line (☹ for now)

- SASOL mobile grounded
- A need for equipping and support of science
- Online science engagement



Introduction – A Programming Journey

- How many primary school educators here teach programming?
- How many high school educators here teach programming?

On the road ...

- Lecture **Python** programming to large classes of online under-graduates at UNISA.
- Difficult 😊😞
- Engage with robotics coaches and learners in the engineering and programming of robots through engagement.
- FUN!

Clarity : Coding? Programming?

- Coding – writing the code in a programming language.
- Programming – process of developing an executable program includes problem solving, analysis, design, code, implement, test, deploy and maintain.
- <https://www.freecodecamp.org/news/difference-between-coding-and-programming/>

PURPOSE OF TODAY'S PRESENTATION

- To introduce programming
- To introduce programming languages at different levels
- To introduce programming opportunities
- To encourage educators to join the journey of learning programming
- To engage in a FUN programming challenge

Time is passing ... it is TIME to start the programming journey!



Quartz Clock - Clocks - Sh...
mrphome.com · In stock



Magis Tempo Wall Clock | AmbienteDirect
ambientedirect.com



Century 45CM Boston Clock BL...
game.co.za



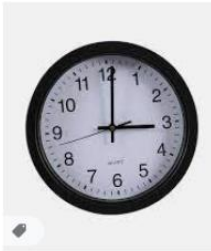
Backwards-Clock - 24h delivery...
getdigital.eu · In stock



Large Clock - Learn to tell time...
takealot.com · In stock



Deep Frame Round Clock...
natedecor.co.za · In stock



Quartz Clock - Clocks - Sh...
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RS PRO White Wall Clock, 300mm | RS ...
ie.rs-online.com · In stock



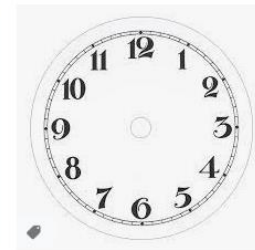
Wall clock Manila, 40x40x8cm / Clocks ...
alandeko.com



Tomkin Wall Clock - Blue...
cielo.co.za · In stock



31 Best Modern Wall Clocks to Buy Now ...
architecturaldigest.com



Clocks Wall Clocks Arabic Nu...
uhrmacherwerkzeuge.com · In s...



Orange Wall Clock Isolated In...
istockphoto.com



shutterstock.com · 315651371



What is code?

- Coded commands to a machine, to make something happen.
- Coded commands to make a robot MOVE ...
- Coded commands used to create an app.
- Coded commands used to develop a website.
- Abstract
- Perceived difficult

What is the process of programming?

- Analyze the problem.
 - Design a solution
 - Use code to develop an executable application.
 - Implement the program of coded lines.
 - Test the program.
 - Debug the program.
 - Maintain the program.
 - Improve the program
- How do you learn to program?

Teaching and learning of programming

- Programming is a useful skill to develop.
- Programming skills are in demand.
- Learning to program is perceived to be difficult.
- Programming requires perseverance and practice.
- Increased use of technology equips learners to overcome perceptions of difficulty.

The first dimension of programming

- Develop problem-solving skills
- Part of 21st century skills
- Critical thinking, innovation, imagination, creativity, collaboration.
- 21st century skills are neither new nor novel.

The second dimension of programming

- Programming principles
- Data types and operations
- Linear programming
- Looping – repetition
- Decisions – use input data to select execution path
- Variables and constants – storing values
- Inheritance, procedures, functions

The third dimension of programming

- Programming language
- Learn ☺ a language
- There is no best language, there are many available languages.
- Icon-based or block programming (no syntax)
- Text-based programming (syntax!)
- Start with appropriate language and continue
- Text languages require you to learn syntax.

Journey of Learning Programming

- **Start** with simpler problem solving and progress to complex
- **Start** with an introduction to programming principles
- **Start** with the visual and progress to text programming language
- **Start** with the concrete and progress to abstract
- **Start** with drag and drop pictures and progress to reading and typing words

More progress on the journey

- Ongoing development of **problem-solving skills**
- Introduce **programming principles** (looping, switching/ decisions, input/output, event drive, object-oriented, ...)
- Start with a **programming language** ...
block-programming (Scratch) and progress to the text-based programming (Python)

The Levels of Programming

- Start at a LEVEL where the learners are, and then progress:
- **FOR EXAMPLE:**
- Icon-based: Scratch Junior (e.g. storytelling)
- Icon-based: Scratch
- Text: Python, Java, C++ (e.g. banking app)

Scratch Junior



ScratchJr - Learn
scratchjr.org



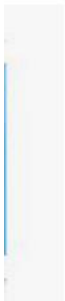
ScratchJr on the App Store
apps.apple.com



ScratchJr: Coding for kindergarten ...
news.mit.edu



Scratch Jr App Review - YouTube
youtube.com



ScratchJr - Apps on Google Play
play.google.com



ScratchJr - Home
scratchjr.org



on Amazon Fire Tablet for Little Kids ...
techagekids.com



Coding for Children with Scratch
edutechpost.com



Scratch Junior

- An introduction to programming.
- Learners (aged 5-7) create interactive stories and games.
- Using graphical programming blocks to program.
- Characters can move, jump, dance, and sing.
- Can add own colours and sounds.
- Programming used to animate characters.
- <https://www.scratchjr.org/about/info>

<https://www.scratchjr.org/>

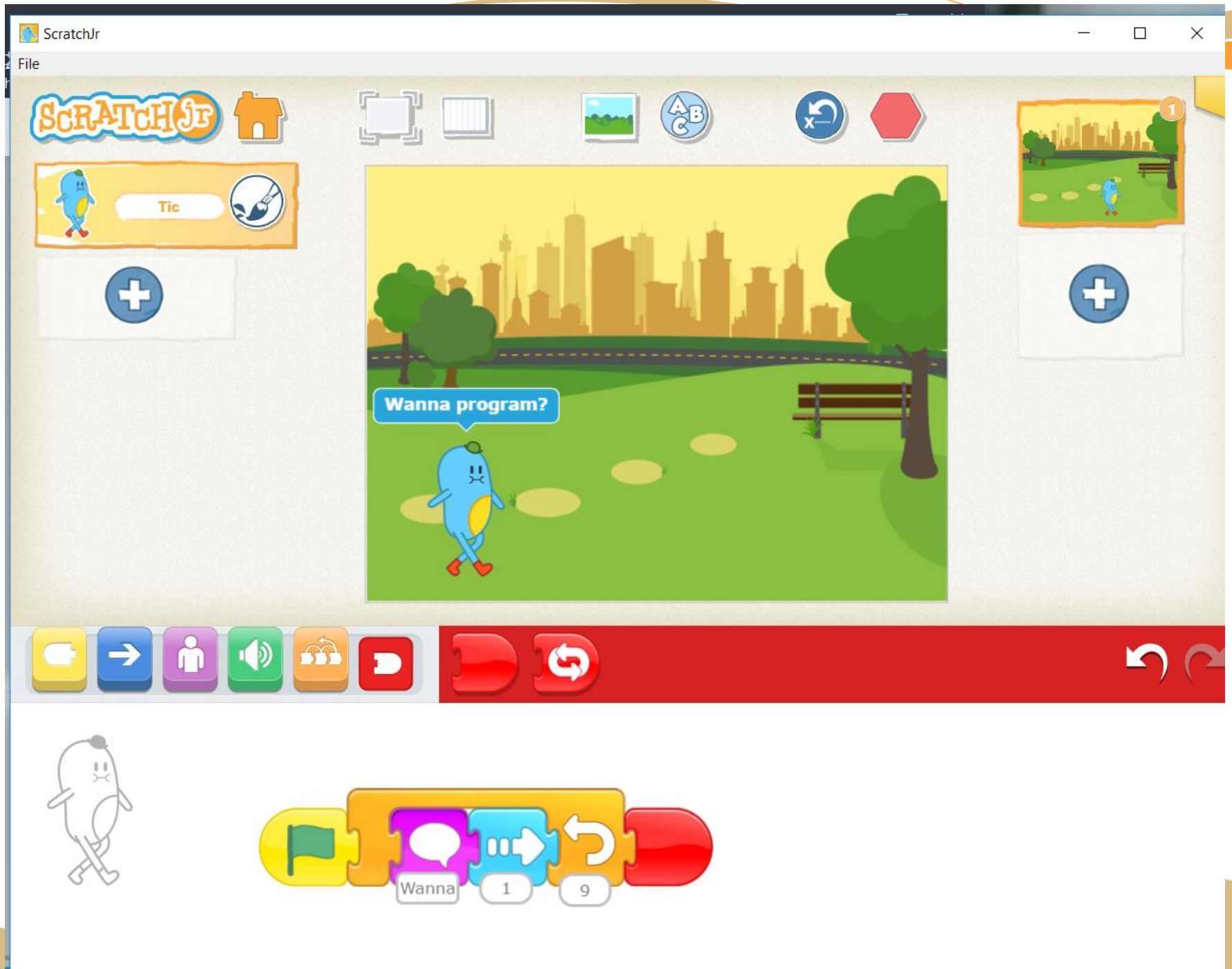
AboutLearnTeachOutreachDonate



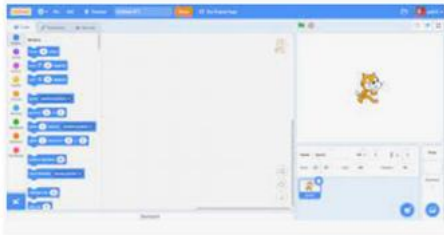
ScratchJr is available as a free app.

ScratchJr
Coding for young children





Scratch



Scratch (programming language) - Wikipedia
en.wikipedia.org



User Interface | Scratch 3 Walkthrough...
learn.adafruit.com



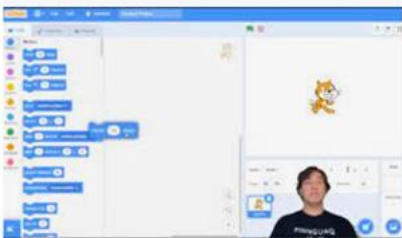
Scratch programming language and editor ...
twitter.com



Scratch Team on Twitter: "Heads up: T...
twitter.com



Scratch Review | PCMag
pcmag.com



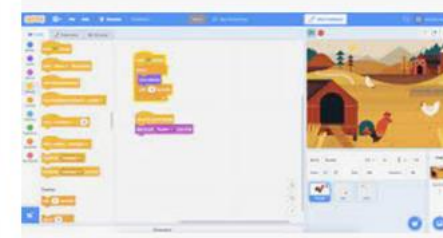
Intro to Scratch: A New Course about ...
pinnguaq.com



MIT Scratch Studio Interface. Image ...
researchgate.net



5 New Features in Scratch 3.0 ...
technokids.com



Try the Scratch 3.0 Beta today!. The ...
medium.com



Using Scratch for Hour o...
knowledgequest.aasl.org



Scratch Team on Twitter: "Are you ...



Learning the basics of 3D programming ...



Scratch 3.0 is now available | TechCrunch



3 Things To Know About Scratch 3.0 | by ...

Scratch

- Scratch is a visual programming language.
 - Learners create interactive stories, games and animations.
 - The four elements of Scratch: the stage (background), the sprites (character), the script (story) and the programming palette (icons used to program). Use play to tell a story.
-
- https://www.uab.edu/icac/images/Scratch_Guides/Intro_to_Scratch.pdf
 - <https://www.dkfindout.com/us/computer-coding/what-is-scratch/>

Sharing Community Of Projects and Ideas

<https://resources.scratch.mit.edu> › [www](#) › [guides](#) ▼ PDF

[Animate Your Name - Scratch Resources browser - MIT](#)

The video shows a variety of **projects** for ideas and inspiration. ... [scratch.mit.edu](#), or you can set up student accounts if you have a ... Download the **PDF** at:

36 pages

<https://scratched.gse.harvard.edu> › [default](#) › [files](#) ▼ PDF

[Super Scratch Programming Adventure - ScratchEd](#)

a new **Scratch project** without logging in by clicking the Create button. You'll want to ... You can download free **PDF** versions of Chapters 1 and 2, which explain ...

45 pages

<https://umaine.edu> › [uploads](#) › [sites](#) › [2016/12](#) › [S...](#) ▼ PDF

[Scratch Programming Worksheet Compilation Table of ...](#)

In this activity, you will create a new **project** with **Scratch** and explore different **Scratch** blocks to make the cat do something surprising! What will you create?

19 pages

<https://www.sean.co.uk> › [downloads](#) › [Cool-Scratch](#)... ▼ PDF

[Cool Scratch Projects in Easy Steps: PDF sampler - Sean ...](#)

Others will enjoy making these **projects** first and then seek out the. **Scratch** Programming book when they want to understand more about what the blocks do. I ...

22 pages

<https://www.raspberrypi.org> › [magpi-issues](#) › [CC_...](#) ▼ PDF

[Book of Scratch - Raspberry Pi](#)

Programming in **Scratch** is a great way to learn how to code. It's also really creative. You can create your own characters and backgrounds to make your **project** ...

https://scratch.mit.edu/download

[Create](#)[Explore](#)[Ideas](#)[About](#)[Join Scratch](#)[Sign in](#)

Download the Scratch App

Would you like to create and save Scratch projects without an internet connection? Download the free Scratch app.



Requirements

Windows 10+

macOS 10.13+

ChromeOS

Android 6.0+

Choose your OS:

[Windows](#)[macOS](#)[ChromeOS](#)[Android](#)

Install the Scratch app for Windows

Untitled

v463.1



Sprites

New sprite:    

Stage
1 backdrop


Sprite1

New backdrop:

Scripts

Costumes

Sounds

Motion

Looks

Sound

Pen

Data

Events

Control

Sensing

Operators

More Blocks

play sound meow

play sound meow until done

stop all sounds

play drum 1 for 0.25 beats

rest for 0.25 beats

play note 60 for 0.5 beats

set instrument to 1

change volume by -10

set volume to 100 %

☐ volume

change tempo by 20

set tempo to 60 bpm

☐ tempo

when  clicked

move 10 steps

turn  15 degrees

ask What's your name? and wait

say Hello! for 2 secs

repeat 10

play sound meow



stop all sounds

Pen

set color effect to 0



Ballerina

Backdrops



File

Edit



Tutorials

Scratch Project



Code

Costumes

Sounds



Motion

Looks

Looks

Looks

Sound

Sound

Events

Events

Control

Control

Sensing

Sensing

Operators

Operators

Variables

Variables

My Blocks

My Blocks

Pen

Pen

Pen

Events

when green flag clicked

when space key pressed

when this sprite clicked

when backdrop switches to backdrop1

when loudness > 10

when I receive message1

broadcast message1

broadcast message1 and wait

Control

wait 1 seconds

repeat 10

when green flag clicked

pen down

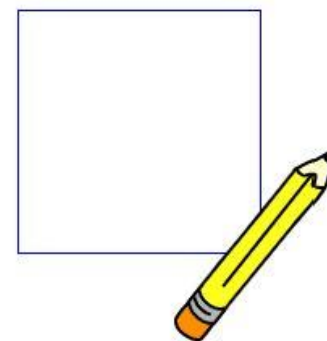
repeat 4

move 150 steps

turn 90 degrees

wait 1 seconds

pen up



Sprite Pencil

x 39

y -42

Show



Size 100

Direction -90



Pencil

Stage

Backdrops 1





Code

Costumes

Sounds



Motion



Looks



Sound



Events



Control



Sensing



Operators



Variables

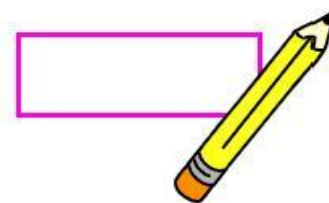
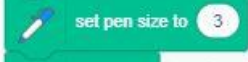
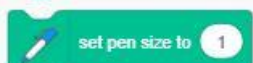
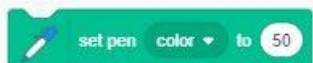


My Blocks



Pen

Pen



Sprite

Pencil

x 100

y -38

Show

Size 100

Direction -90



Pencil

Stage

Backdrops 1

Python



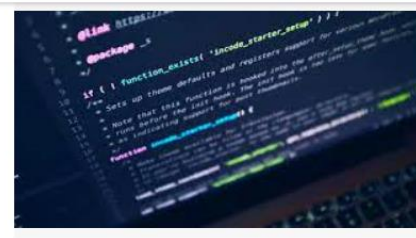
Engineers Shoul...



Python programming language ...
devgap.uk



15 Free Courses to Learn Python in 2021 ...
medium.com



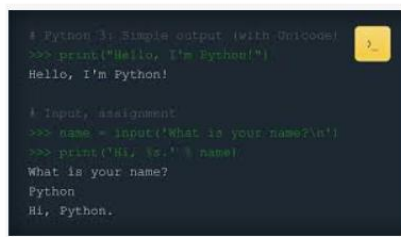
Learn Python programming for web apps ...
engadget.com



Python Programming Language
edureka.co



Python programming ...



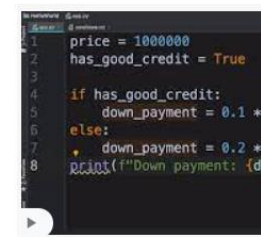
Python Programming Language ...
aezion.com



10 Quick Clean Coding Hacks in Python ...
towardsdatascience.com



8 Steps to master Python programming ...
content.techgig.com



Complete Python Mastery | Code
codewithmash.com



Python Language Ov...



What Is Python Programming Language?



Things You Might Not Know About...



Ready to start coding? What you need...



Is Python programming language...



Introduction to Programming

Python

In []:

```
#comment ....  
def myAverage(a,b,c,d,e)  
    return (a+b+c+d+e/5.0)  
#input  
#processing  
nAve=myAverage(1,2,3,4,5)  
#output  
print(nAve)
```

In []:

```
#comment ....  
def myNumber(nNum):  
    if nNum==1:  
        return('one')  
    elif nNum==2:  
        return('two')  
    else:  
        return('sorry, not defined')  
#input  
nNum=int(input('Please enter a number : '))  
#processing  
  
#output  
print(myNumber(nNum))
```

Python Programming

- Python is easy to learn.
- Python has easy to read syntax.
- Python comes with many libraries to download and install.
- Python can be integrated with other programming languages (e.g. C, C++ and Java)
- Python is a good choice for web development, game development, data processing and business applications.
- Python support exception handling.
- Python can be used to program robots.

Python – another learning journey

- Start with Jupyter Notebook (as a learning environment) in Anaconda (free)
- Can also use the IDLE environment
- To develop Graphical User Interfaces (GUI) for applications use PyQt
- Add libraries, and introduce game development
- Data Science Graphs

Python Online Support

- Online tutorials
- Free eBooks
- YouTube Videos
- Massive Open Online Courses (MOOCs)
- Short Courses

Ad • www.datacamp.com/ ▼

Python Online - Free Python Intro by DataCamp

Learn **Python** by doing 50+ interactive coding exercises. Start Now! Learn R And **Python**. Free And Premium Courses. Learn At Your Own Pace. Try 350 Free Chapters.

Learn Python Basics

Create variables interactively.
Learn Python data types.

Python Data Courses

Improve your data science python
Data visualization & manipulation

Ad • www.udemy.com/ ▼

Learn Python from A to Z - Courses For All Skill Levels

Learn **Python** programming language in weeks with this **Python** for beginners **online** course. Join millions of learners from around the world already learning **Python** on Udemy! PySpark.

Ad • www.codecademy.com/ ▼

Best Sites To Learn Python - Beginner-Friendly Lessons

Master your language with lessons, quizzes, and projects designed for real-life scenarios. Create portfolio projects that showcase your new skills to help land your dream job.

Ad • www.info.com/web/results ▼

Online Python Course For Beginners - Online Python Course For...

Search **Online Python** Course For Beginners. Look Up Results on Info.com. --

Python (more) Online Support

mikkegoes.com › learn-python-online-best-resources

Learn Python Online: 22 Best Python Courses and Tutorials ...



Learnpython.org; Google's **Python** Class; Learn **Python** the Hard Way (LPTHW); **Python** Tutorial (After ...

21 Mar 2020 · Uploaded by Udacity

geekflare.com › Geekflare Articles

12 Resource to Learn Python for Beginners - Geekflare



The most popular **web** frameworks for **Python** are Django and Flask. Django is a more robust framework than ...

22 Dec 2019 · Uploaded by edX

medium.com › swlh › 5-free-python-courses-for-beginne...

15 Free Courses to Learn Python in 2021 | by javinpaul | The ...



You can take these **best online** courses to learn **Python** at your own ... classes or boot camps and nothing ...

27 Jan 2019 · Uploaded by freeCodeCamp.org

www.mltut.com › Blogs › Python

30 Best+Free Resources to Learn Python Online in 2021



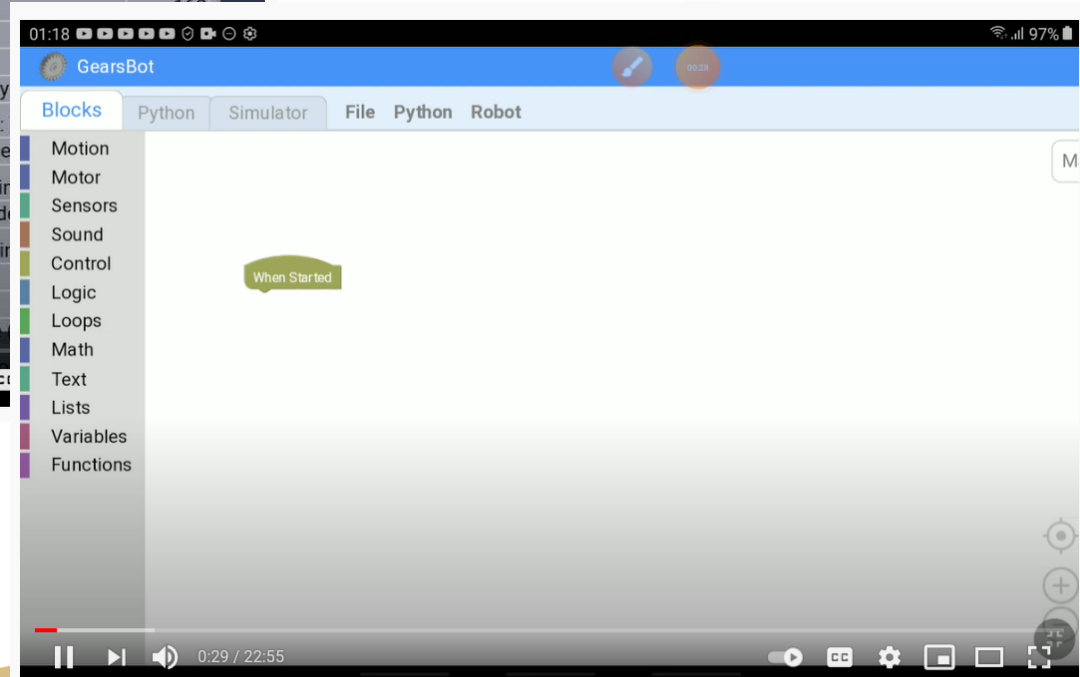
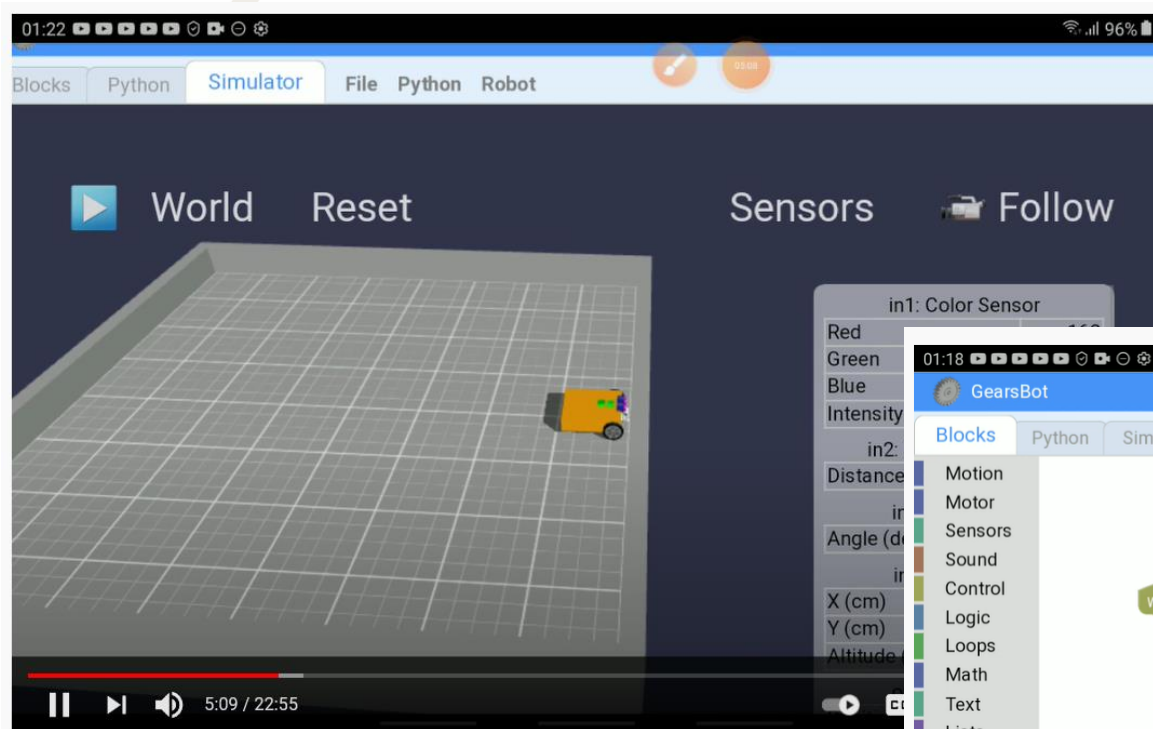
I am gonna share **Best Python Online** Courses, Tutorials, YouTube Channels, and Books. When I started ...

14 Aug 2020 · Uploaded by MD MUSTAFEEZ ALAM

Opportunities to learn programming

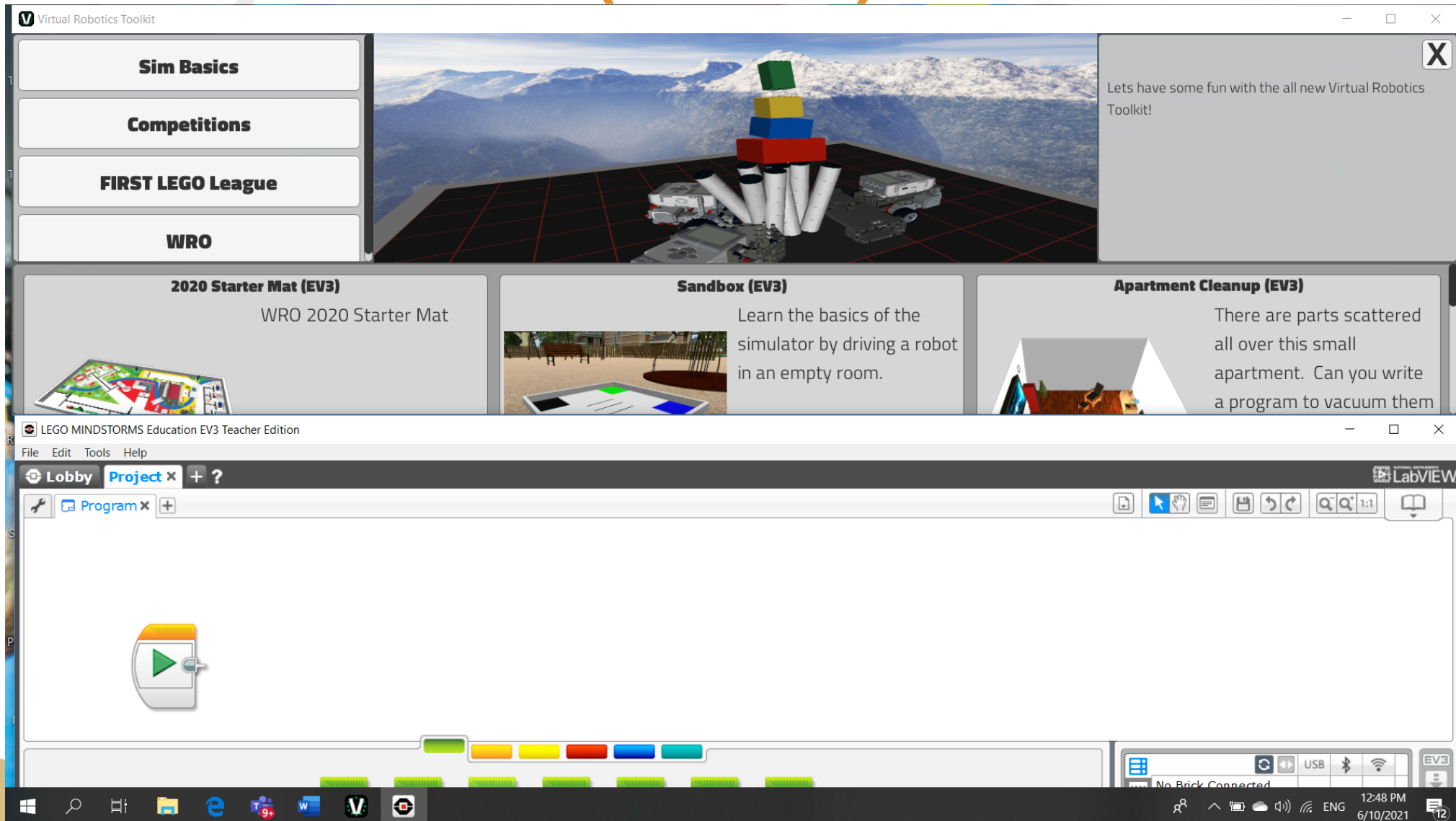
- Problem solving skills – puzzles.
- Use program installations on computers.
- Other opportunities:
- Use simulation software programs - programming to make simulated robots move.
- Use physical robots – programming to make physical robots move.

Simulation software - programming robots Gearsbot (scratch and python)



GearsBot : Using the Ultrasonic Sensor

Simulation Software - Virtual Robotics Toolkit (free trial)



Programming opportunities ...

- Problem solving – puzzles.
- Use program installations on computers.
- Use simulations programs - programming to make simulated robots move.
- Use a robotics kit to build a robot – programming to make physical robots move.

Example: Robotics Kit (Spike Prime) – Scratch



Lego Mindstorms EV3 Programming ...
medium.com



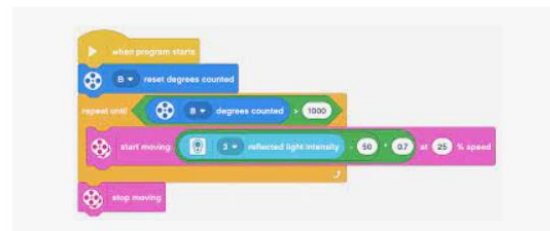
EV3 Classroom or EV3 Lab? MINDSTORMS ...
robocamp.eu



EV3 Classroom: Line Followers ...
ev3lessons.com



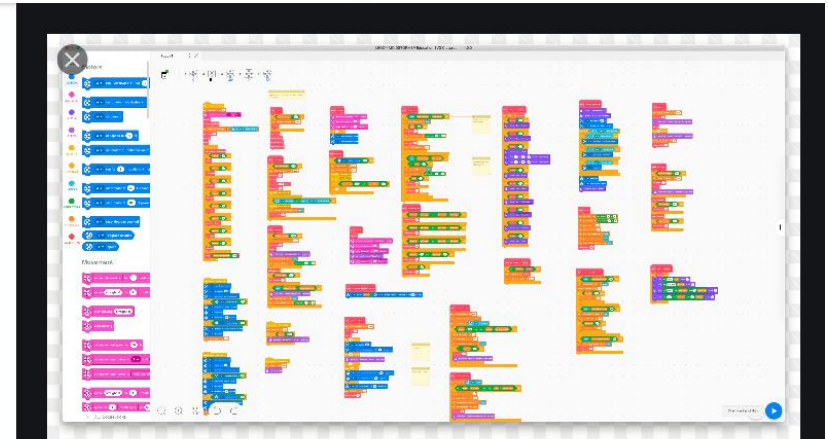
Lego Mindstorms EV3 Programming ...
medium.com



EV3 Classroom: Line Followers ...



FIRST LEGO League Challenge Programming ...



Medium

The Future of Lego Mindstorms EV3 Programming | by Dong Lian

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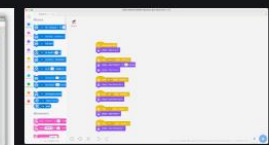
[See more](#)



Ev3 PID(PD) Line Follower with...
youtube.com



Can you program Lego Mindsto...
bricks.stackexchange.com



LMSP File Extension - What is a...
fileinfo.com

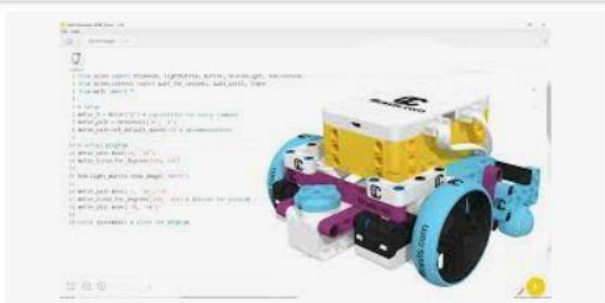
Example: Robotics Kit (Spike Prime) - Python

```
129 def main():
130     start_off()
131     start_line_sensing()
132     move_clip('F')
133     send_to_destination()
134     move_clip('T')
135     return_to_base()
136
137 main()
```

into Python Code ...



LEGO Spike Prime – Programming ...
thecodingfun.com



for flip attachment from LEGO Education
filccasts.com

```
76 def return_to_base():
77     hub.motion_sensor.reset_yaw_angle()
78     wait_for_seconds(1)
79     motor_pair = MotorPair('B', 'D')
80     motor_pair.start_tank(-50, 0)
81     while True:
82         if hub.motion_sensor.get_yaw_angle() > 170:
83             break
84
85     motor_pair.stop()
86     motor_pair.start_tank(50, 50)
87     motor_b = Motor('B')
88     motor_d = Motor('D')
89     while True:
90         if color_sensor_c.get_color() == 'red' and color_sensor_e.get_color() == 'red':
91             break
92         elif color_sensor_s.get_color() == 'red':
93             motor_d.stop()
94         elif color_sensor_e.get_color() == 'red':
95             motor_b.stop()
```

Programming Blocks into Python Code ...
thecodingfun.com



into Python Code ...



LEGO Spike Prime or LEGO MindStorms ...
thecodingfun.com

```
97 wait_for_seconds(1)
98 motor_pair = MotorPair('B', 'D')
99 motor_pair.move_tank(100, 'cm', 50, 50)
100 motor_pair.move_tank(175, 'degrees', 5, 50)
101 motor_pair.start_tank(50, 50)
102 motor_b = Motor('B')
103 motor_d = Motor('D')
104 while True:
105     if color_sensor_c.get_color() == 'red' and color_sensor_e.get_color() == 'red':
106         break
107     elif color_sensor_s.get_color() == 'red':
108         motor_d.stop()
109     elif color_sensor_e.get_color() == 'red':
110         motor_b.stop()
111
112 wait_for_seconds(1)
113 motor_pair = MotorPair('B', 'D')
114 motor_pair.move_tank(10, 'cm', 50, 50)
115 motor_pair.move_tank(200, 'degrees', -50, 50)
```

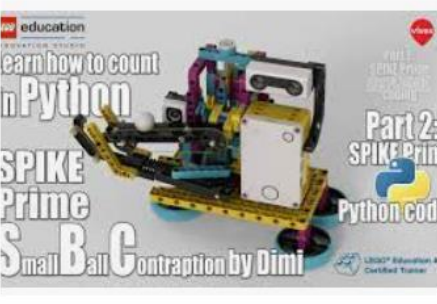
Programming Blocks into Python Code ...
thecodingfun.com



LEGO Spike Prime – Programming ...
thecodingfun.com



Spike kit provides



12 Spike ideas



LEGO SPIKE Prime Small Ball Contraption



set 45678 SPIKE Prime [Review



Python snakes its way to

The opportunities ...

- It is new.
- It is coming.
- Coding will be part of the SA curriculum.
- It is an upskilling opportunity for a community of educators and learners (You are not alone).
- There is a community of educators already in the space.
- There is support ...

Online Programming Resources

- Online tutorials.
- Online YouTube videos.
- Online programming activities.
- Opportunities to share programming teaching and learning.

The journey of learning programming

- Alternative pathways to introduce programming to our learners and educators.
- There MUST be a **START!**
- To introduce in a FUN way
- To introduce so that learners discover
- To introduce so that the educators and learners can learn.

Why bother?

- It is already the 21st year of the 21st century (and the 21st hour of the 21st day has passed).
- To develop the 21st century skills of all learners.
- To promote problem-solving, critical thinking, collaboration, creativity, innovation and imagination.
- Why not?

If not NOW, When? Ke Nako!!!



Quartz Clock - Clocks - Sh...
mrphome.com · In stock



Magis Tempo Wall Clock | AmbienteDirect
ambientedirect.com



Century 45CM Boston Clock BL...
game.co.za



Backwards-Clock - 24h delivery...
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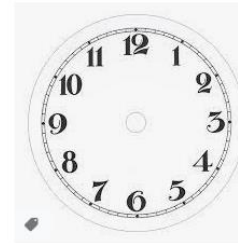
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If not us, who?

- Our **START** challenge:
 - Download Scratch Junior
 - <https://www.scratchjr.org/>
 - Write a program in Scratch Junior or Scratch.
 - The sprite must move and say (walk the talk):
 - “ke Nako”
 - Please share a screen-shot of your program.
- Happy Programming!



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Thank you