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NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM
CHPC

DSTI-CHPC Coding & Robotics Workshop

Introduction to Robotics 2

A national initiative of the Department of Science and Innovation and implemented by the CSIR

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Science and Innovation
REPUBLIC OF SOUTH AFRICA

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What is a AI?

Background On Generative AI

Rapid Growth

There has been a rapid rise in the growth and adoption of generative AI solutions since 2022.

Public Awareness

The value and impact of generative AI solutions has raised public awareness, adoption and interest in this technology.

Useful Optimizations

Generative AI can provide useful optimizations and efficiencies to the various areas of CSIR.

Potential Risks

While useful, generative AI can also expose organizations to risks that need to be addressed.

Dispelling Common AI Misconceptions (1)

Myth 1: AI Replaces Expertise

❌ **Reality**: AI assists but cannot replace human judgment, domain knowledge, or ethical reasoning.

✅ **Best Practice**: Use AI as a support tool, applying your own critical thinking and expertise.

Myth 2: Internet Data = Safe to Use

❌ **Reality**: Data online may be copyrighted, restricted, or subject to privacy protections.

✅ **Best Practice**: Always check permissions and legal status before using data in AI tools.

Myth 3: AI is Unbiased

❌ **Reality**: AI reflects biases present in training data, potentially perpetuating stereotypes or discrimination.

✅ **Best Practice**: Carefully review outputs for bias, especially on sensitive or controversial topics.

Dispelling Common AI Misconceptions (2)

Myth 4: One-Time Reading Suffices

❌ **Reality**: AI technology, regulations, and organizational policies evolve rapidly and continuously.

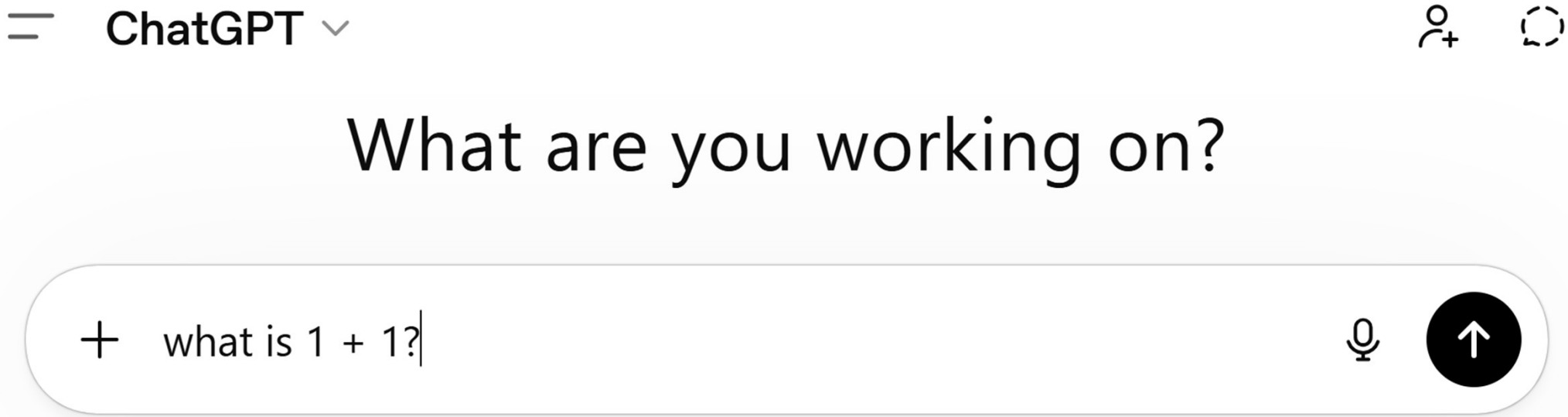
✅ **Best Practice**: Regularly revisit guidelines and stay updated on new developments and requirements.

Myth 5: Tools are Secure by Default

❌ **Reality**: Security varies widely; some tools have significant vulnerabilities or lack proper safeguards.

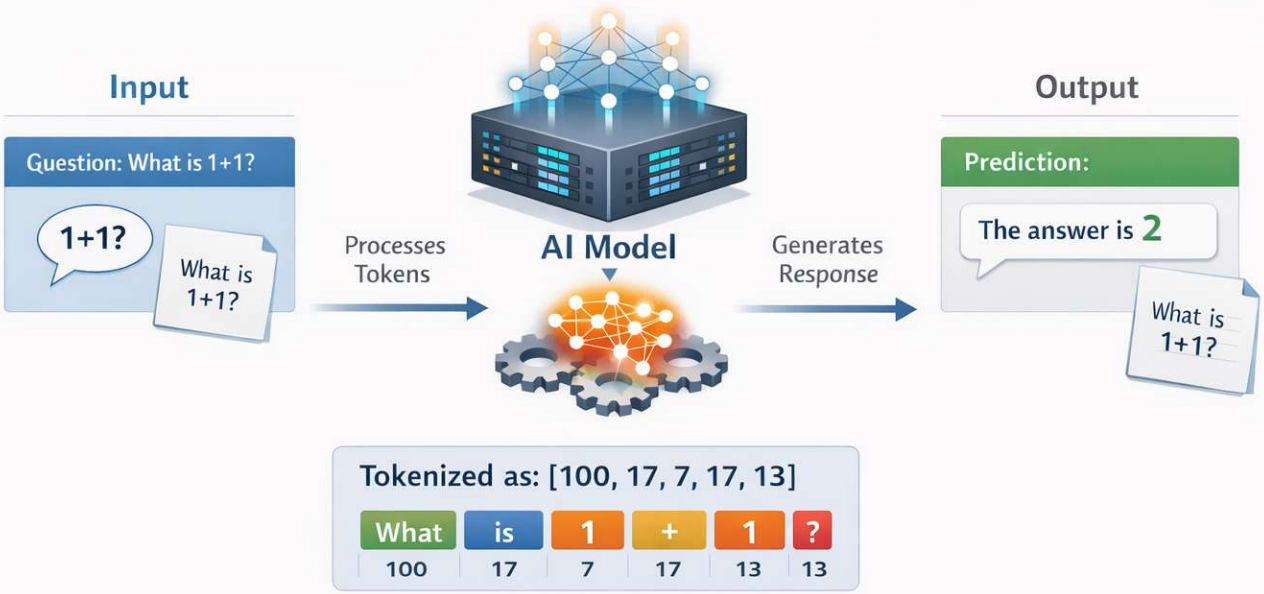
✅ **Best Practice**: Use CSIR-approved tools that have undergone security vetting.

What is a AI?



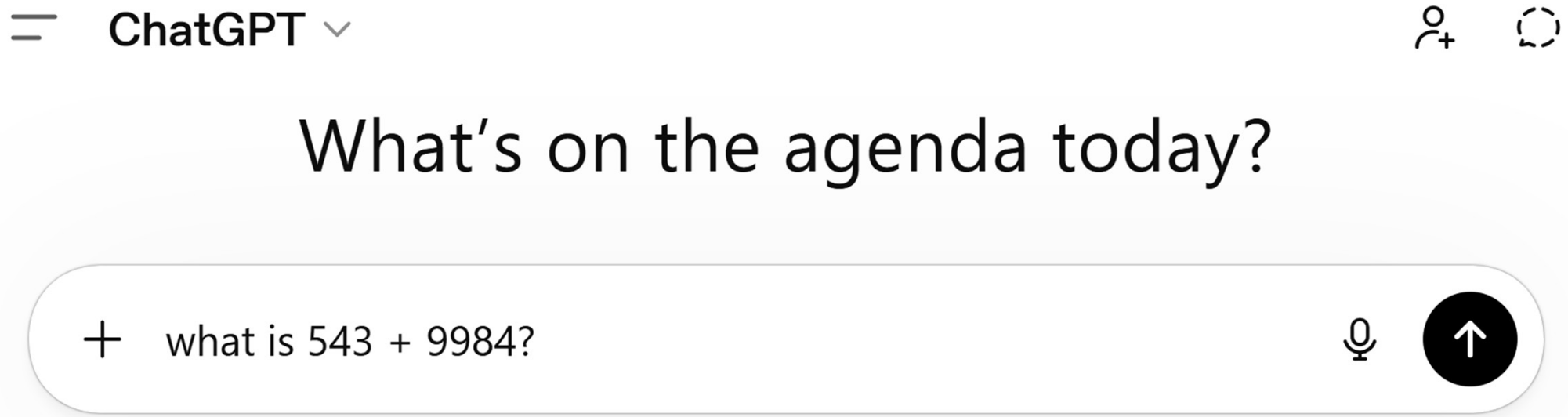
What is 1+1?

1+1=?


Input
Question: What is 1+1?
1+1?
What is 1+1?
Processes Tokens
AI Model
Generates Response
Output
Prediction:
The answer is 2
What is 1+1?
Tokenized as: [100, 17, 7, 17, 13]
What
is
1
+
1
?
100
17
7
17
13
13

What is a AI?

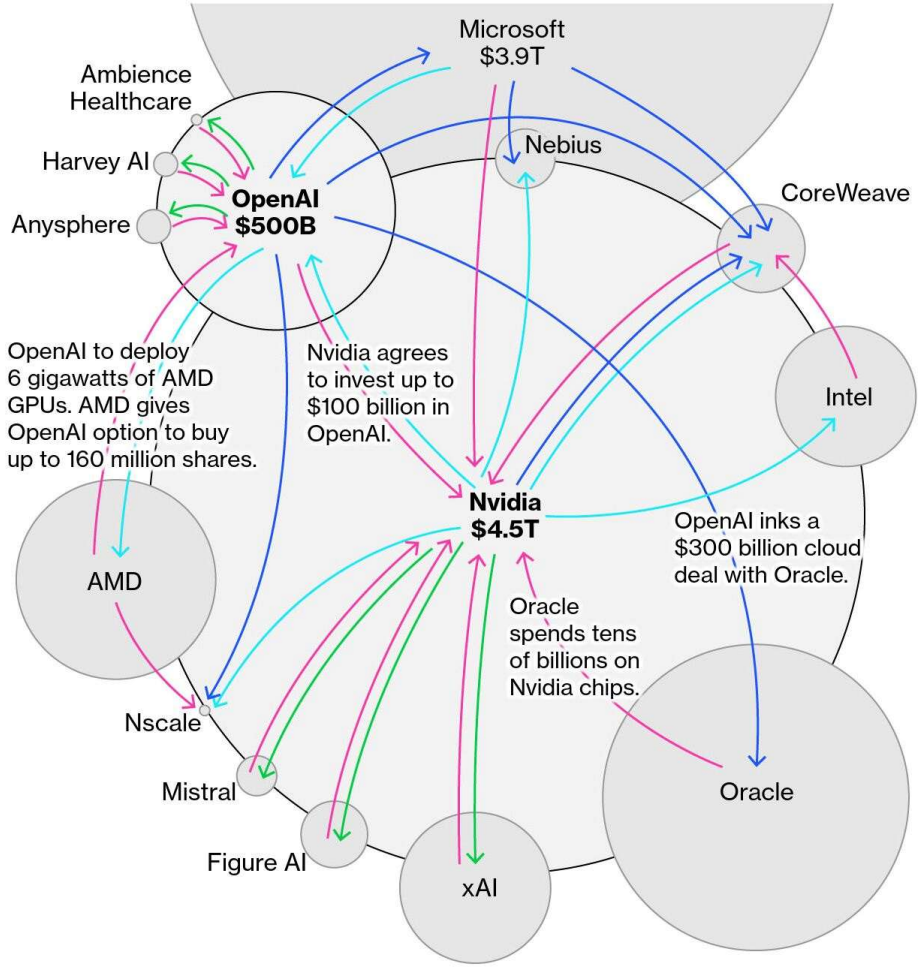
What if all the data on the internet said “1+1 = 3”


ChatGPT
What's on the agenda today?
what is 543 + 9984?

How Nvidia and OpenAI Fuel the AI Money Machine

Hardware or Software · Investment · Services · Venture Capital

Circles sized by market value



Source: Bloomberg News reporting

Bloomberg

Final Thoughts

Remember that AI is a **powerful tool**, not a truth engine. Responsible use requires human judgment, ethical awareness, and continuous learning.

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netram.co.za/arduino/8988-arduino-uno-r3.html?srsltid=AfmBOoqKw4a7rMGcBlWqISbqevDHuckUxZh29t0-KH8zd2A

netram ELECTRONICS

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Home / Development Platforms / Arduino / Arduino Uno - R3

Arduino Uno -

An Atmega328 based

Reference DEV-00006

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1 review

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Why Teach Robotics?

STEM Learning: Combines science, technology, engineering, and mathematics in an engaging way.

Career Opportunities: Prepares students for future tech-related jobs.

21st Century Skills:

- Problem-solving
- Critical thinking
- Collaboration
- Creativity
- Artificial Intelligence (AI) *

Real World Applications and Industries

Healthcare: Medical robots, prosthetics, surgical robots.

Everyday Life: Vacuum cleaning robots and drones.

Manufacturing: Automated production lines.

Agriculture: Autonomous farming equipment.

Defense & Security: Surveillance and unmanned vehicles.

Space Exploration: Rovers, space station robotics.

Future Opportunities: As robotics advances, new fields like autonomous vehicles, smart homes, and human-robot collaboration will continue to emerge.

Careers and Opportunities in Robotics

Growing Industry: Robotics is an expanding field with applications in multiple sectors.

In-Demand Skills:

- Mechanical Engineering
- Electrical Engineering
- Computer Science & Programming
- Artificial Intelligence (AI) & Machine Learning
- Data Analysis

Career Opportunities:

- **Robotics Engineer:** Design and build robots.
- **Automation Specialist:** Develop robotic systems for industry.
- **AI/ML Developer:** Create intelligent robots that can learn and adapt.
- **Research Scientist:** Work on advanced robotics technologies.

Robotics in the Classroom

Robotics in Education:

- Hands-on learning that enhances engagement and creativity.
- Develops problem-solving skills through trial and error.
- Encourages teamwork through collaborative projects.
- Integrates multiple subjects: science, technology, engineering, and math (STEM).

Robotics in the Classroom:

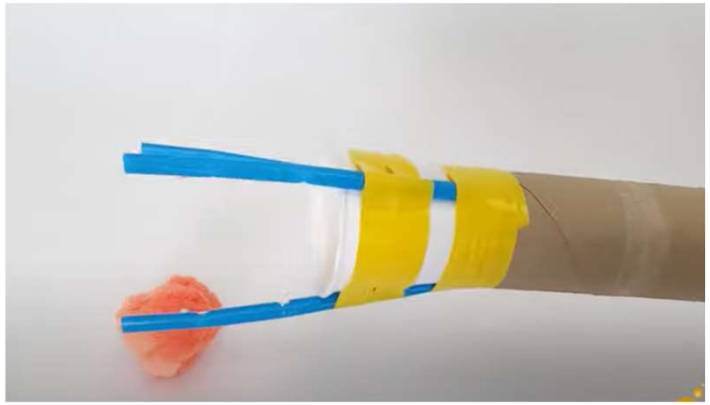
- Household Items – Cardboard Robots
- Robotic kits (Arduino, Microbit, Raspberry pi, etc)
- Use virtual platforms (e.g., Scratch, MakeCode, ArduinoClassroom)
- Six Blocks

DIY Robotic Hand Using Household Items

Objective: Create a simple robotic hand using everyday materials to teach the principles of mechanics and motion.

Materials Needed:

- Cardboard tube (from a kitchen roll or toilet paper roll)
- Straws (5 plastic straws for fingers)
- String (to control finger movement)
- Tape or glue (for assembly)
- Scissors (to cut materials)



Steps:

- Cut 5 Straws: These will act as fingers.
- Cut small notches to create "joints" where the fingers will bend.
- Thread String: Thread a piece of string through each straw.
- Tie a knot at the tip of the straw and leave enough string hanging out the other end to pull.
- Attach to Cardboard Tube: Use tape or glue to attach the straws (fingers) to the cardboard tube (hand base). Ensure the strings are free to move.
- Create Finger Movement: When the string is pulled, the notched straws will bend, simulating finger movement.
- Test and Improve: Experiment by adjusting the string tension and straw positions to improve the movement.

Lesson: This project demonstrates how tendons and muscles work in the human hand, making it a fun, hands-on way to learn about biomechanics and engineering.

cardboard.lofirobot.com

CARDBOARD ROBOTS

BY LOFI ROBOT

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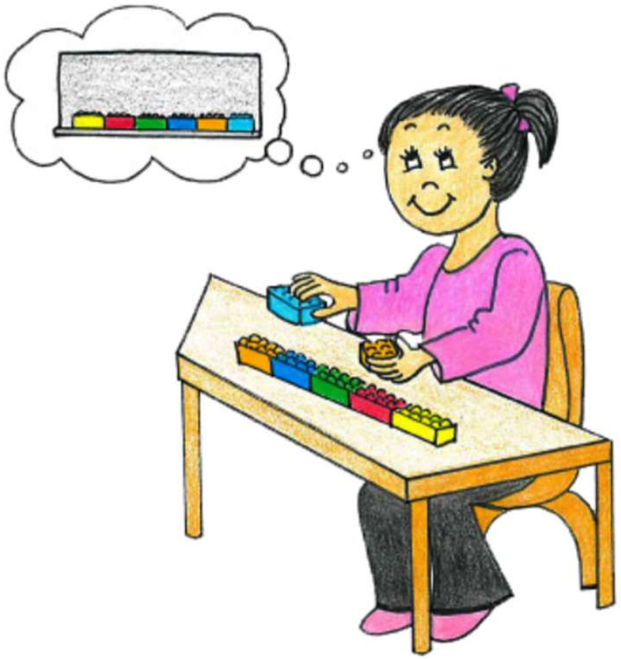
Free Cardboard Robot Designs for Education

Scroll Down

handsontech.co.za/unplugged.html#!/Unplugged-Classroom-Student-Kit/p/501906371



What is *Unplugged Coding with Six Bricks?*

Unplugged Coding with Six Bricks uses the *Six Bricks* concept to excite and motivate students in the classroom to attain the skills, knowledge, and attitudes necessary for success in an everchanging world. To help create confident problem solvers, we combine playful, hands-on learning activities using *Six Bricks* with computational thinking concepts that teach students the foundational knowledge and skills upon which the fields of programming and robotics are built. This will empower students to succeed once they are introduced to technology.

Watch a video on the concept here: https://vimeo.com/754438722

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tinkercad.com/things/flHpOFbJ1CN-arduino-simulator-and

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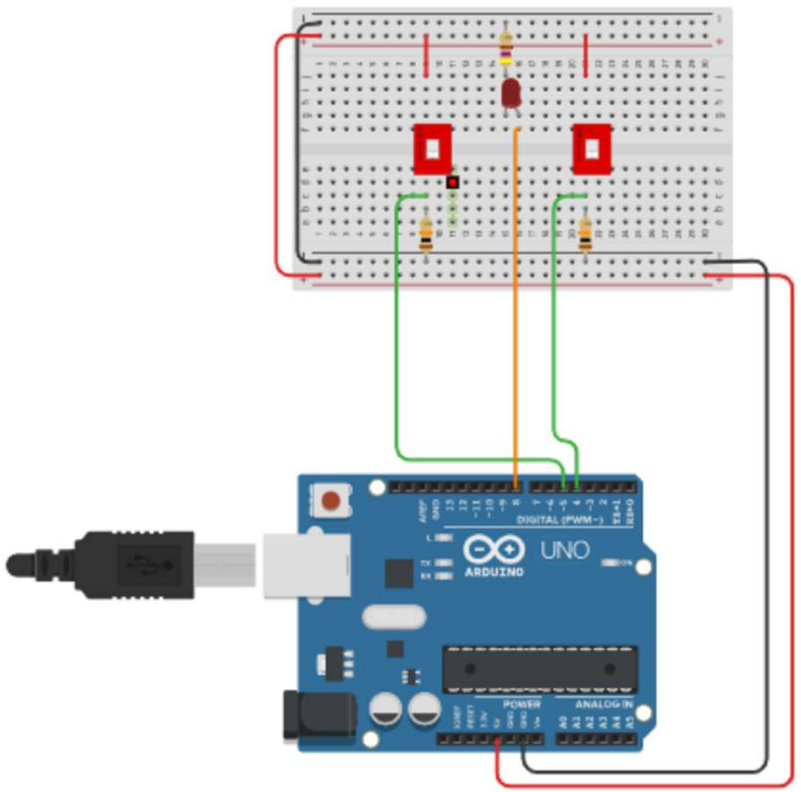
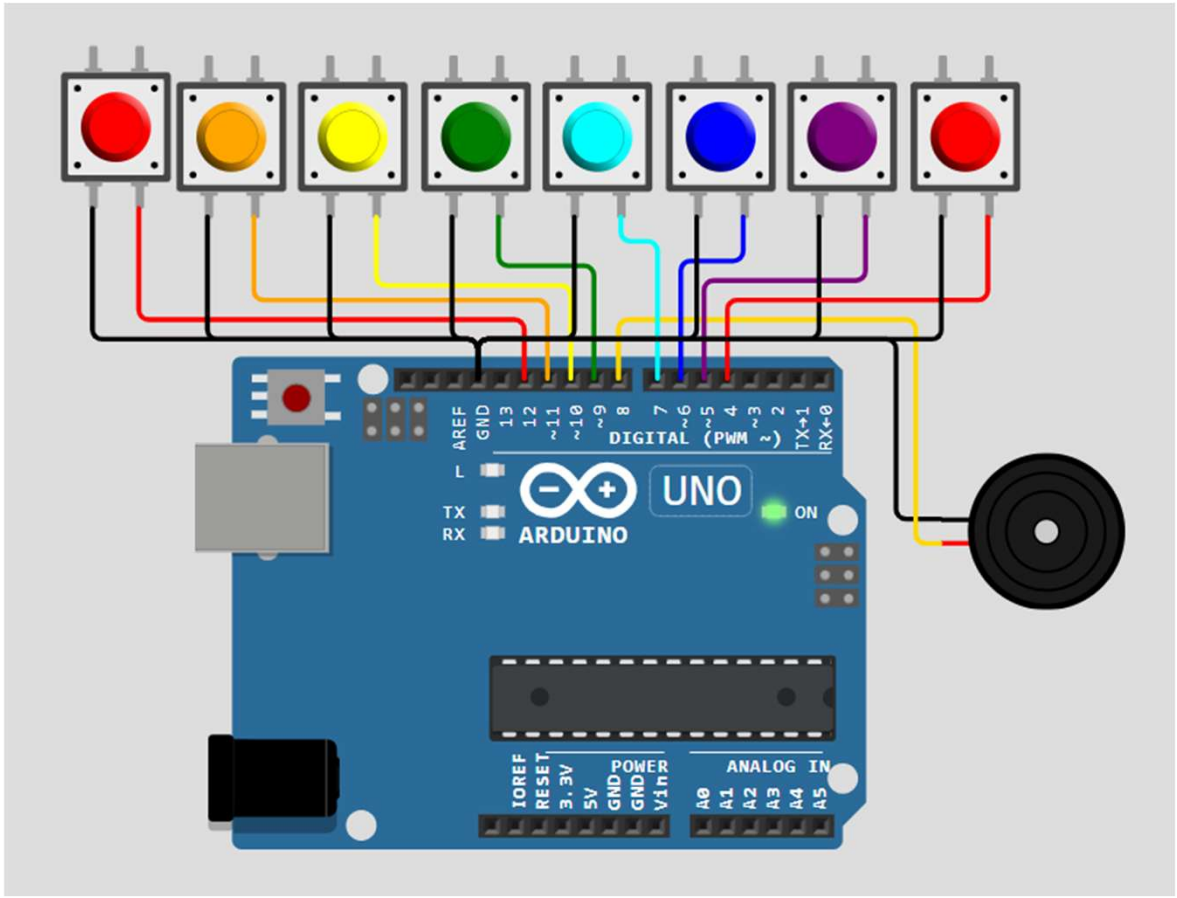
Tinker Gallery Learn Teachers Resources

Arduino simulator AND

Simulate



Robotics in the Classroom (https://wokwi.com/)



Free coding clubs for kids | Cod

codeclub.org/en/

Raspberry Pi Foundation

English | Sign Up | Log In

code club

Join a club | Run a club | Start coding | Partner with us

We are Code Club

Learn to code, shape the future. Join a global community of digital creators.

Find a club | Run a club

2+ million

young people involved in Code Club over 10 years

100+ countries

have active Code Clubs

90%

of young people increase their skills and independence in coding

{code club} Coder:LevelUp Micro:bit Offer

You're suggesting

Coder:LevelUphave received a donation of micro:bit club kits.
These are to be shared with code clubs following these steps.

Steps to Qualify

To qualify for this you need to:

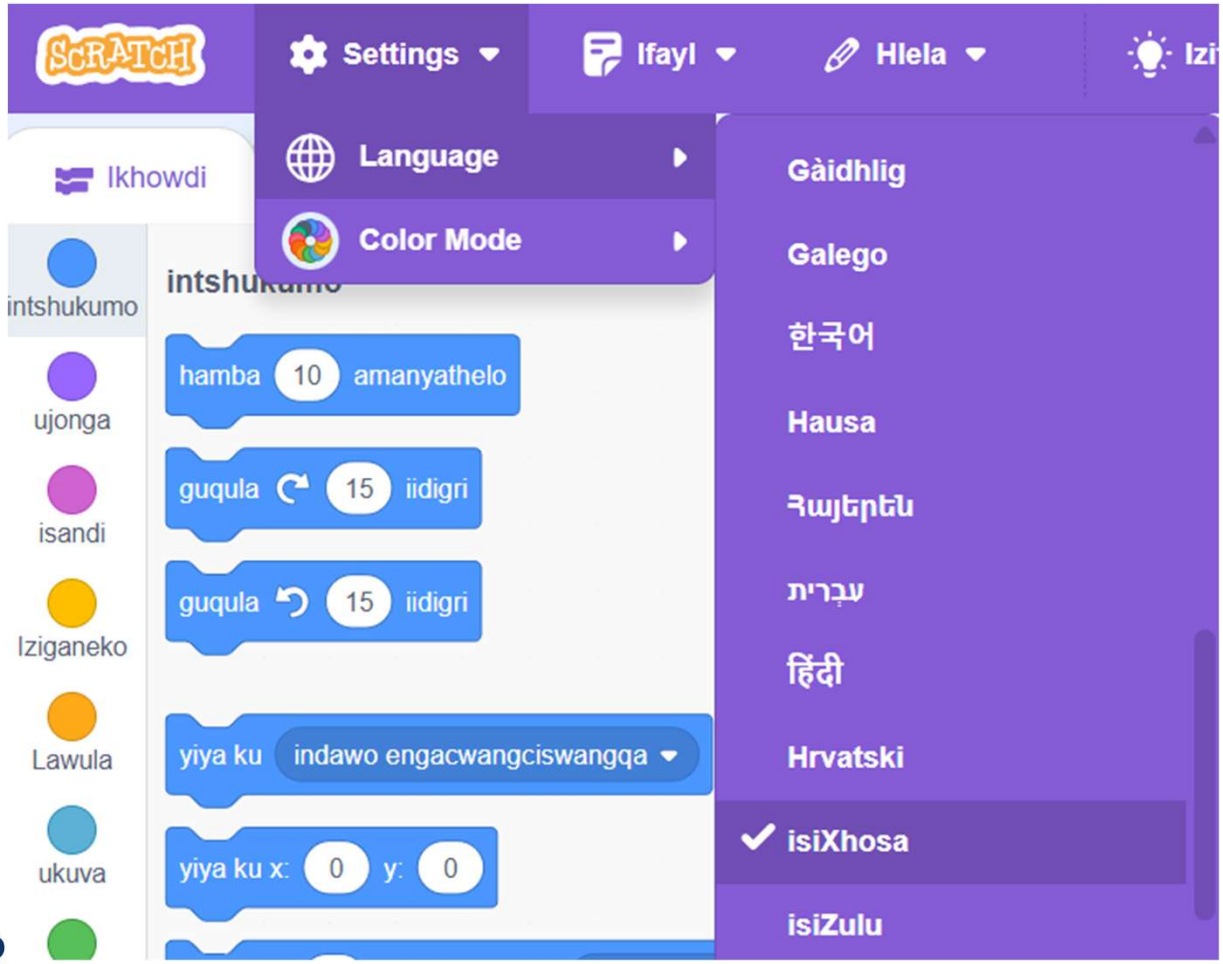
1. Run a code club in South Africa
2. Complete a Sim2Real Microbit Journey
3. Request your devices

Run a code club in South Africa

If you don't already have a registered & verified code club:

1. Do the "prepare to run a code club" course
   This can be done in person (contact your district official or local code club hub) or online at:
   https://online-learning.raspberrypi.org/courses/
2. Register & verify your club
   a. Start club registration at codeclub.org
   b. Complete your safeguarding module (while logged in!)
   c. Get your safeguarding sponsor to approve your club
   d. Wait for verification from Raspberry Pi team
3. Complete your club details (when/where, private/public, volunteers needed?)

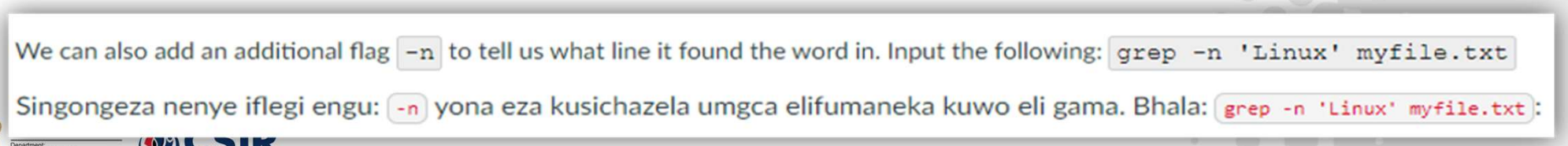
Coding & Robotics in Your Home Language



Training Beyond English

- CHPC provides training material in isiXhosa, isiZulu, Setswana, and Sepedi
- Redefining how words are used is how languages are **kept alive**
- Support AI Tools for African languages with limited resources
- Anglicizing words with “-i” like “iprogrammer” stops languages like isiXhosa from growing

Umbhali nkqubo	**Programmer (**the writer of the procedure)
Umbhali	Writer
nkqubo	Procedure



Practical – Microbit…