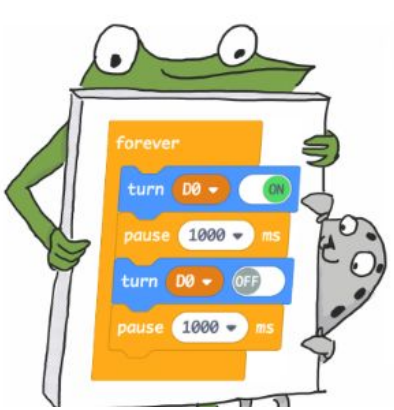
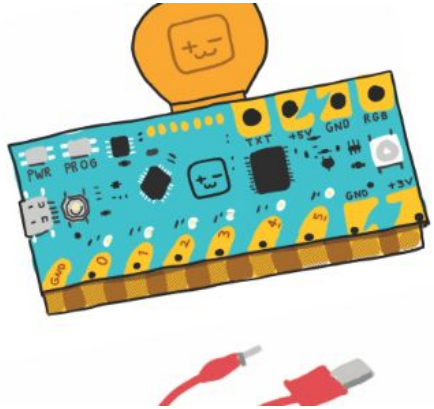
# K-12 Global Experience: Creating Digital Infrastructure for Urban Planning and Design

The Beginning...

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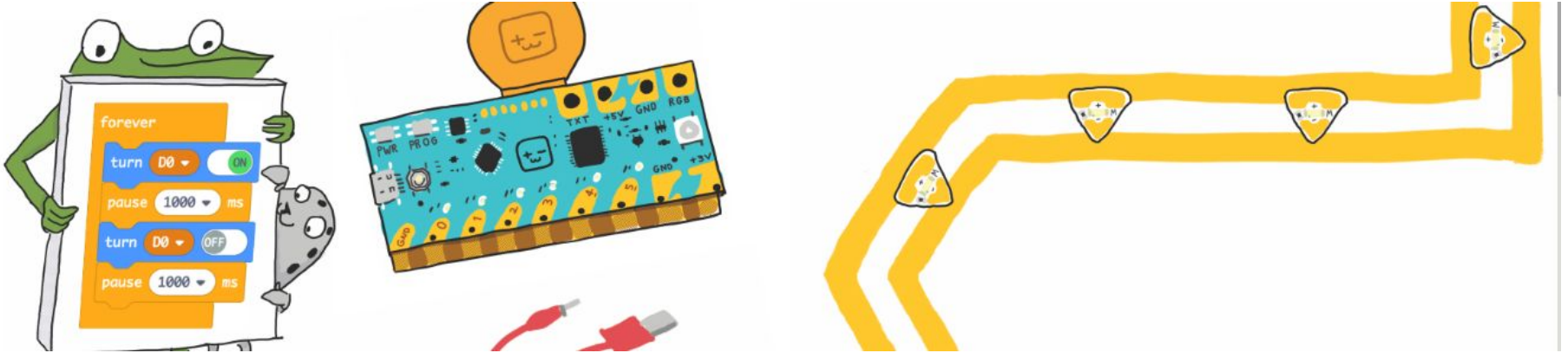



# The idea sprang from [bit.ly/Makersville](bit.ly/Makersville)

Mountsfield Makersville. (n.d.). Retrieved September 30, 2018, from https://sites.google.com/gotvdsb.ca/mountsfieldmakersville/home

A Thames Valley District School's Google site documenting a project in the school's makerspace in **London, Ontario**

# The idea sprang from bit.ly/Makersville

# Here are their curriculum connections:

Grade 8's - City design - zoning, roads, angles, area, percentages - google hangout or visit with city planner

Grade 7 - Given a set volume, build your structure - out of 3 different prisms

Grade 6 - Electricity - lights, advertising, signs, LED lights on switches, motor for monument on a switch, MAK

Grade 5 - Government - create city by-laws

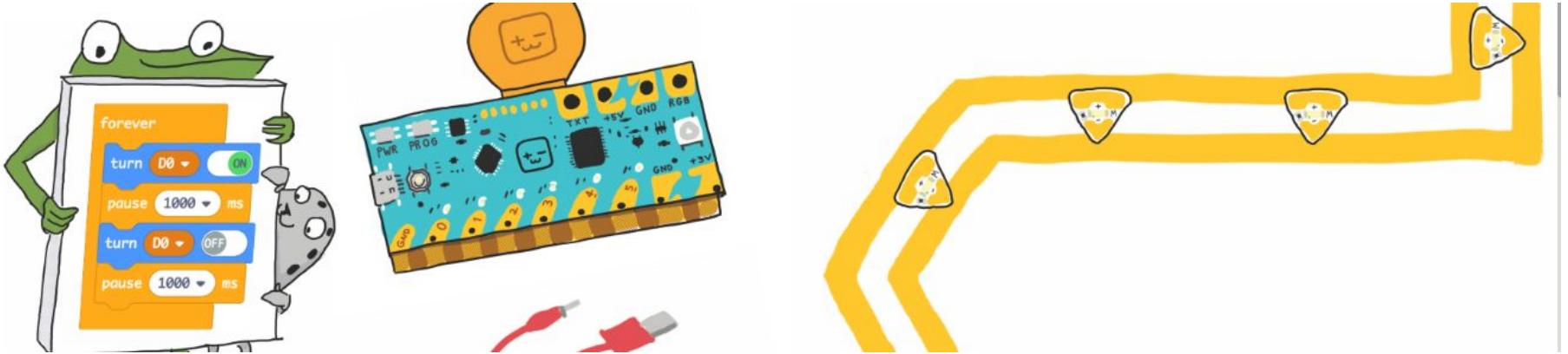
Grade 4 - Media literacy - advertising, design city flag

Grade 3 - Larger scale buildings out of cardboard, nets for smaller homes

Grade 2 - Motion and movement, transportation, literacy - using Write About app to explain favourite part

Grade 1 - Communities, mapping

FDK - Data management - Survey - What do want to see in a park?




Our Essential Question:

How will our city change as digital and analog work hand in hand?

(That's called Physical Computing)

# What the heck is physical computing?

**Physical computing** means creating or using devices that interact with the world around them. A physical computer senses its environment, processes that information, and then performs some action.  This "*sense* – *think* – *act*" cycle can also be used to define a robot.

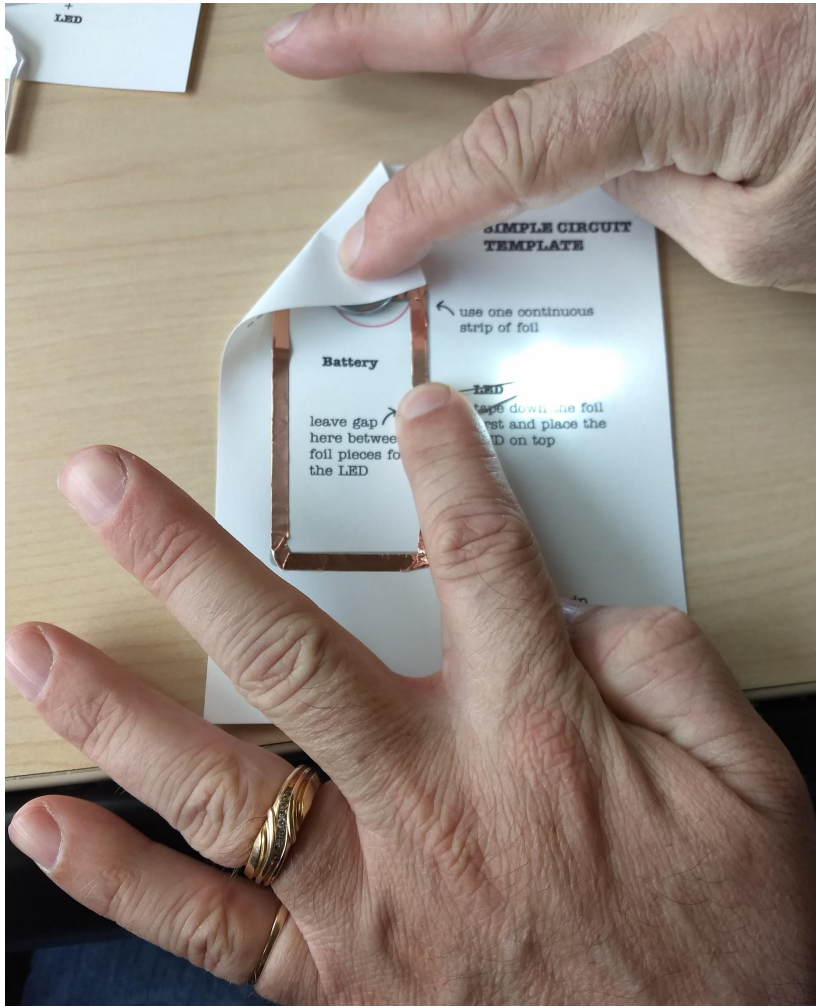
https://marketbrief.edweek.org/the-startup-blog/physical-computing-a-primer/

Physical computing means building interactive physical systems by the use of software and hardware that can sense and respond to the analog world

In a broader sense, **physical computing** is a creative framework for understanding human beings' relationship to the digital world.

https://en.wikipedia.org/wiki/Physical_computing

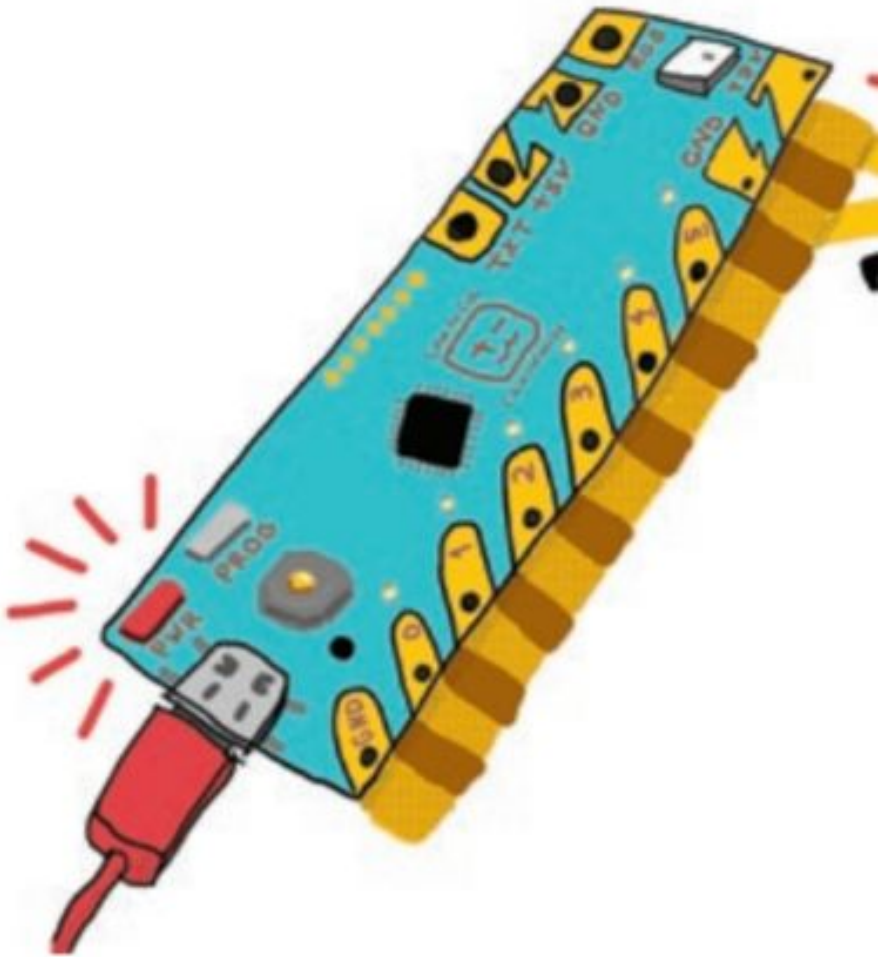
Here is an artist's rendering of Dandelions using physical computing by Dr. Jie Qi, from MIT[https://vimeo.com/40904471](https://vimeo.com/40904471).




Students and teachers started learning 2017-18 school year with:

Paper circuits:

- Simple
- Parallel
- Integrating switches




Students began using
Chibi Chip Fall of 2018

# Chibi Chip

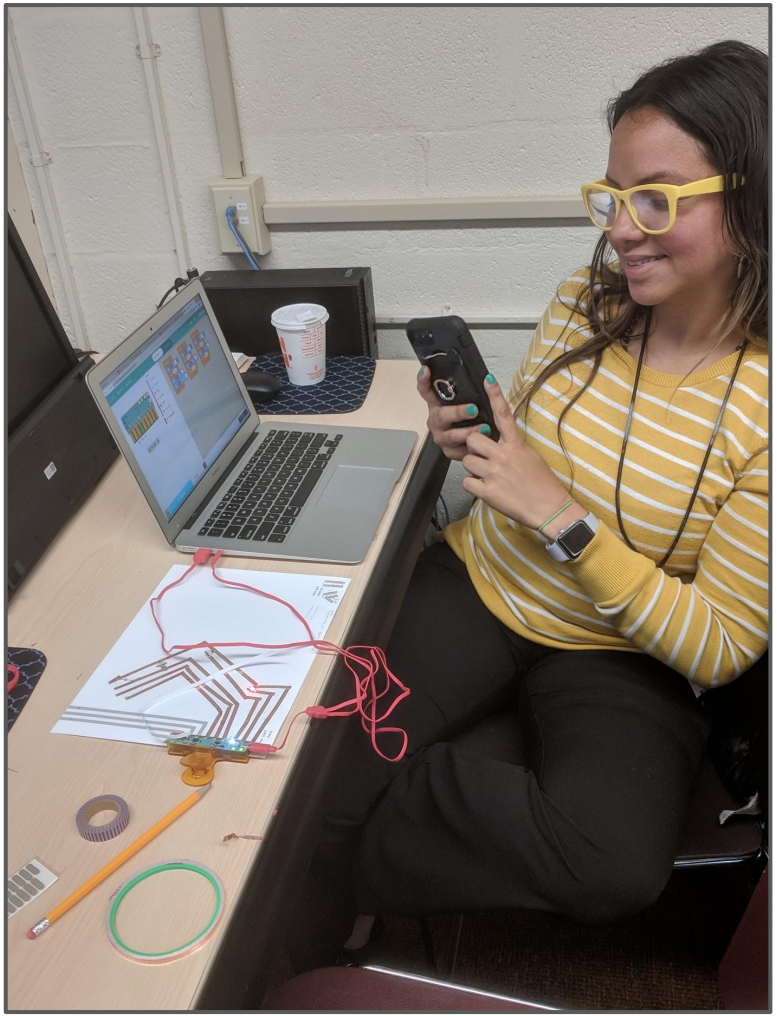
(Chibi pronounced Chee bee)

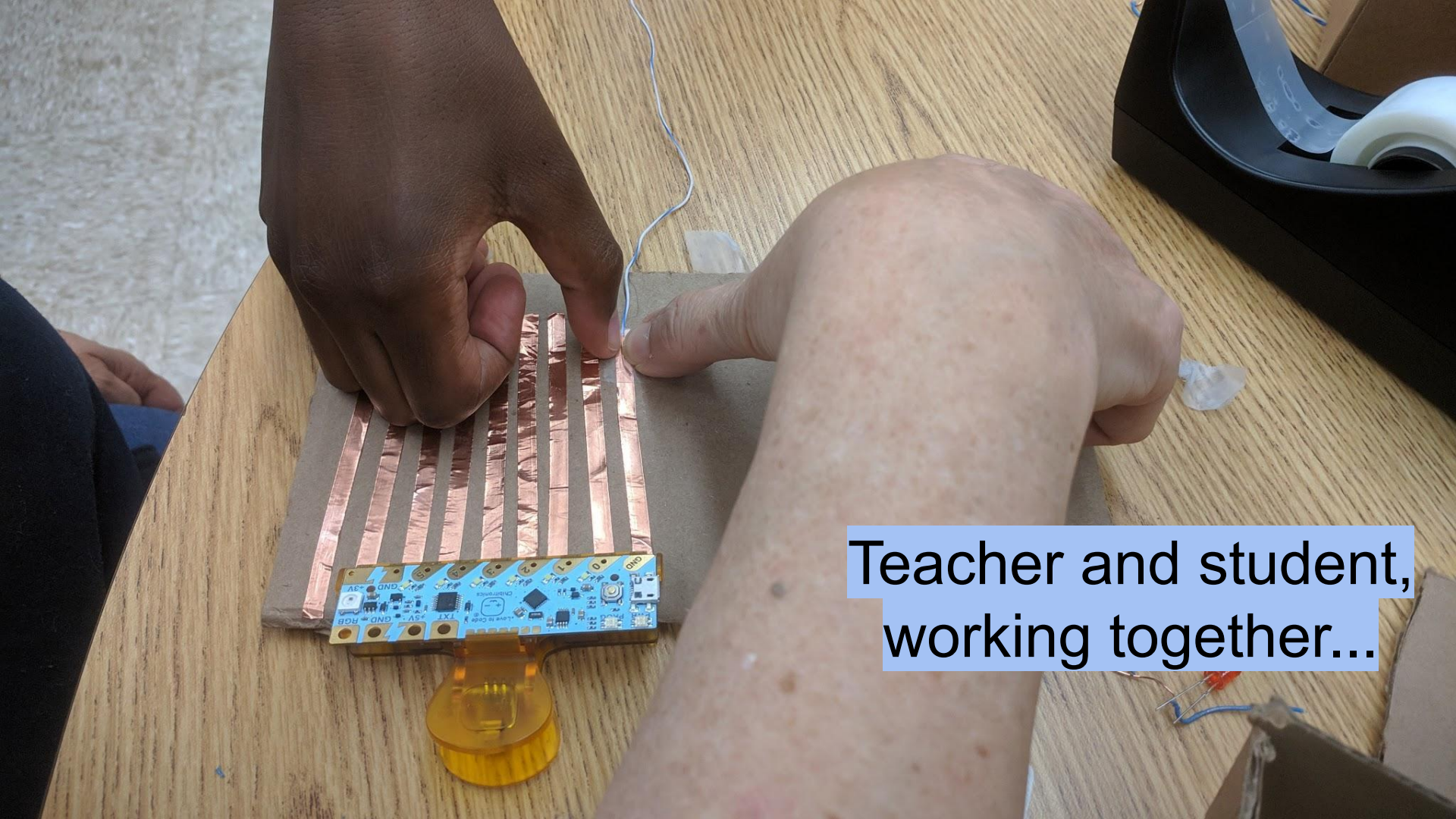
=

Microcontroller
that can be connected to
paper circuitry.
Students learn to code
actions of LEDs and more:
Bits controlling atoms!

PD came first,
but not all the time.
This time, students
and teachers learned
together!!

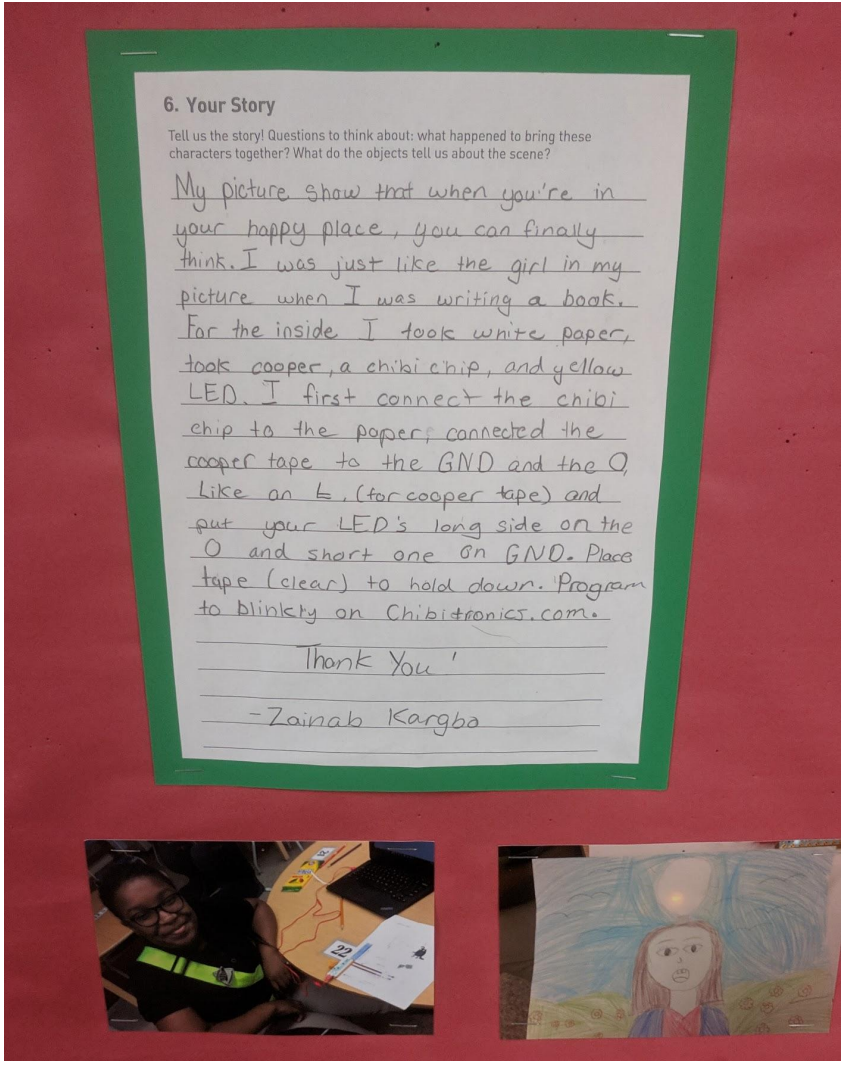
You know; there is never
enough time!




Teacher and student,
working together...

EASY CHAPTER
← BOOKS →
(Yellow Dots)
How Am I Doing Today?
Best Behavior
Warning

TABLE 4

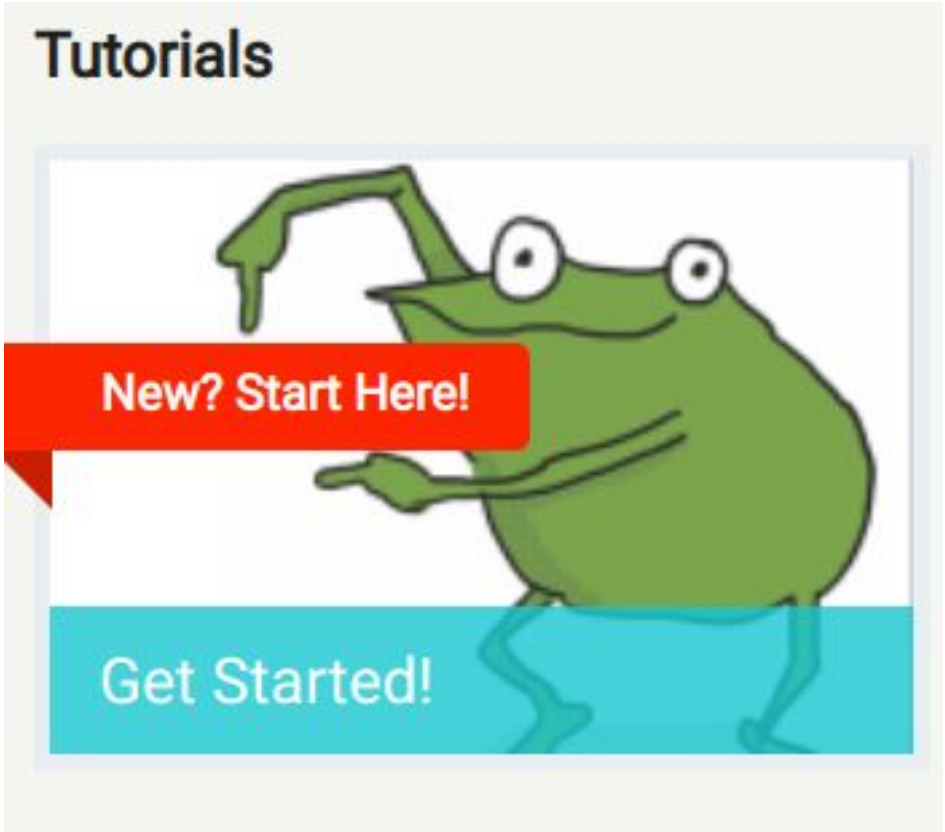



Some students used the [Chibitronics' Hour of Code project] to get their feet wet going from analog storytelling to physical computing.

Found under

https://hourofcode.com/us/learn/robotics

# They all started with [makecode.chibitronics.com](makecode.chibitronics.com)



Get Started!

Complete the Circuit!

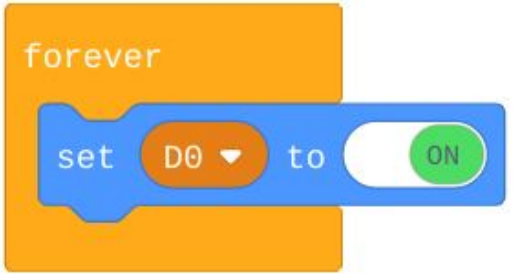
## Get Started!

Start coding your Chibi Chip with this simple tutorial.

Start Tutorial

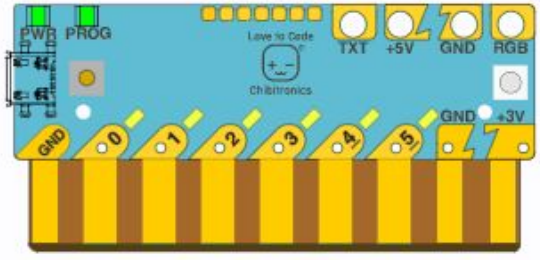
# Get Started!

Welcome to the Chibi Chip! Let's start with your first coding challenge on the board. Grab a **forever** loop found in **CONTROL** and place a **set D0 ON** block from **LIGHTS** inside of it.




Try to upload your code now. Did you see what happened? You made your LED to turn on with code! Well, we don't want it shining forever, so, let's add more code to make your first project a little more interesting.

Ok




Hint

Welcome to the Chibi Chip! Let's start with your first coding challenge

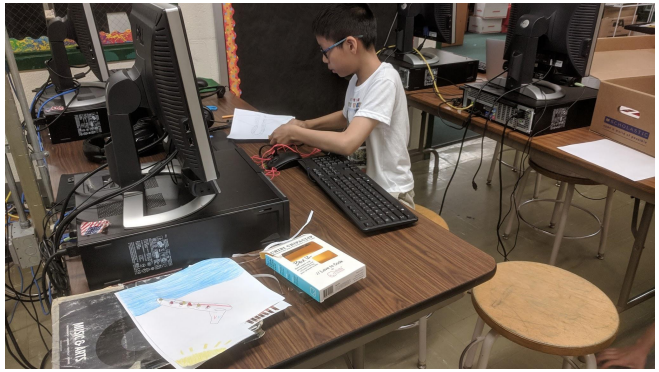
**forever** loop found in **CONTROL** and place a **set D0 ON** block from **LIG**

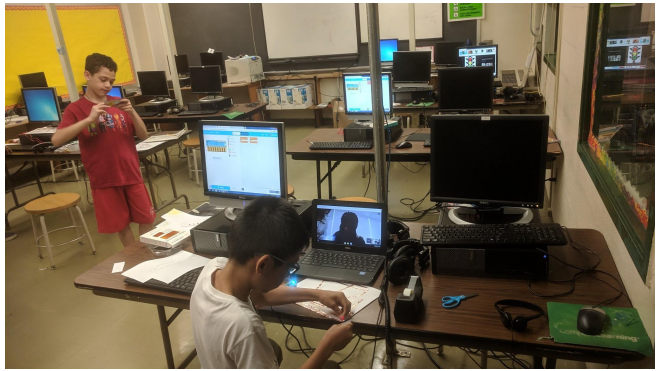
Lights

Control

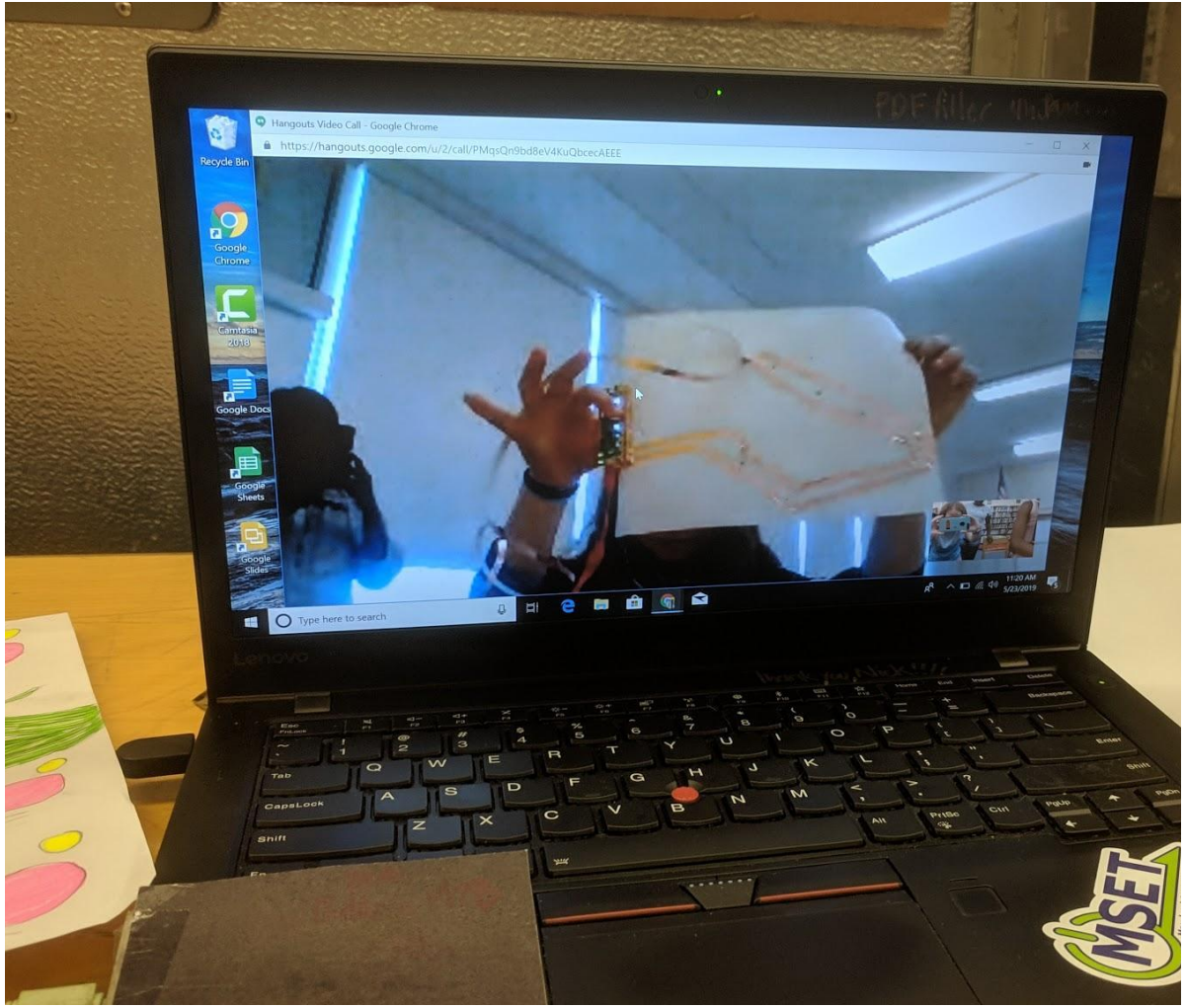
Advanced

Upload





4th graders in Maryland collaborating with 8th grade students in Chicago, Illinois



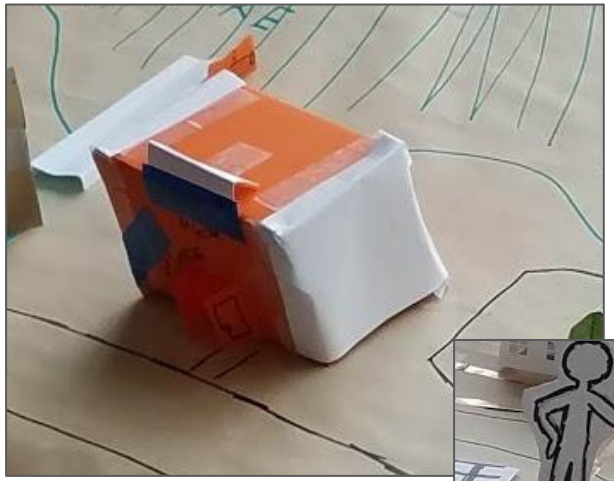

Google hangouts allows the 8th grade students in Chicago to collaborate with 4th grade students in Maryland.

After the first 3 8th graders, who were brave enough to work with younger kids and in front of a camera, began creating with the Chibi Chip, all the 8th grade students wanted to do the same, so the 4th graders got a wonderful opportunity to hone their communication and collaboration skills!

# WHAT IS THE WORST PROBLEM YOU'VE COME ACROSS AS AN ELECTRICAL ENGINEER?

- The worst problem I encountered was in year 2014 when our area of responsibility was hit by a typhoon. Some of our major facilities were ruined and almost all our substation went down. I think that's the biggest power outage I've been with up to now. We have lots of major troubles like pole downs on different places, broken transformers, wire downs, etc. during that time, we don't know where to start. We have limited crews, our areas are flooded which hinder the restoration of power. We worked there for almost 16-20 hours a day during a span of 1-week just to restore our facilities and provide power to our customers.

Arthur John V. Leonardo, Electrical Engineer, Maintenance Department, Meralco (Manila Electric Company), Philippines attempted a Google Hangout with he kids, but :-(... so here is one of the student  questions and Mr. Leonardo's answers! Wow! Typhoon!

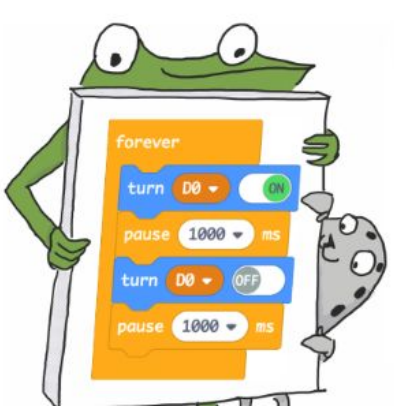


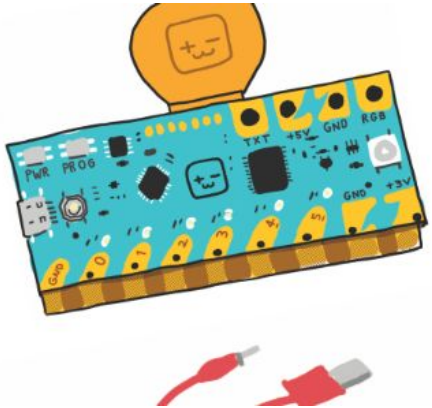
Designed by hand

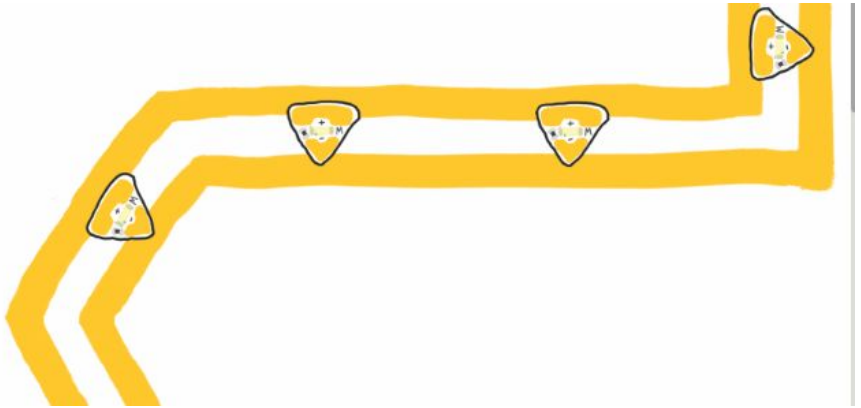
Then learned to use Origami and Kirigami

Beginning to make models of buildings:

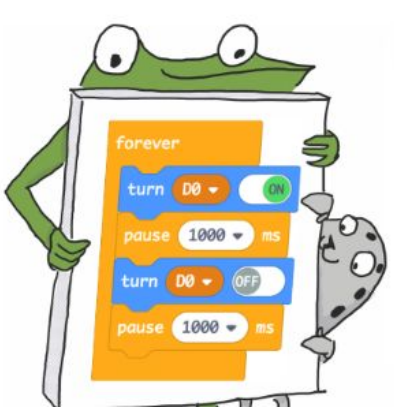
as well as a [Silhouette Cameo]

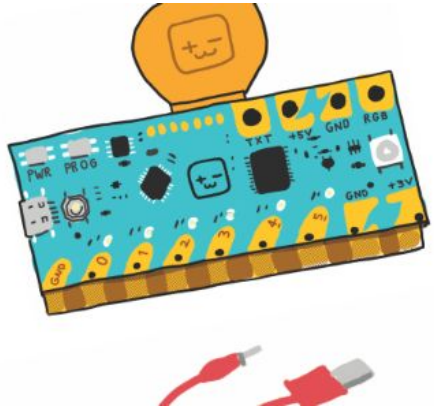


- More examples: Barbara's 5 stories  5th grader's STEAM project
- Ideas
- Where can I learn more?

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