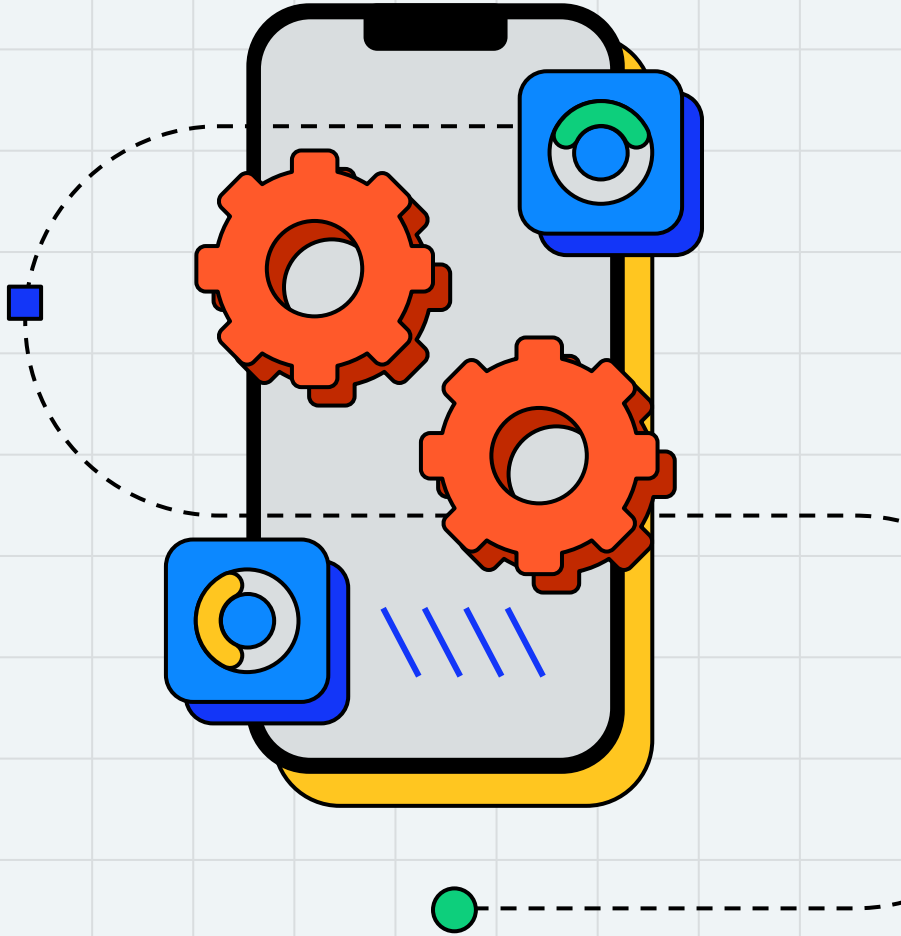
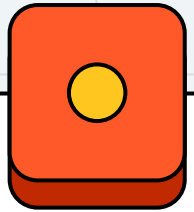
Final Version

- Curriculum Plan
- Prototypes
- Tangible Pieces

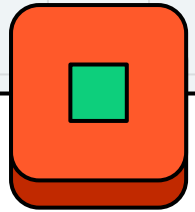


THREE STAGES OF LEARNING



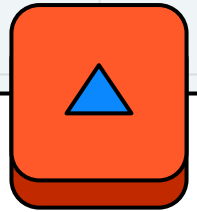
STAGE 01 - 1 lesson

Introduction



STAGE 02 - 7 lessons

Example design for safety projects with basic block-based coding



STAGE 03 - 2 lessons

Final Project Showcase

FOUR SAFETY PROJECTS

01 NAME TAG - 1 lesson

Team name tags created to introduce themselves

02 NIGHT SAFETY - 2 lessons

Simple add-ons to help safely ride in the night

03 CLASSROOM SAFETY
2 lessons

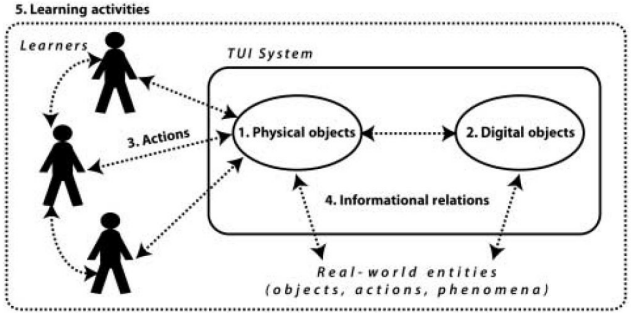
Alarm for warning the tilt of something important

04 COOKING SAFETY
2 lessons

Upgrade the oven mitts to accurately sense the heat

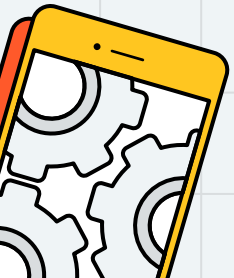
	NAME TAG	Night Safety NIGHT SENSOR	Classroom Safety TILT ALARM	Cooking Safety HEAT GLOVES
MICRO:BIT COMPONENTS	LED Display	LED Display	LED Display	Temperature Sensor
	Button	Light Sensor	Accelerator	
OTHER COMPONENTS			Speaker	Servo Motor
CODING KNOWLEDGE	Conditional Statement	Loop	Loop	Loop
		If Condition	Conditional Statement	If-Else Condition
			Pin Control	Pin Control

Tangible Learning Design Guidelines



Alissa N. Antle, Alyssa F. Wise, Getting Down to Details: Using Theories of Cognition and Learning to Inform Tangible User Interface Design, Interacting with Computers, Volume 25, Issue 1, January 2013, Pages 1–20, https://doi.org/10.1093/iwc/iws007

Night Safety



Learning Objectives

1.Students will be able to identify potentially dangerous situations at night

2.Students will be able to incorporate LED display into safety design

3.Students will be able to describe what a conditional statement is and how to implement it in makecode

Example Class Structure Overview

NIGHT SAFETY

Identify problem

What are the main issues around road safety for students?

What risks are increased at night?

What groups of students might be especially at risk?

Solution

Introduce what can be provided by micro:bit - **Light sensors** and **LED Display**

How could a night sensor help students?

Why might it be especially useful for students with hearing or visual impairments?

Think of ideas in groups – be creative!

Guideline

“Using concrete representations can support interpretation of symbolic representations of abstract concepts” (Antle&Wise, 12)

Algorithm & Micro:bit

Think of the algorithm to create a Night sensor with the help of **Tangible Coding learning kit**

Using the MakeCode editor and your algorithm, write your Night sensor program.

Once finished, download and copy to your micro:bit to test and run.

Guidelines

1. Creating configurations in which participants can monitor each other's activity and gaze can support the development of shared understandings
2. Distributing parts of mental operations to actions on physical and/or digital objects can simplify and support mental skills

(Antle & Wise,7)

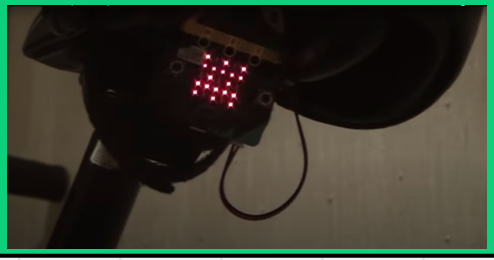
Activities

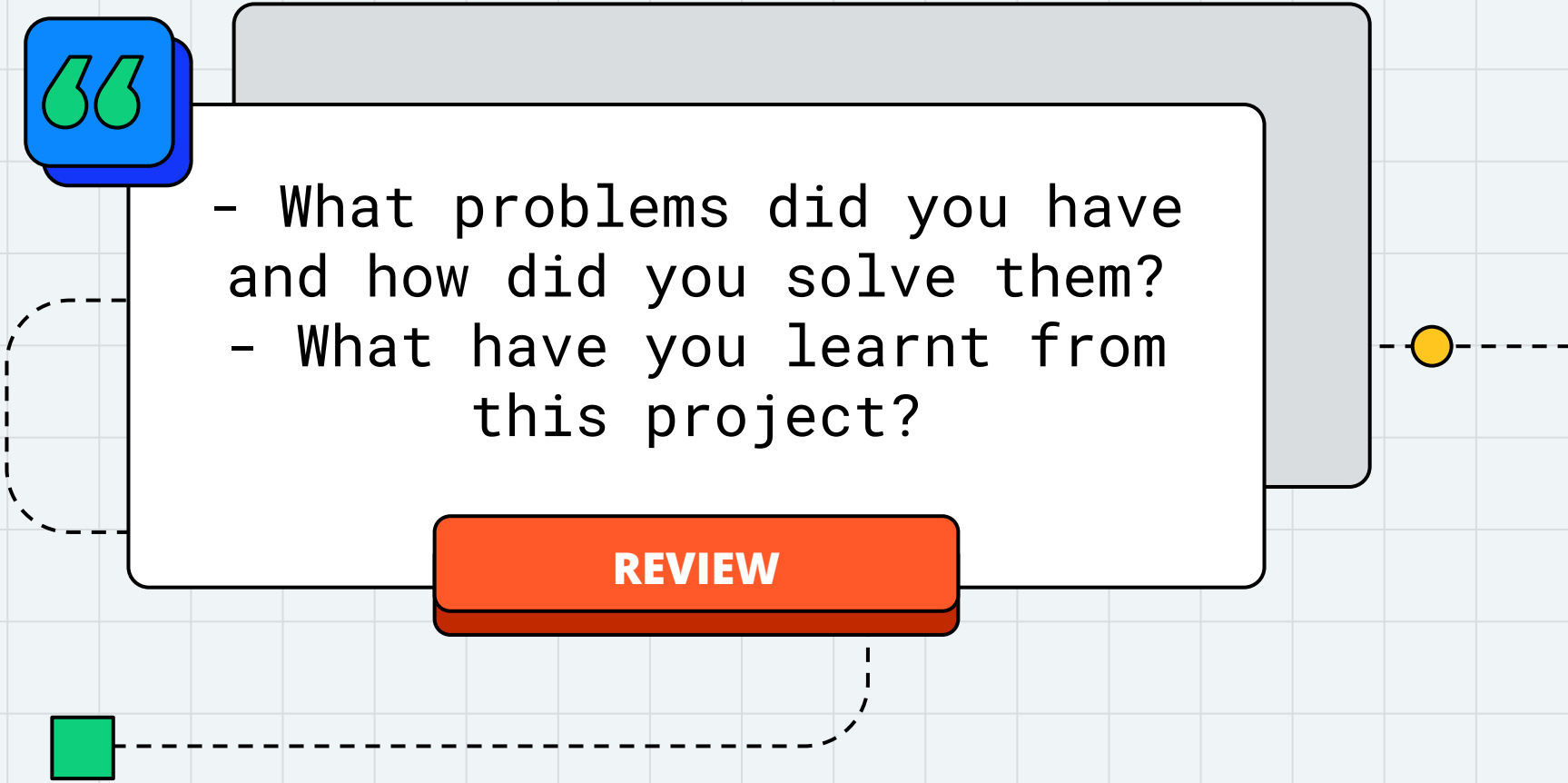
1. Explain the code to each other
2. Write individual's understanding of the block on the back of tangible pieces

ADD SOME CREATIVITY!

Think about where you can add the night sensor.

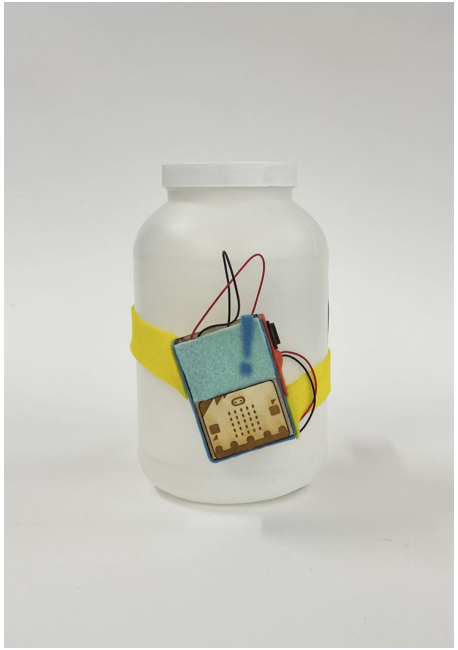
What kind of design will fit the scenario?




- What problems did you have and how did you solve them?
- What have you learnt from this project?
REVIEW

PROTOTYPES

TILT ALARM



HEAT SENSING GLOVES

$22+@

Microbit($22):
Micro:bit($15), Servo($2), Alligator Clips(3pcs)($3), AAA battery(2pcs)($2),

Craft:
Thick craft foam sheets, craft felt sheet, double sided tape, scissors, A pair of gloves

HEAT SENSING GLOVES

With computer in class

-Making guideline

-Makecode.microbit.org

-Material preparation

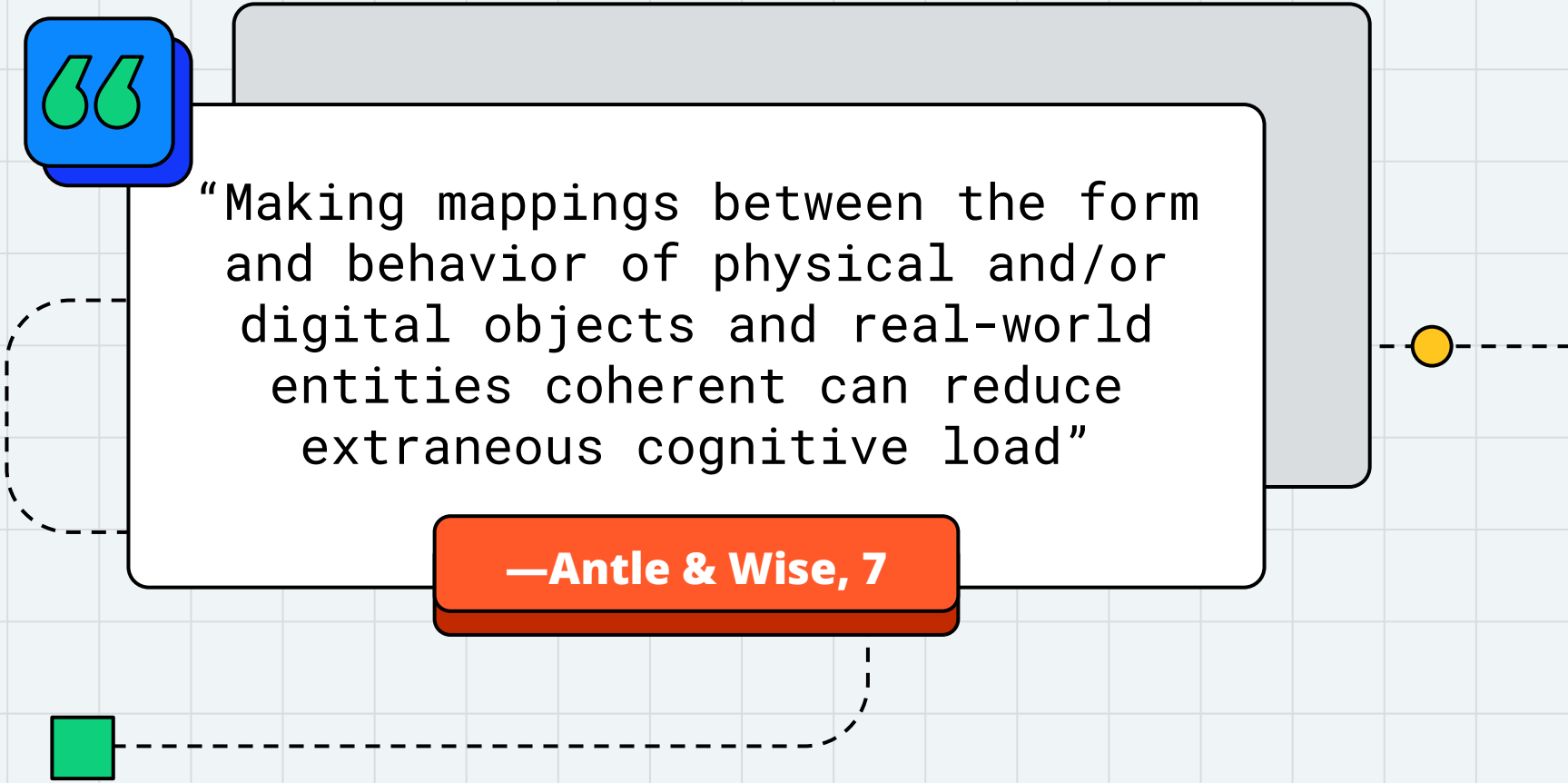
Without computer in class

-Making guideline

-Upload code on googleDrive

-Material preparation

TANGIBLE PIECES


“Making mappings between the form and behavior of physical and/or digital objects and real-world entities coherent can reduce extraneous cognitive load”
—Antle & Wise, 7

Tangible Learning in STEM Topics

Tangible Technologies for Education

Tangible Interaction refers to the concept of *interacting with the digital world using physical objects*, gestures and behaviours in familiar or intuitive ways. People can access and manipulate digital data instinctively using recognisable objects and motions.

Tangible Interaction has come to be regarded as an effective way to engage people and provide them with a novel yet instinctive method of engaging with the digital world

\+ Side Benefits
/ no embedded electronics or power supplies
/ create durable and inexpensive parts for practical classroom use

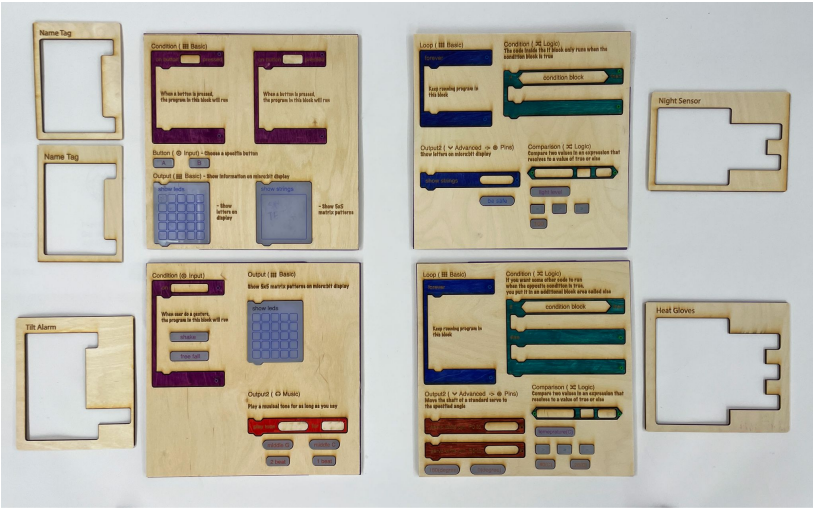
Exploratory Activities

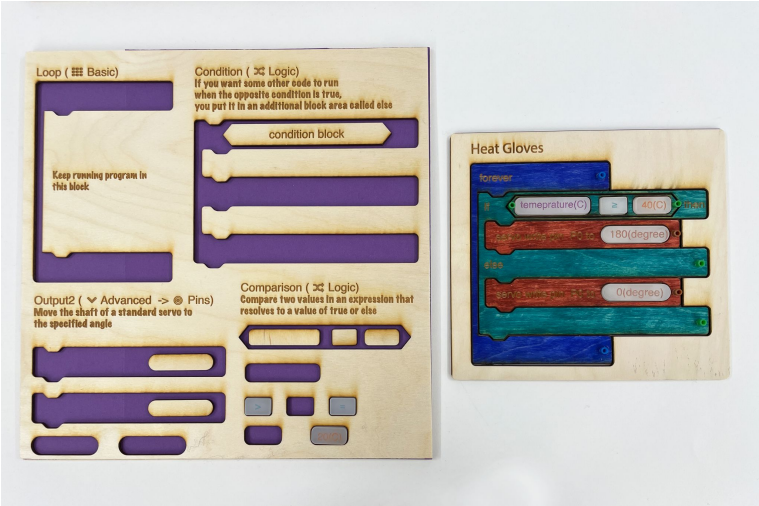
Students can play and experiment with tangibles in a way that chalk-and-talk

Multi-sensory Interfaces

Multisensory stimuli and multimodal feedback

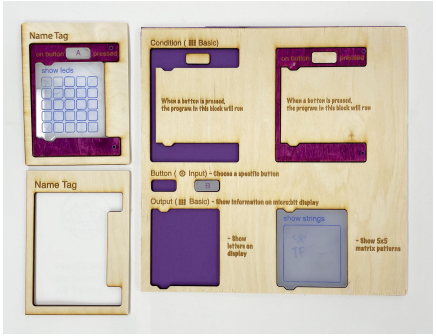
Tangible Coding



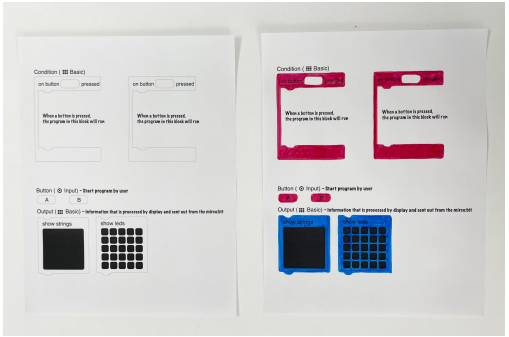


2 Versions of Tangible Coding

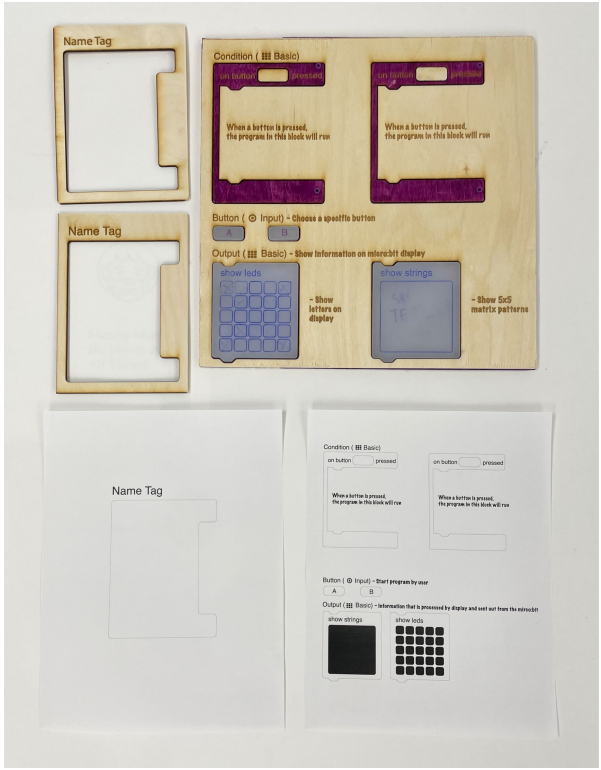
Laser Cutting

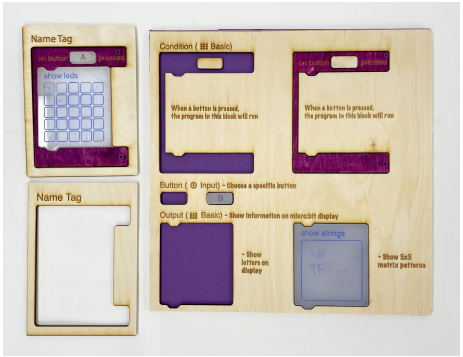


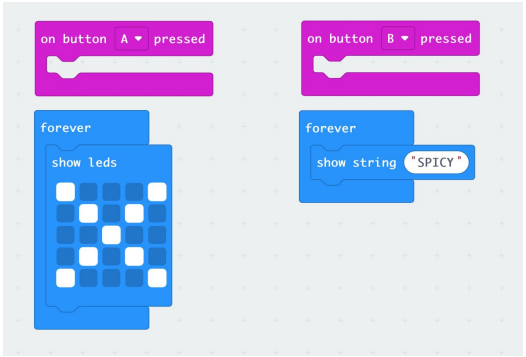
Paper

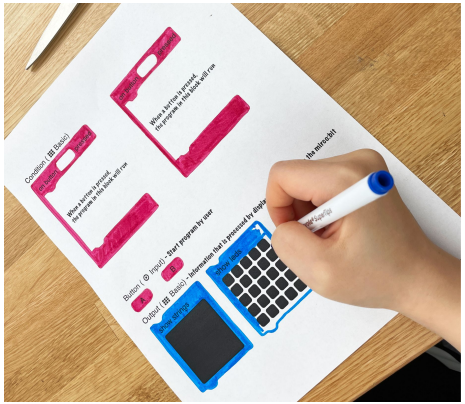


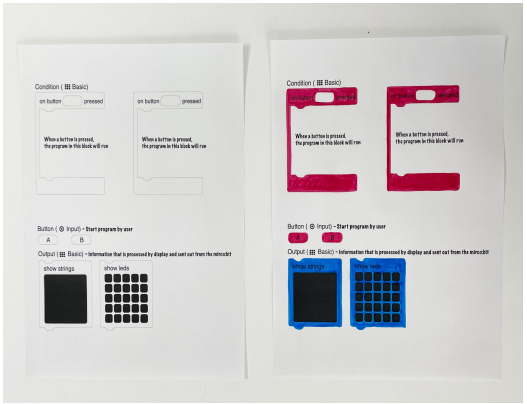
Tangible Coding - Name Tag











THANK YOU

Tangible Electronics for Teaching & Learning