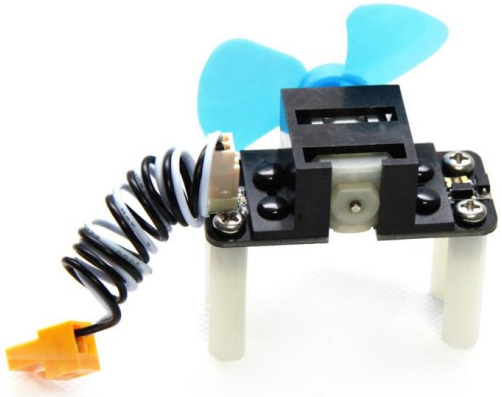
Human Inputting Devices for DC Motor Control

Class 1: Mechanical Input Devices



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Presented by:

DesignNews CEC CONTINUING EDUCATION CENTER

Digi-Key ELECTRONICS ROHDE&SCHWARZ

Human Inputting Devices for DC Motor Control

Agenda

- What Are Human Inputting Devices?
- Me – Orion Controller: An Introduction
- mBlock (VPL)Visual Programming Language
- Hands-On Project: A Cooling Fan

What are Human Inputting Devices?

- Human Inputting Devices refers to the generic set of devices which humans can use for Input/Output (I/O) tasks.
- Primary focus on input-based devices.
- Any device which is primarily aimed at taking user inputs and passing it to a machine.

Source:

www.flings.co.uk/docs/reference/Human-Input-Devices

What are Human Inputting Devices?

Examples:

Manual Input Devices

- A manual input device requires a human hand to control it…

Joystick

Tracker ball

Graphics tablet

What are Human Inputting Devices?...

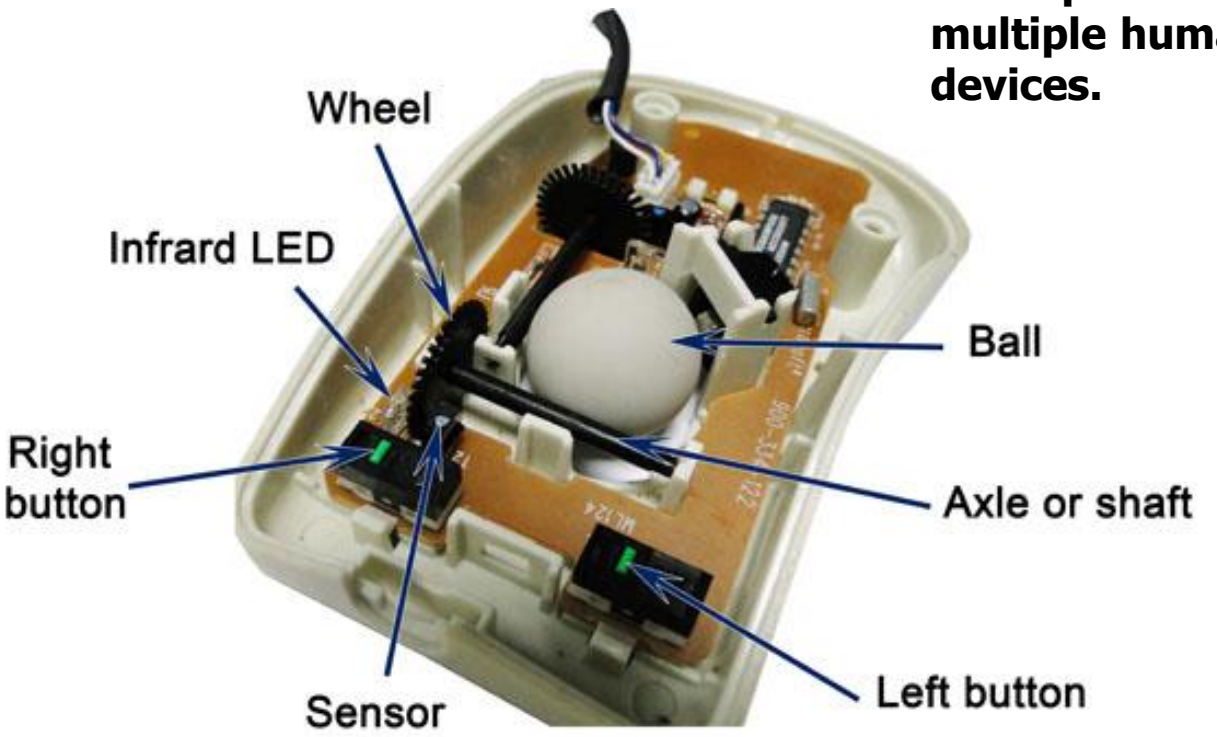
Examples:

Common Human Inputting Devices

What are Human Inputting Devices?...

Examples:

A computer mouse: built with multiple human inputting devices.



Question 1

What's the function of the ball inside of a mouse?

a) Allow the mouse to slide smoothly on any surface

b) Provide x-y signals for the optical encoders

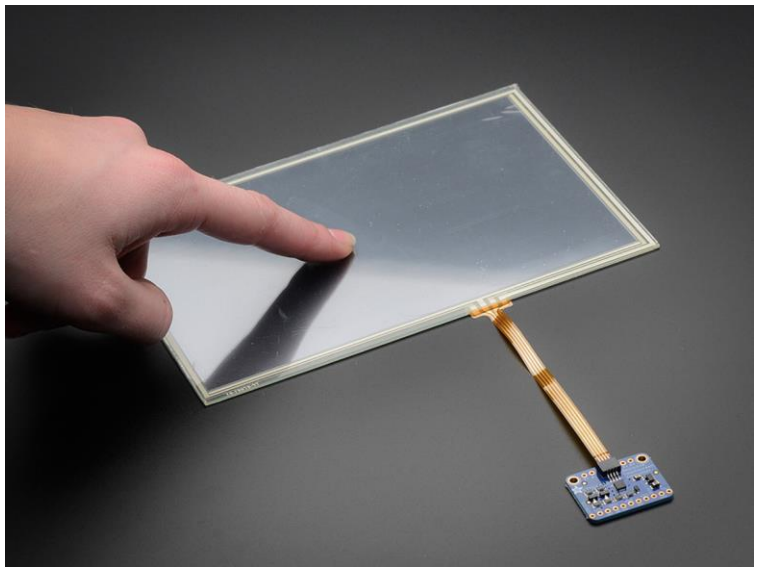
c) To clean the inside of the mouse

d) None of the above

What are Human Inputting Devices?...

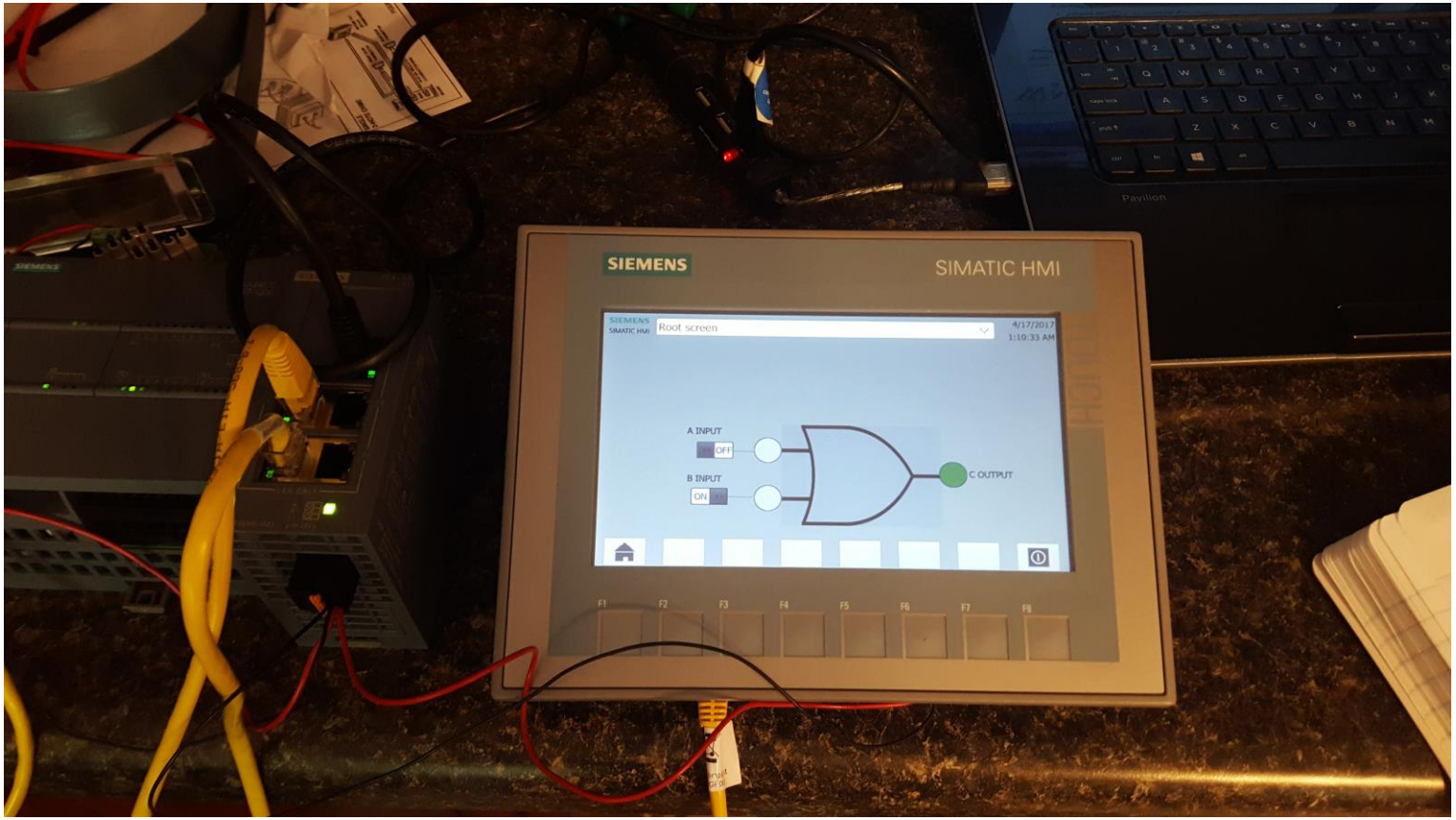
Examples:

HMI(Human Machine Interface) Device uses Resistive or Capacitive Sensing Technologies.



What are Human Inputting Devices?...

Example Project: **HMI based Logic Gate Controller.**



Me-Orion Controller- An Introduction

- An easy to use controller board based on the Arduino Uno.
- Primarily used in education and training environments.
- Provides eight RJ25 ports for connecting with a variety of Me modules and devices.
- Supports programming environments(Arduino IDE, Scratch, and ArduBlock.

Question 2

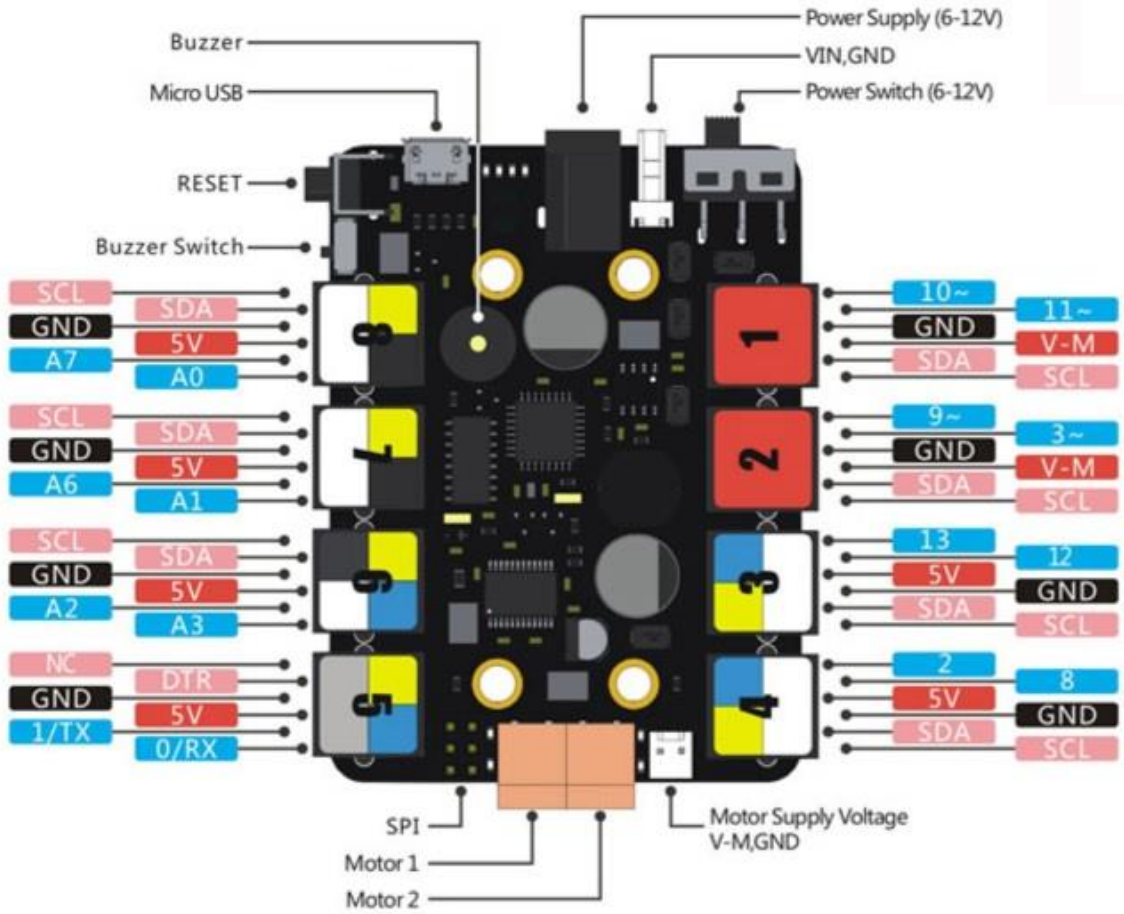
What two technologies are used in touch screens?

Me-Orion Controller- An Introduction…

- A 100% Arduino Compatible prototyping board.
- Arduino Library is provided with Me Orion.
- Modular build design: compatible with LEGO building blocks.
- A variety of machines and electronic devices can easily be prototype with the Me Orion.

Me-Orion Controller- An Introduction…

I/O ports of Me-Orion Controller board



Source:

http://learn.makeblock.com/makeblock-orion/

Me-Orion Controller- An Introduction…

Port No.	Color	Type of compatible modules	Modules using this port
1 & 2	2 1	(6-12VDC) driver module	• Me Dual Motor Driver • Me Stepper Motor Driver • Encoder Motor Driver
3 & 4	4 3	Single-digital port Double-digital port I²C port	• Me Ultrasonic Sensor • Me RGB LED • Me Limit Switch • Me 7-Segment Display • Me PIR Motion Sensor • Me Shutter • Me Line Follower • Me IR Receiver • Me 3-Axis Accelerometer and Gyro Sensor

Me Modules and Port Assignments

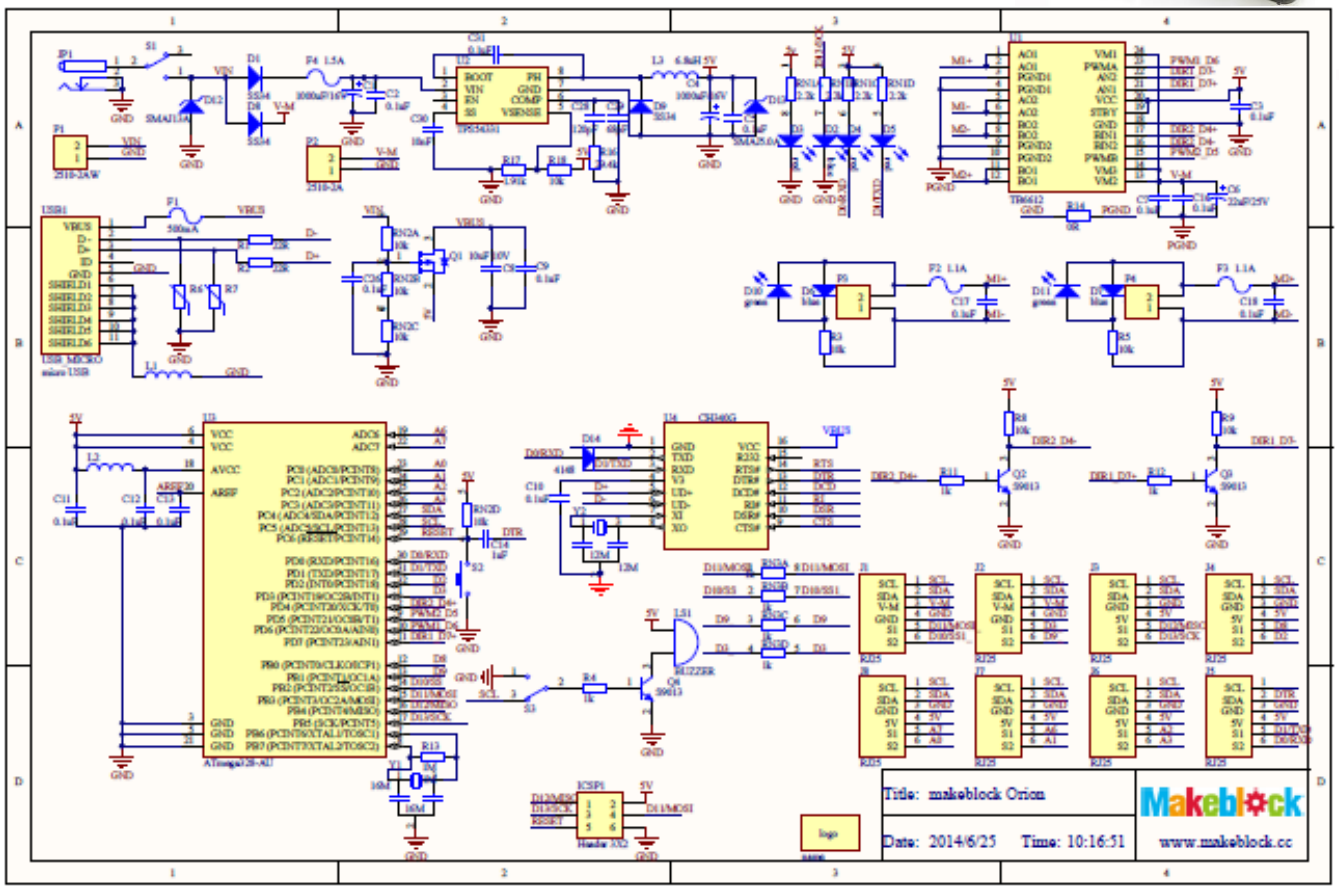
Me-Orion Controller- An Introduction…

5		Single-digital port Double-digital port Serial port of hardware	• Me Ultrasonic Sensor • Me RGB LED • Me Limit switch • Me 7-Segment Display • Me PIR Motion Sensor • Me Shutter Cable • Me Line Follower • Me IR Receiver • Me Bluetooth Module (Dual Mode) • Me TFT LCD Screen
6		Single-digital port Double-digital port I²C port Analog signal port	• Me Ultrasonic Sensor • Me RGB LED • Me Limit Switch • Me 7-Segment Display • Me PIR Motion Sensor • Me Shutter • Me Line Follower • Me IR Receiver • Me 3-Axis Accelerometer and Gyro Sensor • Me Potentiometer • Me Joystick • Me 4-Button • Me Sound Sensor
7&8		Single-digital port I²C port Analog signal port	• Me Ultrasonic Sensor • Me RGB LED • Me Limit Switch • Me Potentiometer • Me Joystick • Me 4-Button • Me Sound Sensor • Me 3-Axis Accelerometer and Gyro Sensor

Me Modules and Port Assignments…

Me-Orion Controller- An Introduction…

Circuit Schematic Diagram for the Me-Orion Controller board



Source:

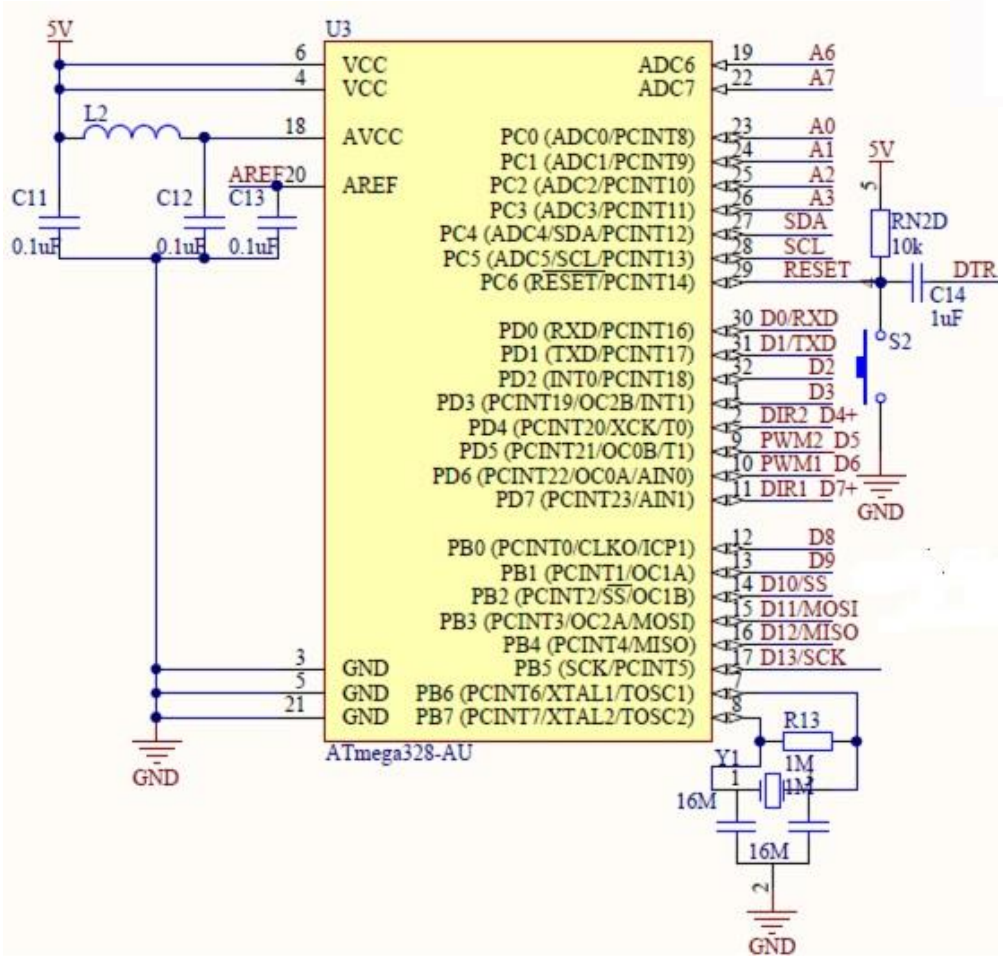
http://learn.makeblock.com/makeblock-orion/

Question 3

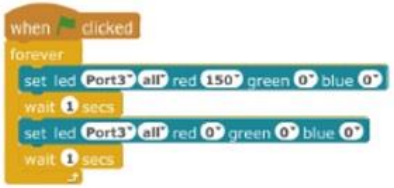
Name three Me modules that can be attached to port 3 of the Me-Orion Controller?

Me-Orion Controller- An Introduction…

ATmega328 microcontroller at the heart of the Me-Orion Controller board

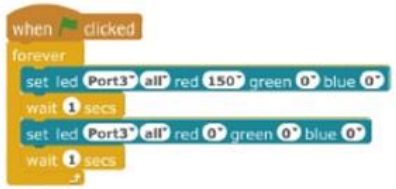


mBlock Visual Programming Language



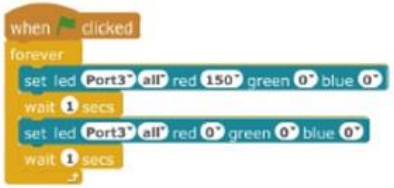
- A visual programming language that uses color scripted blocks with instructions.
- Originated from MIT's Scratch.
- Allows rapid prototyping of features and functions for electronic devices, automation and robotics projects.
- Can develop complex applications without writing code.

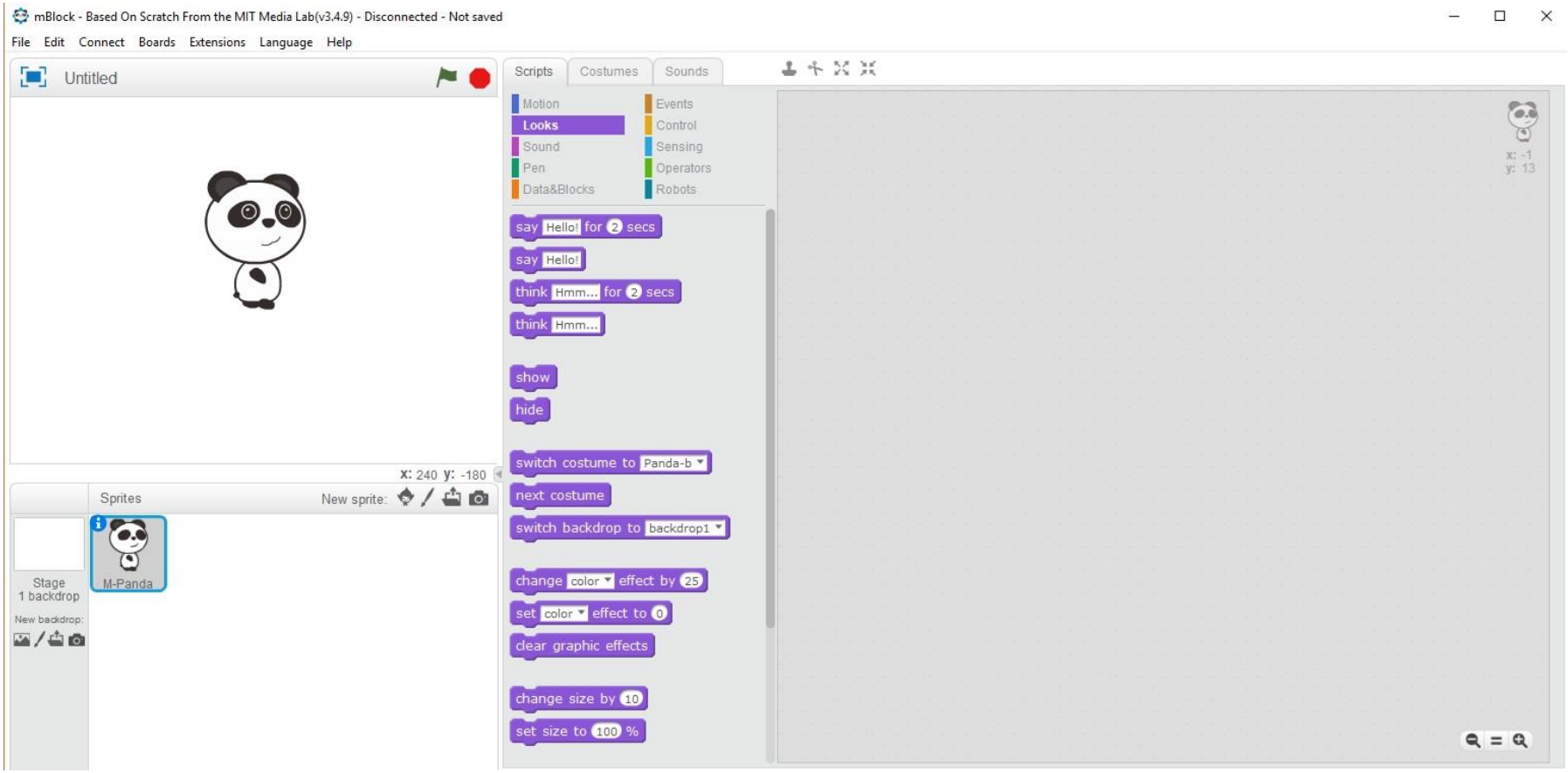
mBlock (VPL)Visual Programming Language…



- Allow Gamification for students learning computer coding in a classroom and training environment.
- Can easily build and test wireless (BLE) HMI device concepts rapidly using an ordinary smartphone or tablet.
- Can easily program UX (User Experience) features rapidly for target electronics device.

mBlock (VPL)Visual Programming Language…





mBlock VPL programming environment

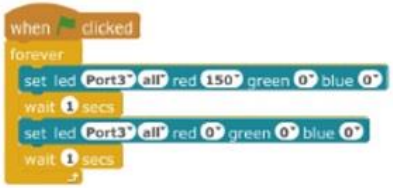
Question 4

The reset switch is wired as Active High to the ATmega328 microcontroller.

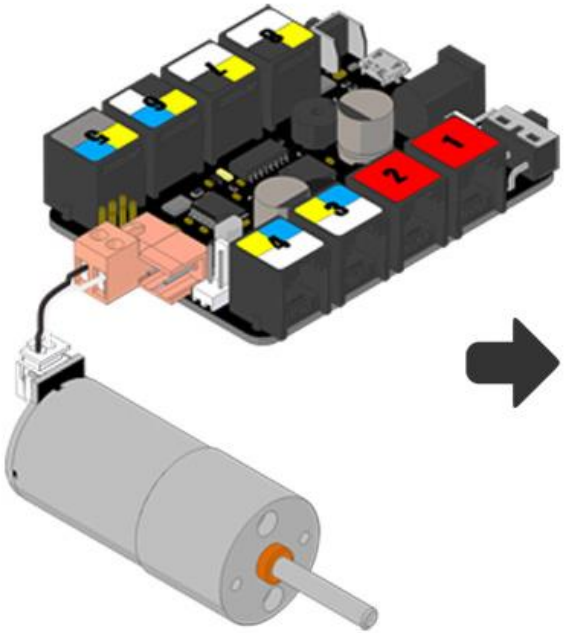
a) True

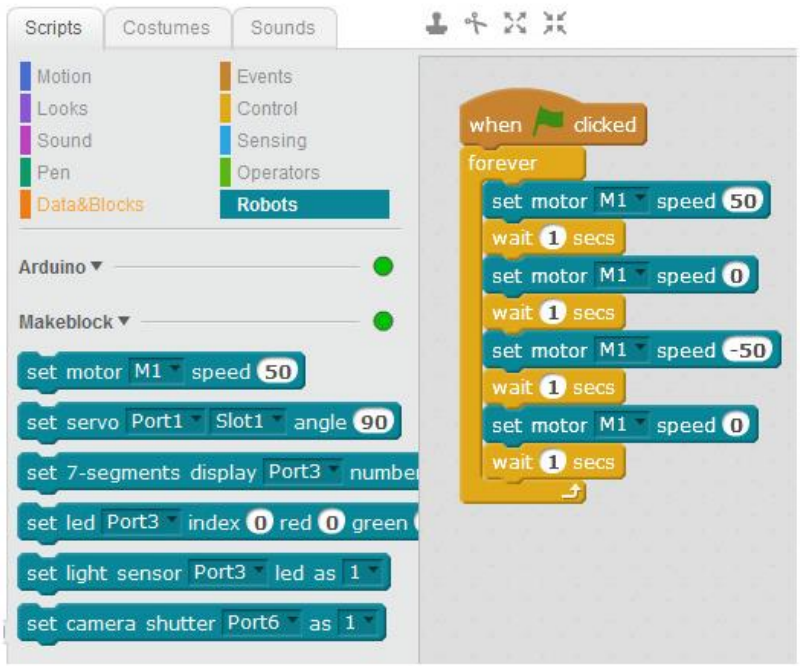
b) False

mBlock (VPL)Visual Programming Language…

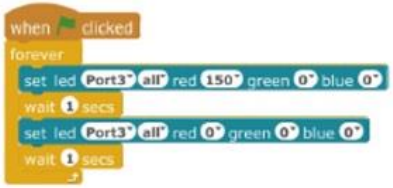


Examples: **Controlling a DC Motor**



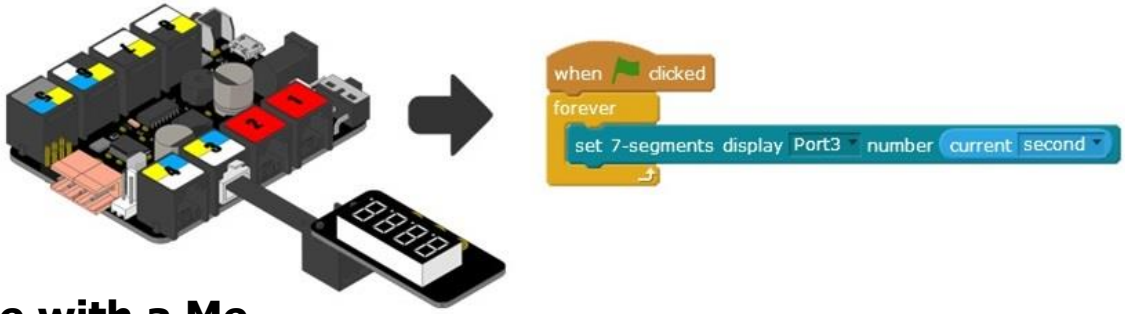


mBlock (VPL)Visual Programming Language…

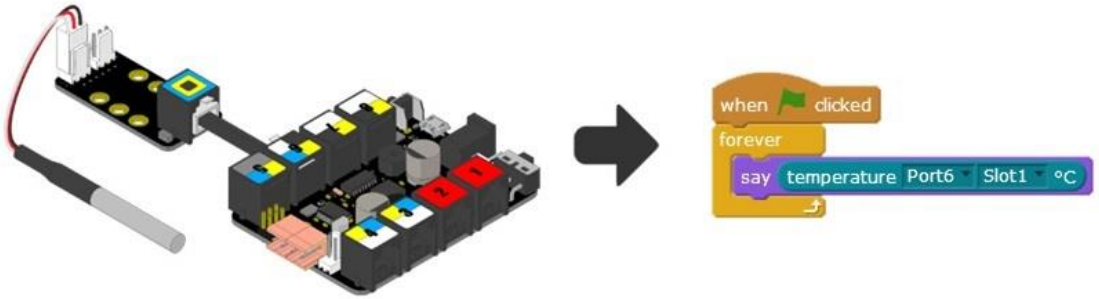


Examples:

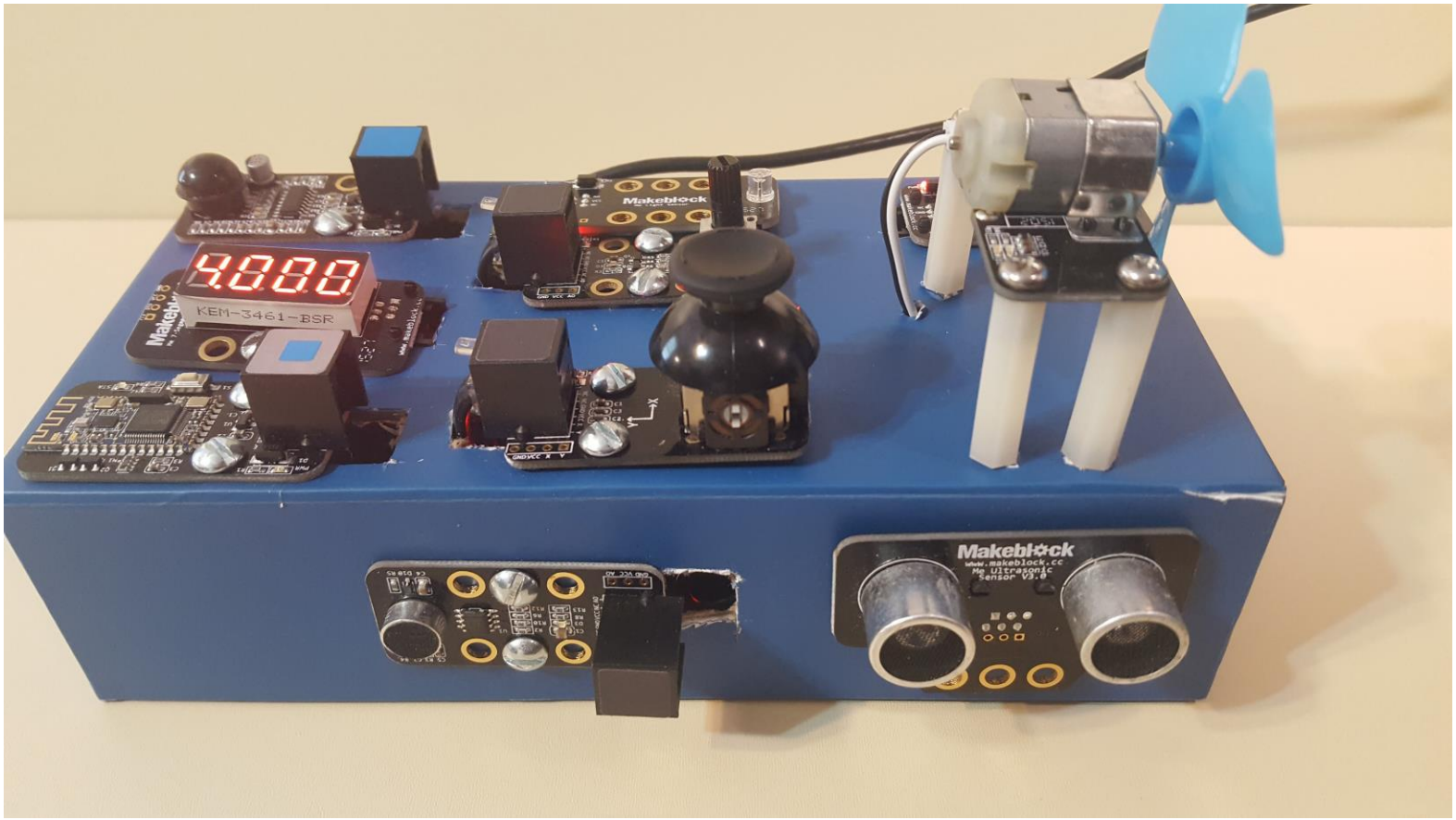
Operating a Me 7 Segment Display:



Reading temperature with a Me Temperature Sensor:



Hands-On Project: Cooling Fan



Hands-On Project: Cooling Fan

Project Objectives:

a) Build a prototyping technology trainer for testing Human Inputting Devices concepts.

b) Learn how electronics can be added in discarded products

c) Learn about visual programming.

d) Prototype a mechanical input control that operates a small dc motor using a joystick or potentiometer.

Hands-On Project: Cooling Fan…

Makeblock Inventor Electronic Kit

Question 5

The mBlock VPL was inspired by _____ program.

a) Visual Basic

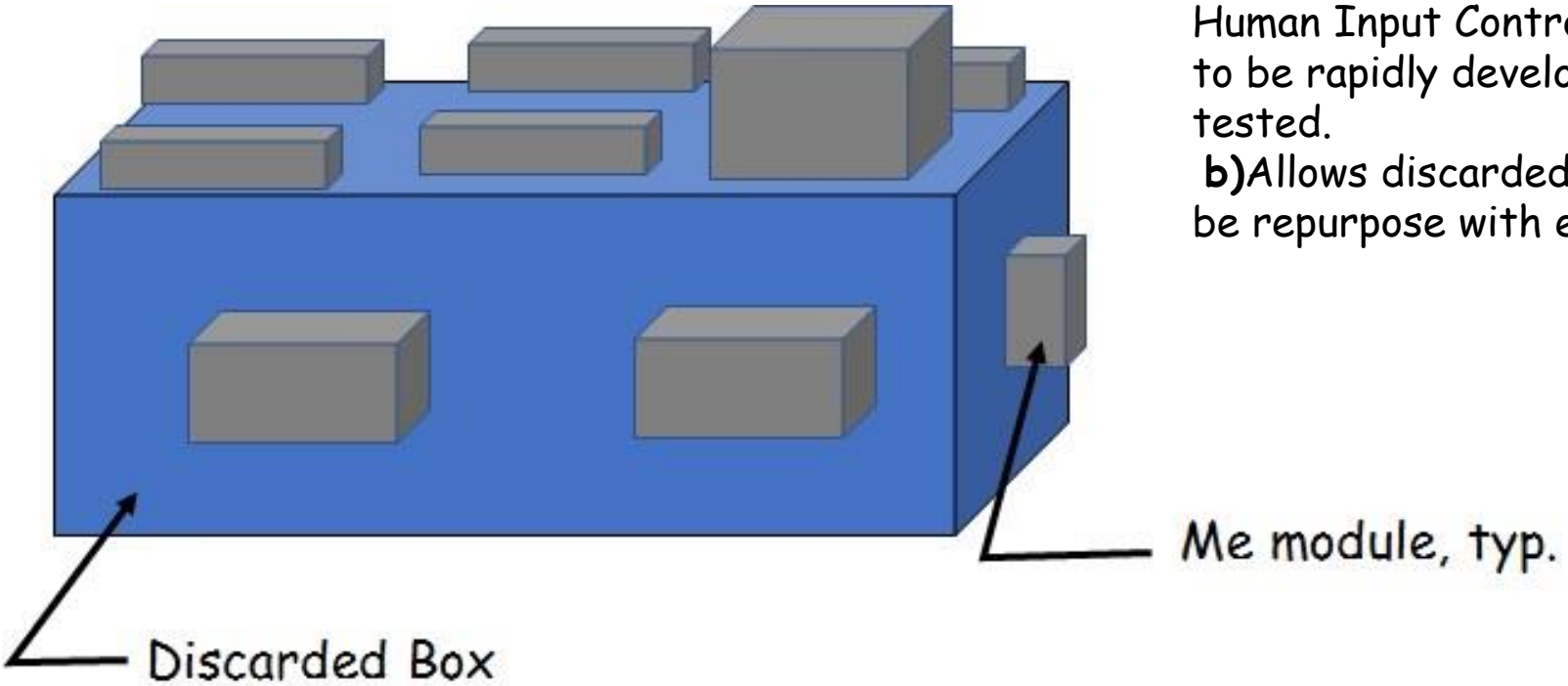
b) Visual Studio

c) BlockyProp

d) Scratch

Hands-On Project: Cooling Fan…

Human Inputting Device Technology Box: Concept Drawing

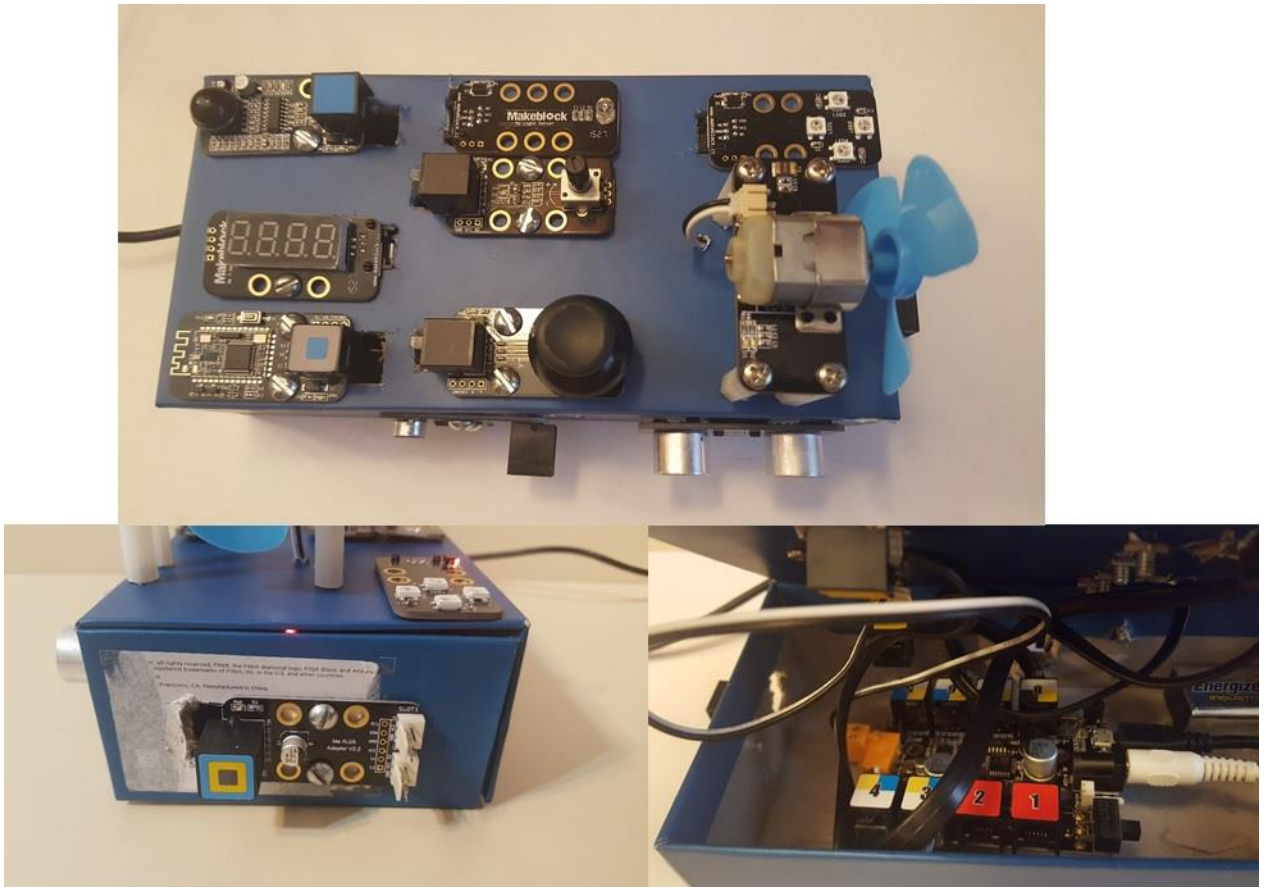


The BIG IDEAs:

a) Technology Box allows Human Input Control Designs to be rapidly developed and tested.

b) Allows discarded items to be repurpose with electronics.

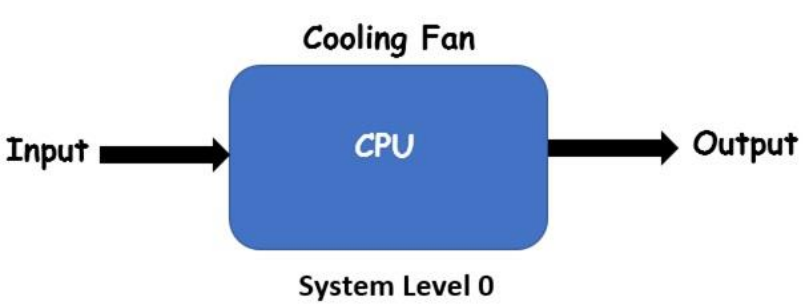
Hands-On Project: Cooling Fan…

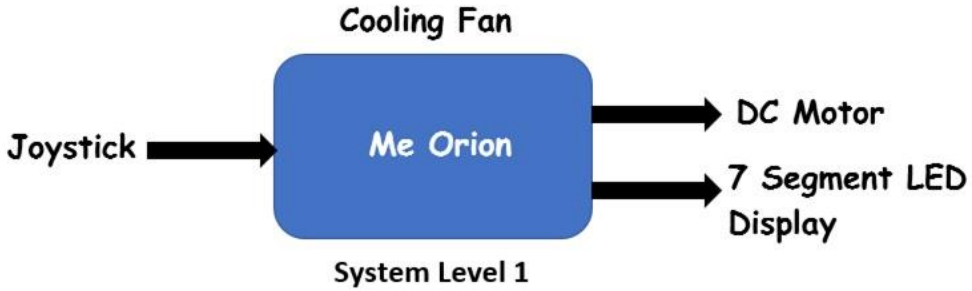


Human Inputting Device Technology Box: Construction Details

Hands-On Project: Cooling Fan…

Cooling Fan: System Block Diagram Designs





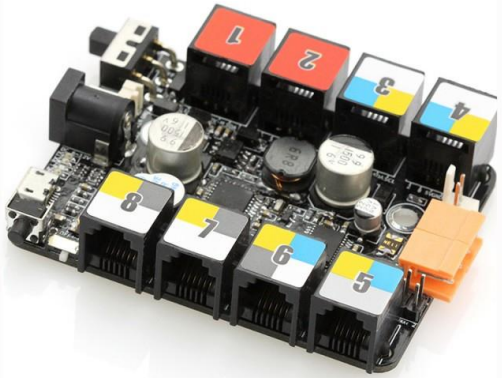
Hands-On Project: Cooling Fan…

Cooling Fan: System Components

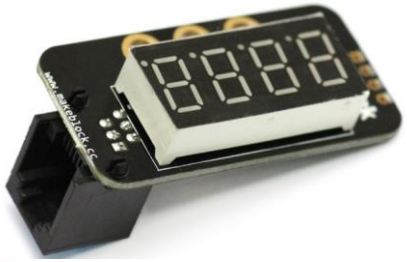
Me-Potentiometer

Me-Joystick

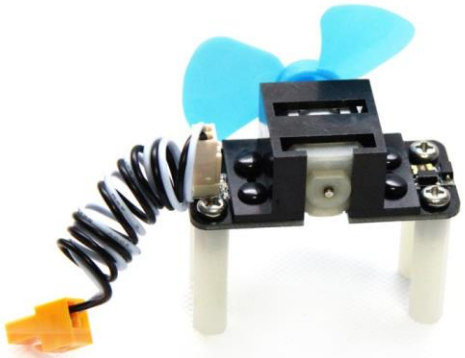
Me-Orion



Me-7 LED Segment Display



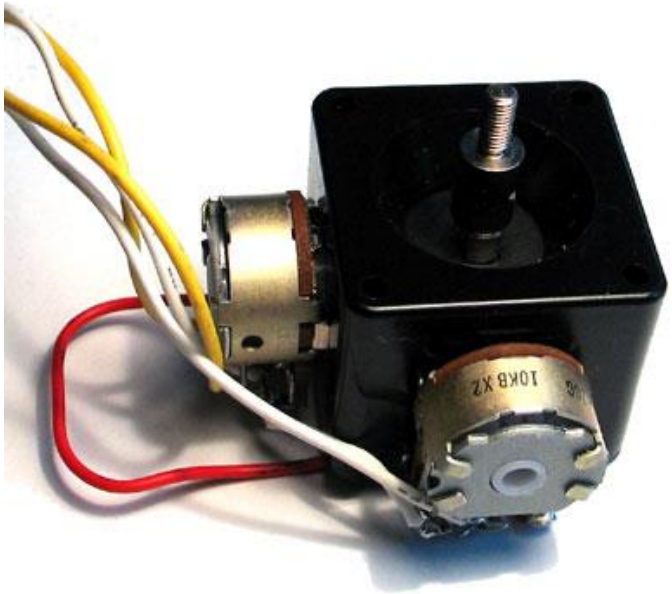
Me-7 DC Motor



Hands-On Project: Cooling Fan…

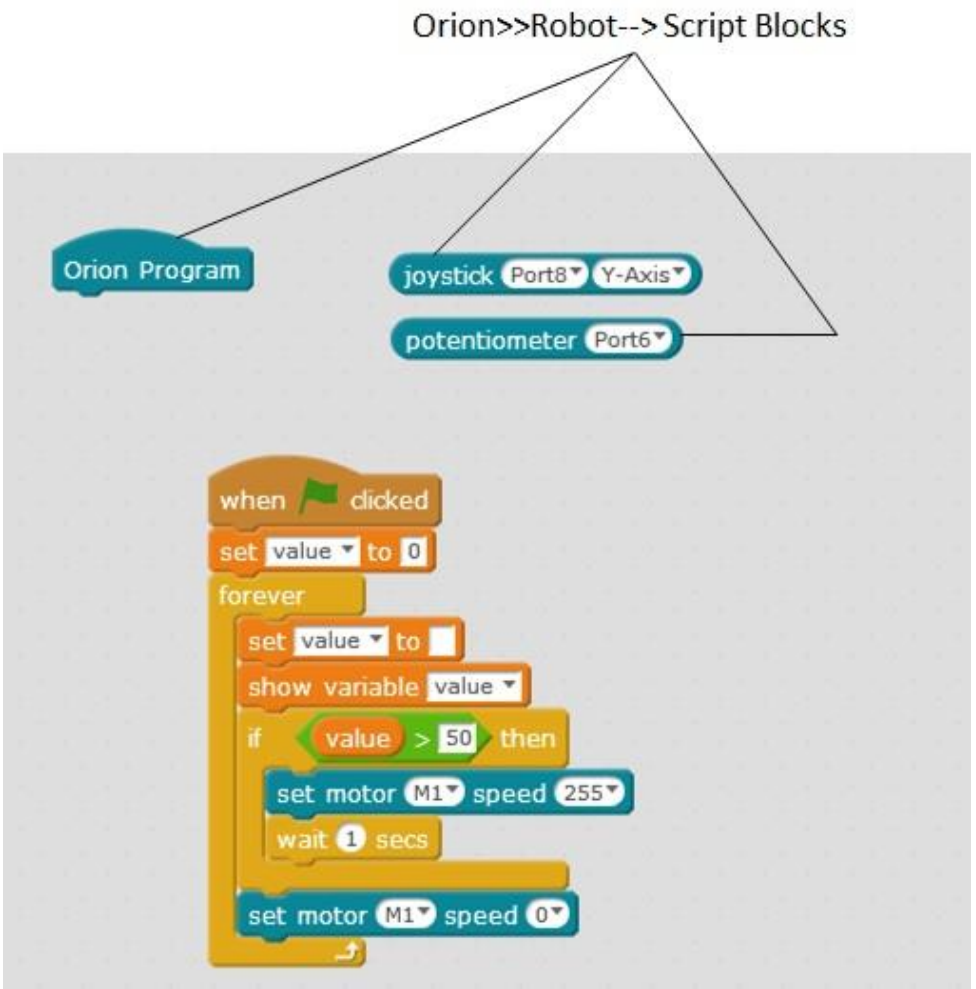
Joystick Construction:

Joystick is 2 potentiometers inside of 1 package!



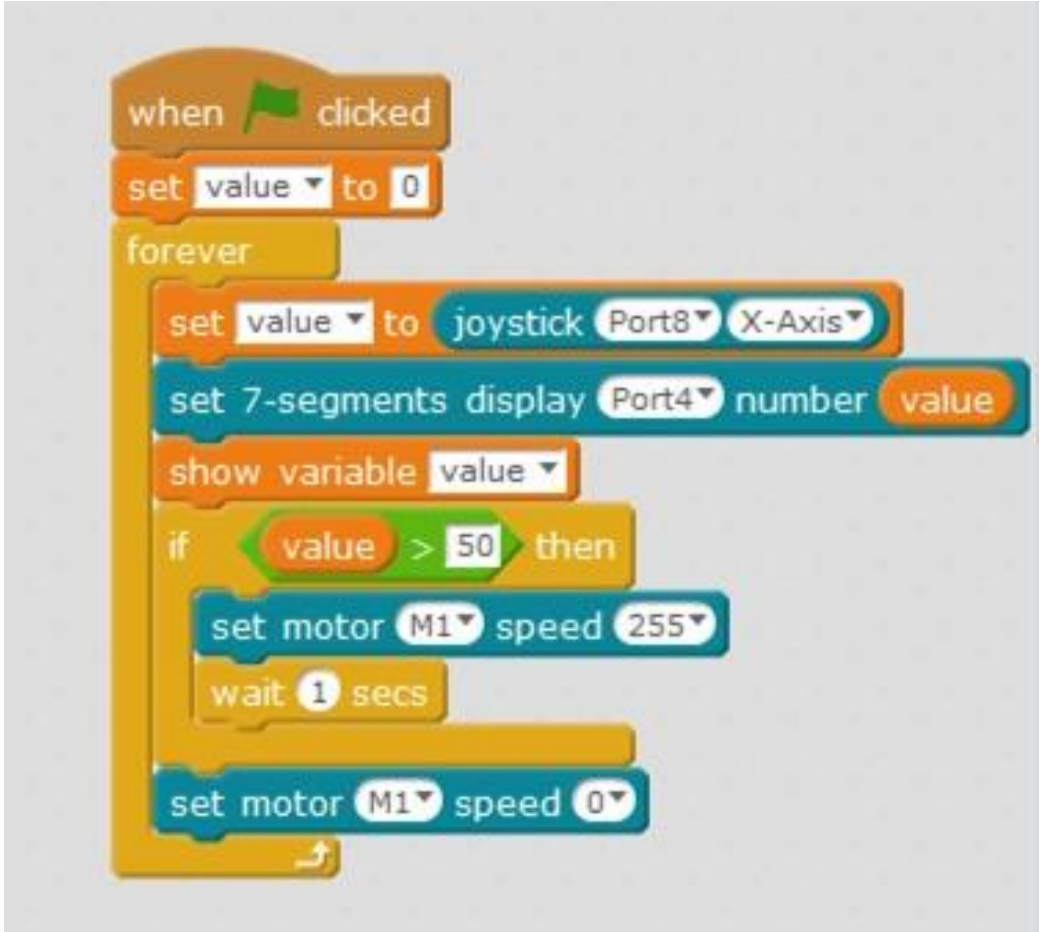
Hands-On Project: Cooling Fan…

Code Blocks for Cooling Fan Project: Building Cooling Fan Code



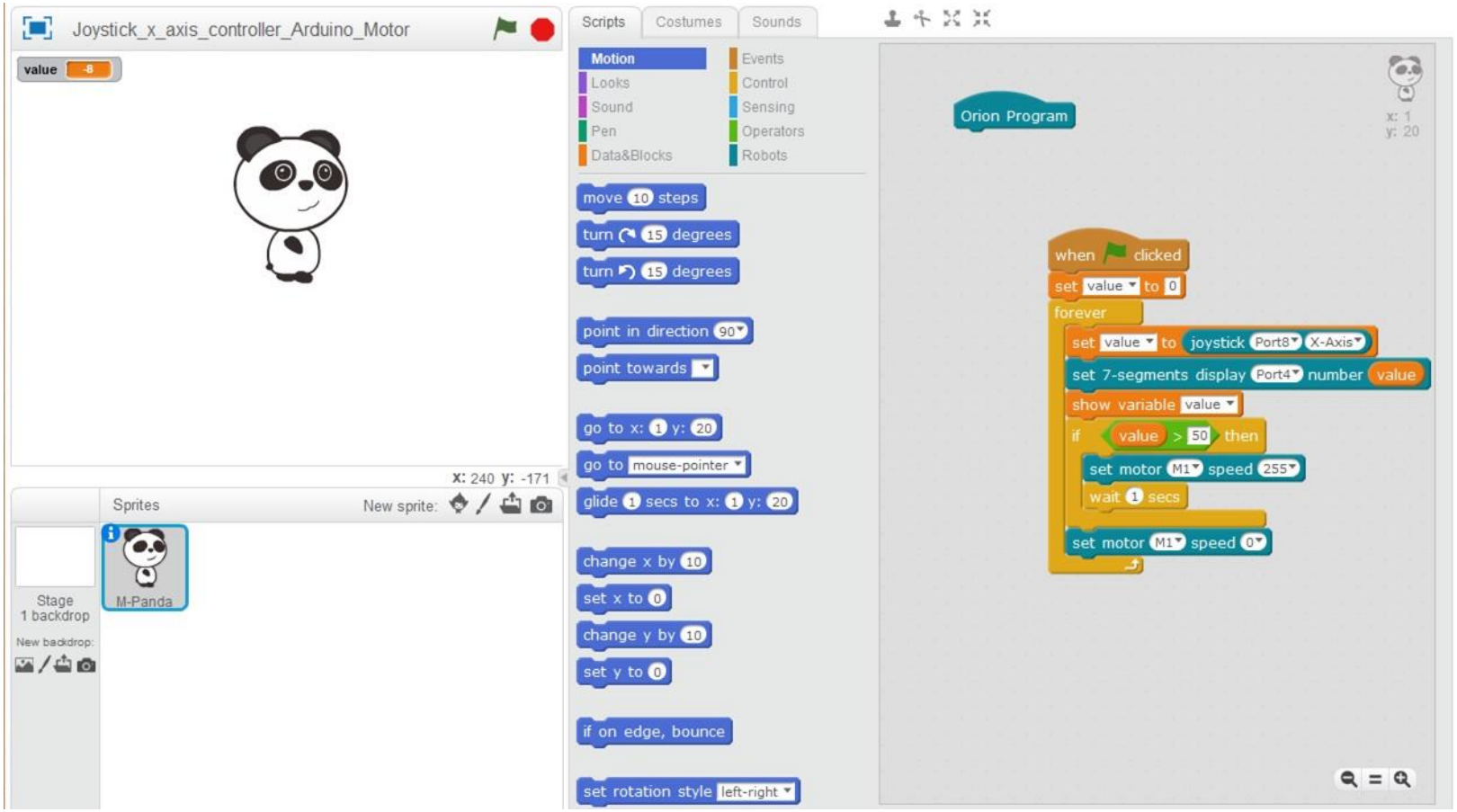
Hands-On Project: Cooling Fan…

Code Blocks for Cooling Fan Project Complete



Hands-On Project: Cooling Fan…

Displaying joystick value using "value" code block.



Question 6

The forever block shown in slide 34 is equivalent to what Arduino C++ code instruction.

a) while 1

b) void forever ( )

c) void loop ( )

d) None of the above