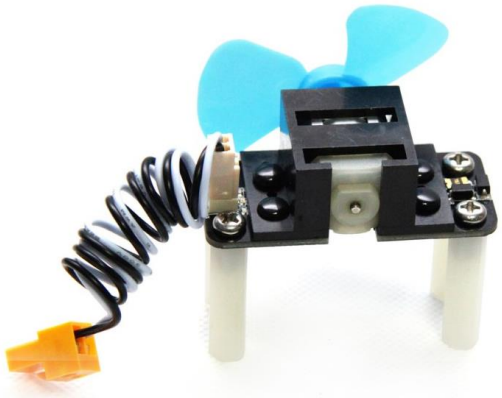
Human Inputting Devices for DC Motor Control

Class 4: Non-Traditional Human Input Devices



July 27, 2017

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DesignNews CEC CONTINUING EDUCATION CENTER

Presented by: Digi-Key ELECTRONICS ROHDE&SCHWARZ

Non-Traditional Human Input Devices

Agenda

- Tangible User Interfaces
- OmniTouch
- Exploring the Me-Sensors
- Hands-On Project: A Motion Control Servo Motor

Tangible User Interfaces

- Extending the senses
- Utilizing physical properties
- Observing behaviors
- Coupling physical objects with digital information
- User **interface** in which a person interacts with digital information through the physical environment.

Sources:

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

http://mas834.media.mit.edu

Tangible User Interfaces

Hiroshi Ishii pioneered the Tangible User Interface

Tangible User Interfaces…

ClearBoard 1990-94

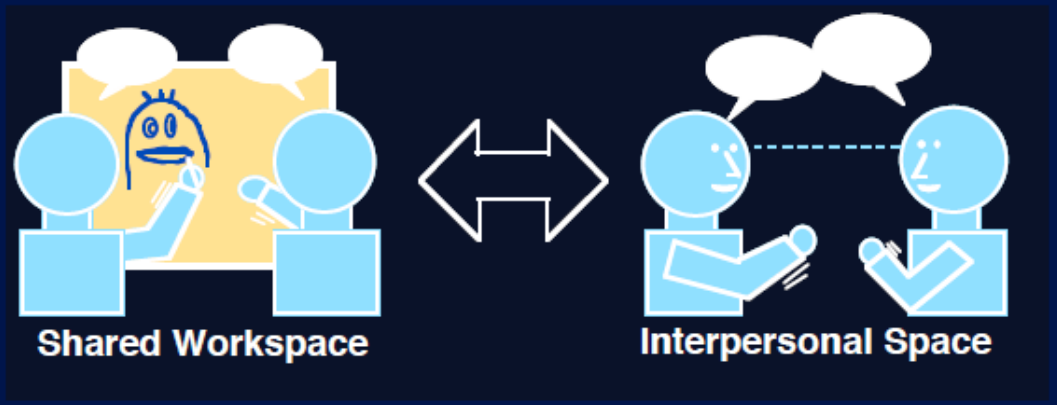
NTT Human Interface Laboratories

Ishii and Kobayashi, 1992

Tangible User Interfaces…

Goal of ClearBoard Design

- Seamless Integration of Shared Workspace and Interpersonal Space
- Natural and smooth transition between them using everyday cues



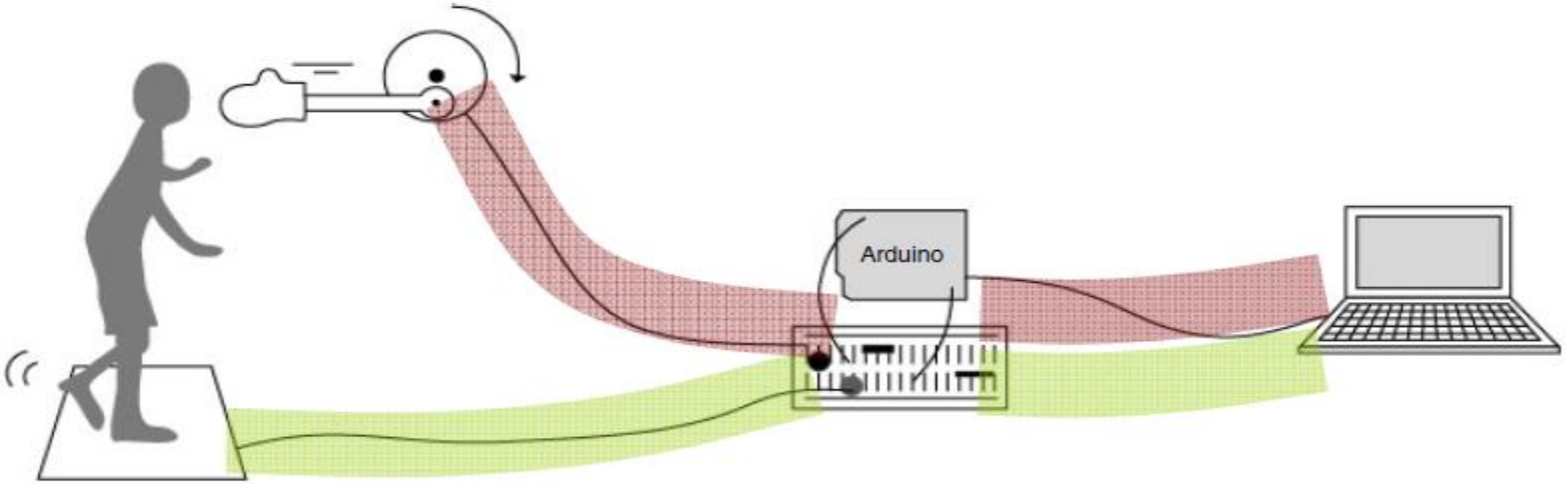
Question 1

Name 3 attributes of a Tangible User Interface.

Tangible User Interfaces…

Physical Computing: is a subset of Tangible User Interfaces.

- A conversation between the physical world and the virtual world of the computer.

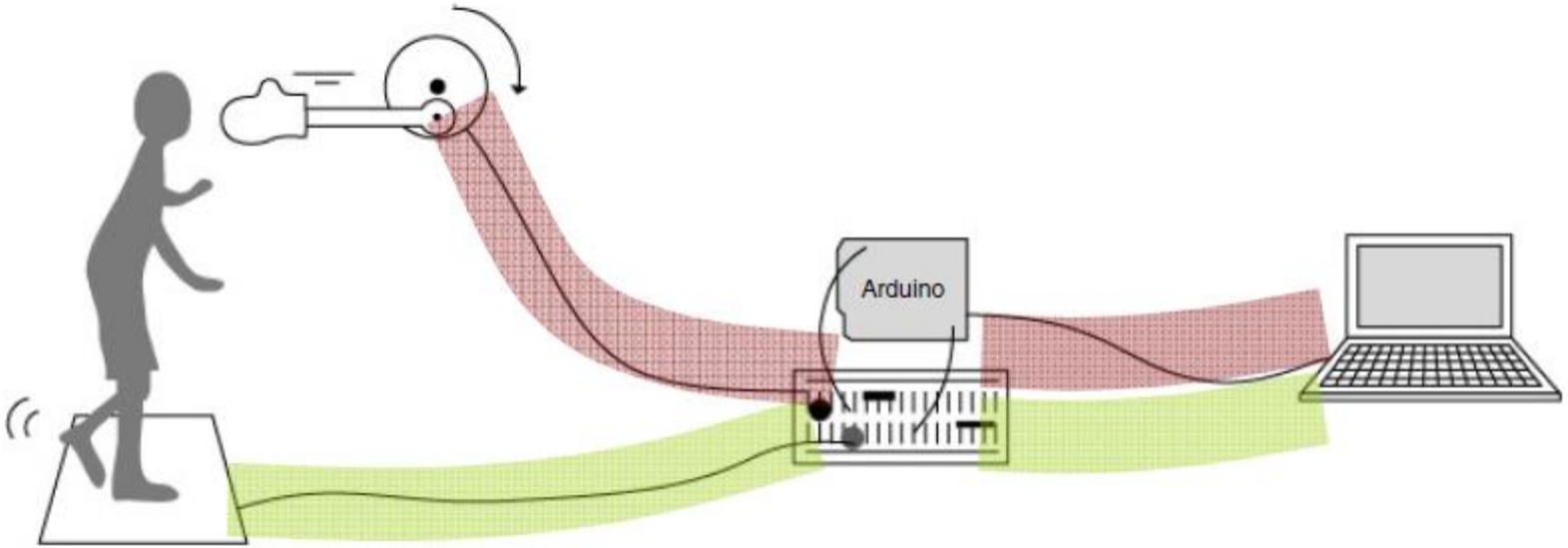


Source:
http://courses.ischool.berkeley.edu/i262/f09/index.html%3Fq=node%252F17.html

Tangible User Interfaces…

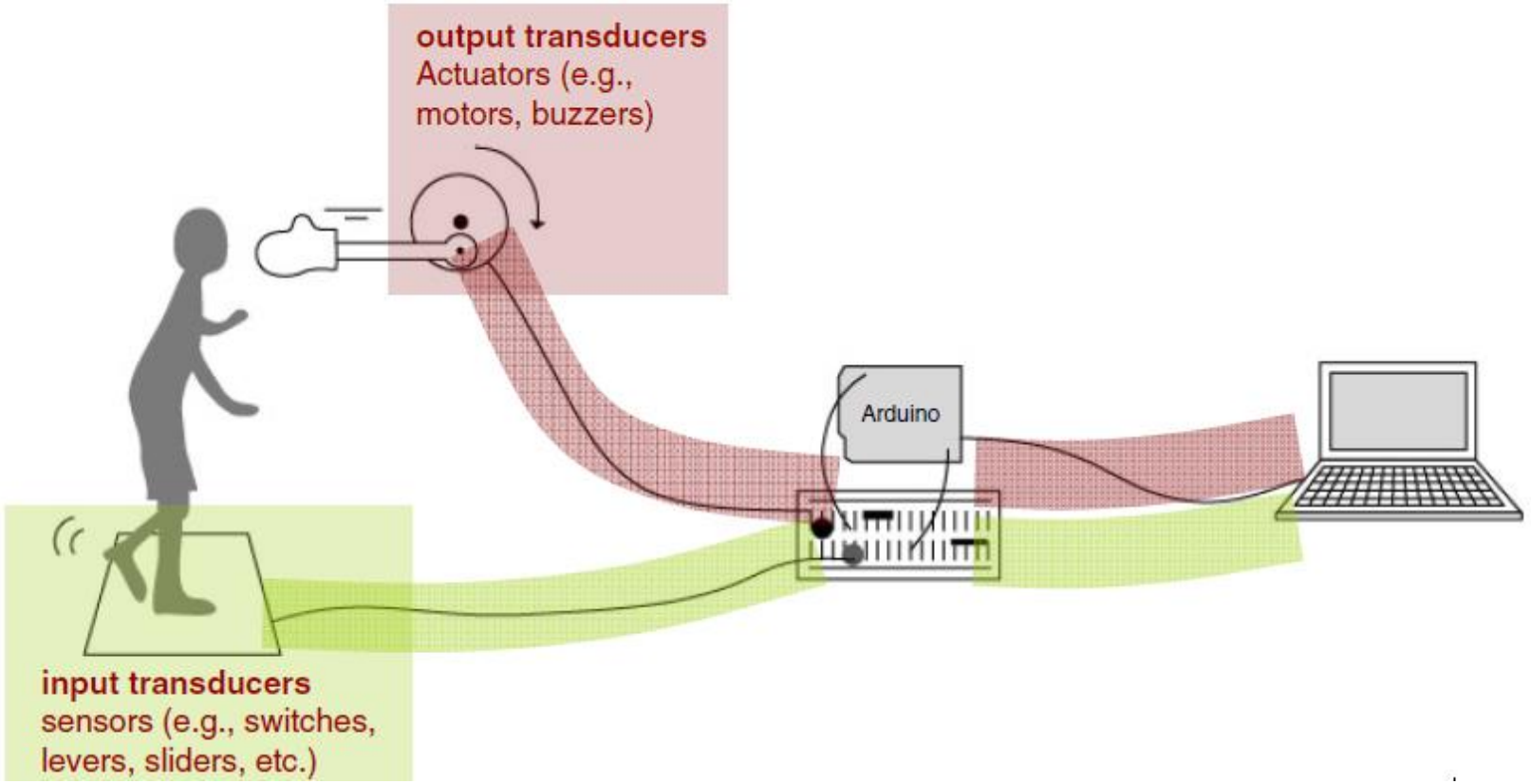
Transconduction:

- The conversion of one form of energy into another.
- The noun: **transducer**

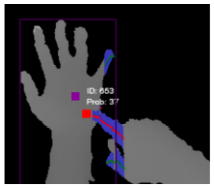


Tangible User Interfaces…

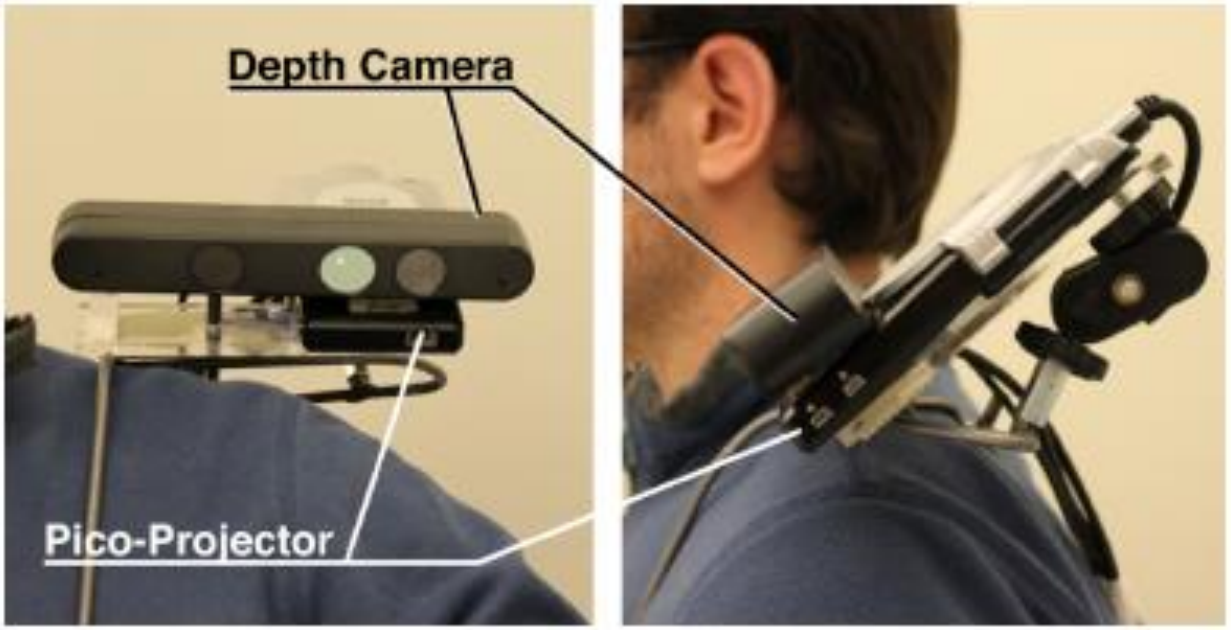
Transducers



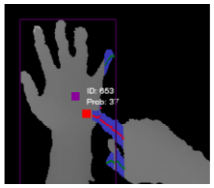
OmniTouch



- A wearable depth-sensing and projection system.
- Allows everyday surfaces to be appropriated for graphical multitouch interaction.



OminiTouch…



- The device draws from a variety of fields.

  a) touch interaction techniques

  b) surface computing

  c) free-space gesturing

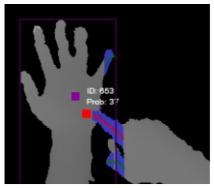
  d) computer vision

  e) wearables

  f) ubiquitous computing

- Augmenting the environment with an interactive projection is research teams vision.

OminiTouch…



The device provides capabilities similar to from a variety of fields.

a) mouse or touchscreen

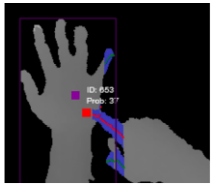
b) uses X and Y location in 2D interfaces

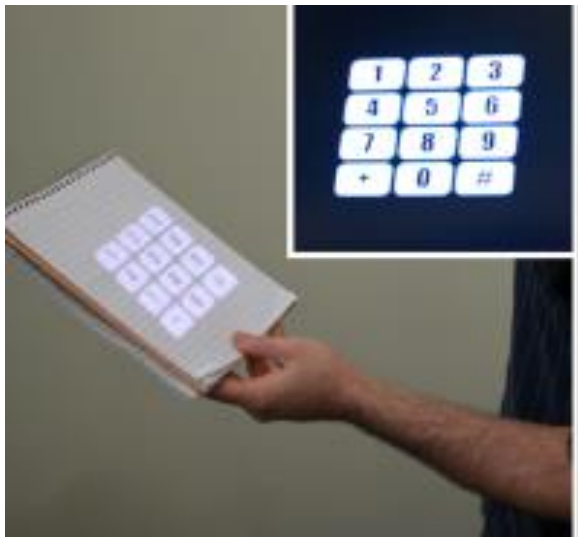
whether fingers are clicked or hovering:

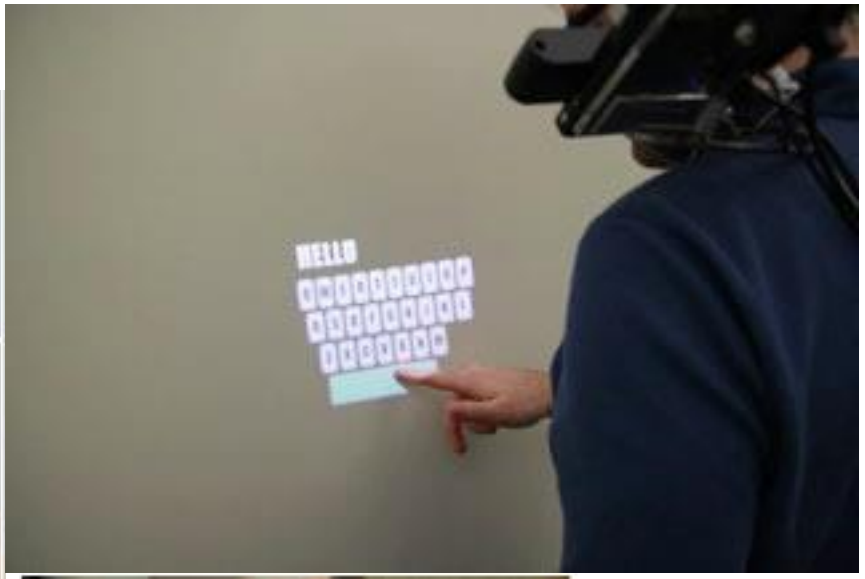
a) enabling a wide variety of interactions

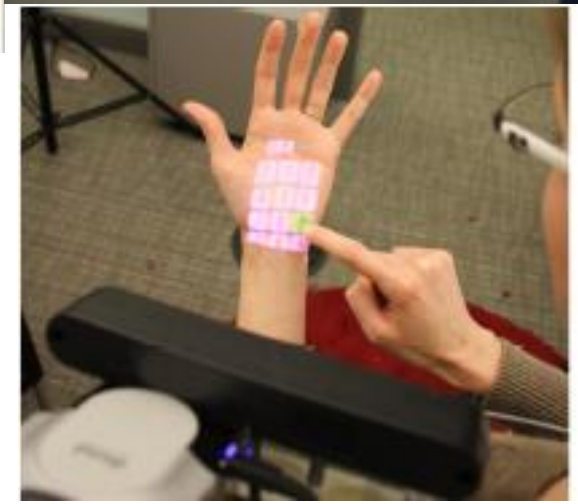
Identifying Figure Input using depth map technique

OminiTouch…







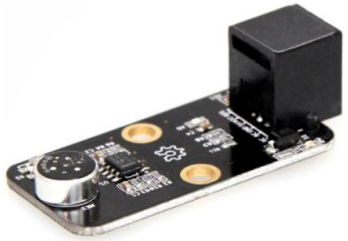


Example Surfaces

Question 2

What is Transconduction?

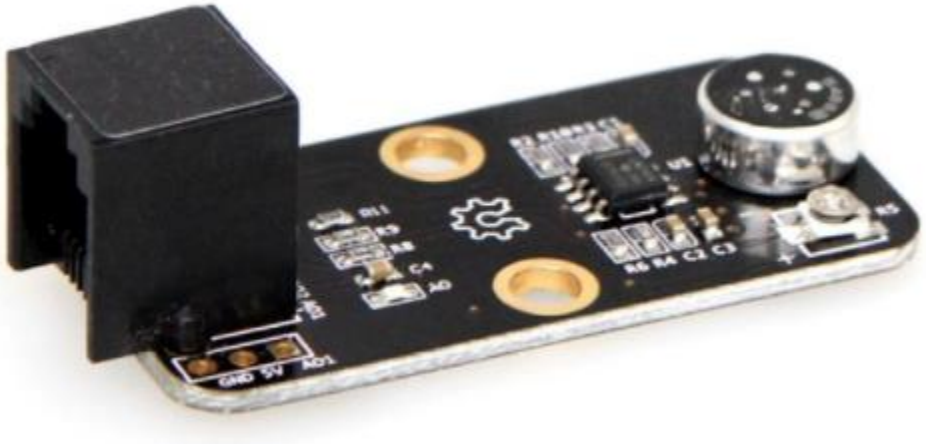
Exploring Me Sensors



Sound Sensor:

- Designed to detect ambient sound intensity.
- Main component is the LM2904 low-power amplifier.

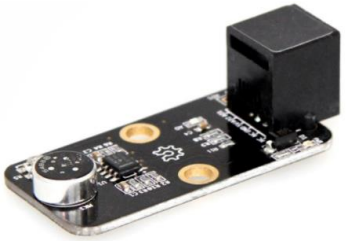
Me-Sound Sensor:



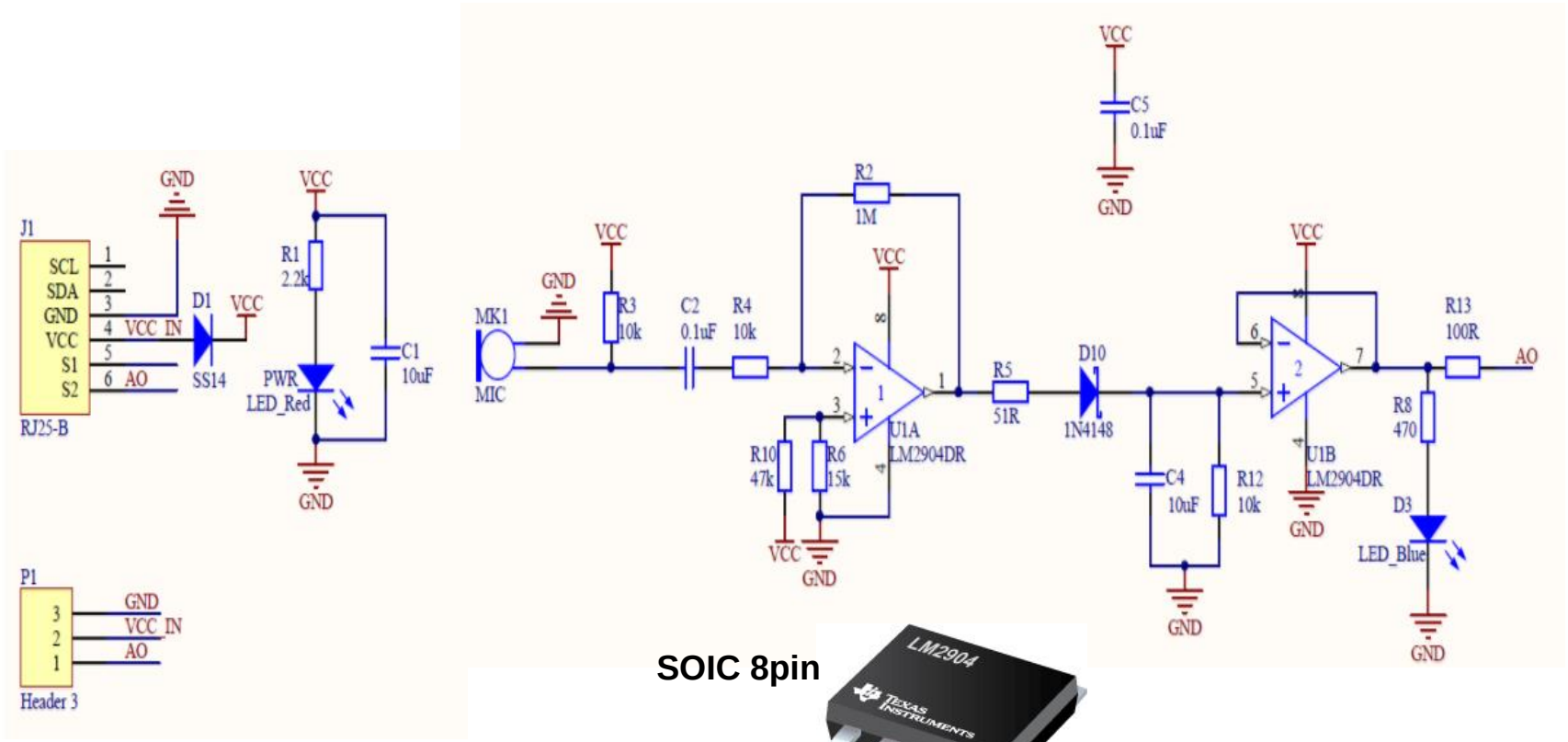
Source:

http://learn.makeblock.com/me-sound-sensor/

Exploring Me Sensors…



Me-Sound Sensor circuit schematic diagram:



SOIC 8pin

Source:

http://learn.makeblock.com/me-sound-sensor/

Question 3

OminiTouch uses x, y, and z locations in 2D interfaces.

a) True

b) False

Exploring Me Sensors…

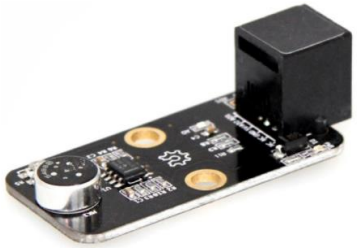
Sound Sensor:

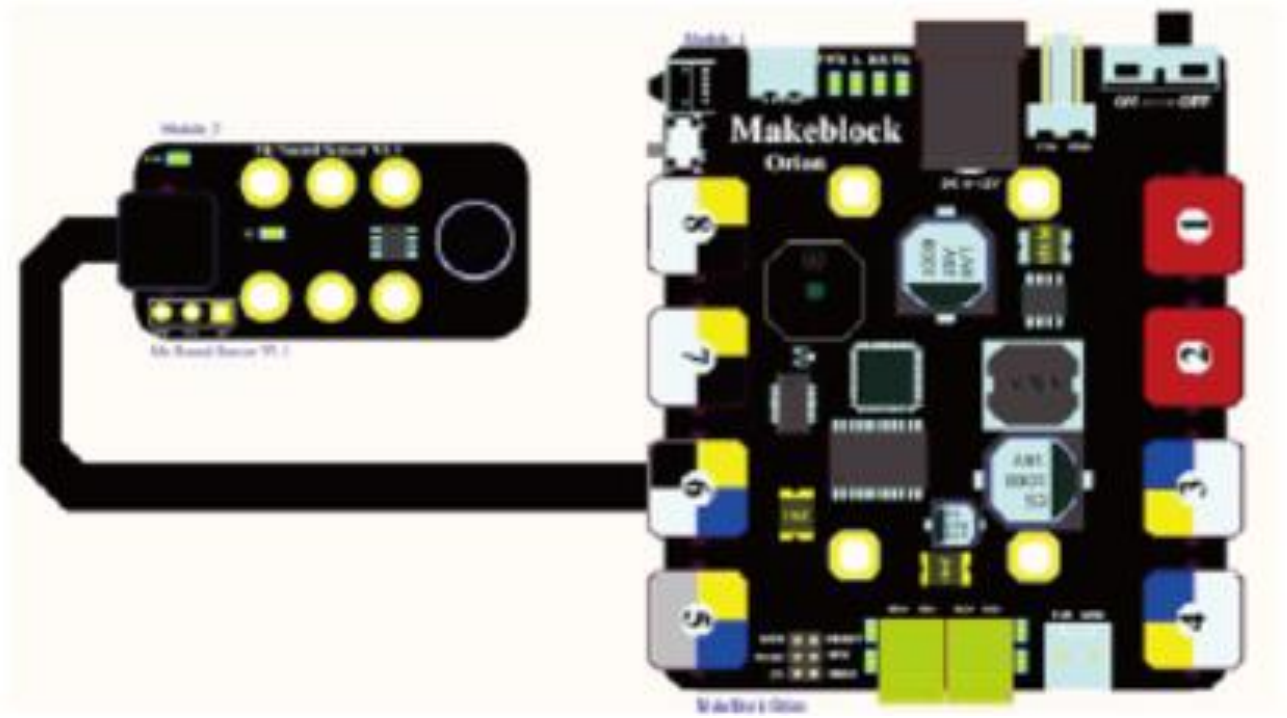
- The module can be used to build interactive projects.
  a)the voice operated switch
  b)the dance-following robot.
- Its black ID means that it has an analog port.
  a)should be connected to the port with black ID on Me-Orion controller.

Source:

http://learn.makeblock.com/me-sound-sensor/

Exploring Me Sensors…



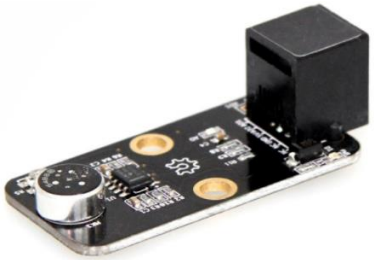


Connecting the Me Sound Sensor to the Me-Orion Controller using a RJ25 cable.

Source:

http://learn.makeblock.com/me-sound-sensor/

Exploring Me Sensors…



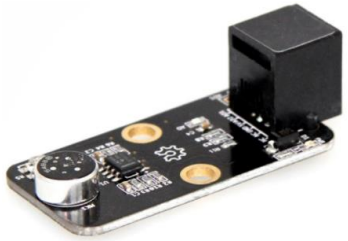
Arduino Test code for the Me Sound Sensor

```
#include "MeOrion.h"

MeSoundSensor mySound(PORT_6);

void setup()
{
  Serial.begin(9600);
}

void loop()
{
  Serial.print("value=");
  Serial.println(mySound.strength() );
  delay(100);
}
```

Source:

http://learn.makeblock.com/me-sound-sensor/

Exploring Me Sensors…



COM3

```
value=224
value=295
value=176
value=196
value=203
value=213
value=253
value=250
value=270
value=290
value=186
value=236
value=229
value=260
value=250
value=295
value=193
value=305
value=301
value=179
value=201
value=196
```

Results from the Me-Sound Sensor

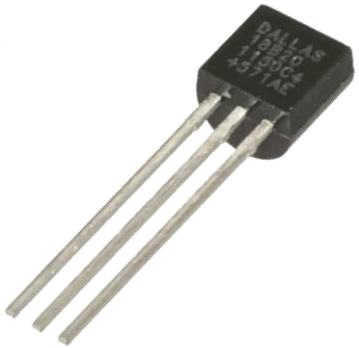
Source:

http://learn.makeblock.com/me-sound-sensor/

Exploring Me Sensors…

Temperature Sensor:

- A stainless steel tube with a DST18B20 sensor.
- DST18B20 sensor used for measuring temperature
- Adapter module is needed to connect it to port with blue tag on Me-Orion controller board.



DST18B20 Temperature Sensor: T092 package

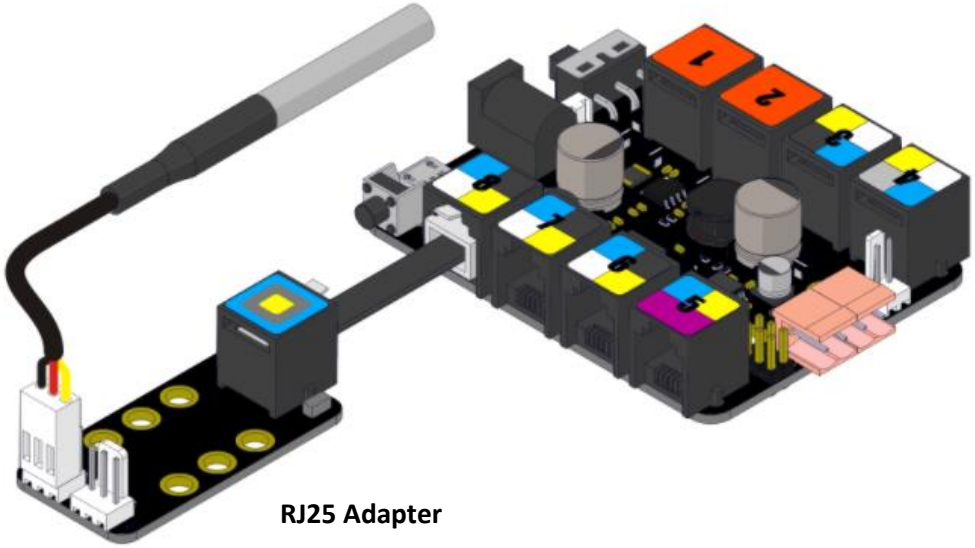
Exploring Me Sensors…

Me-Temperature Sensor:

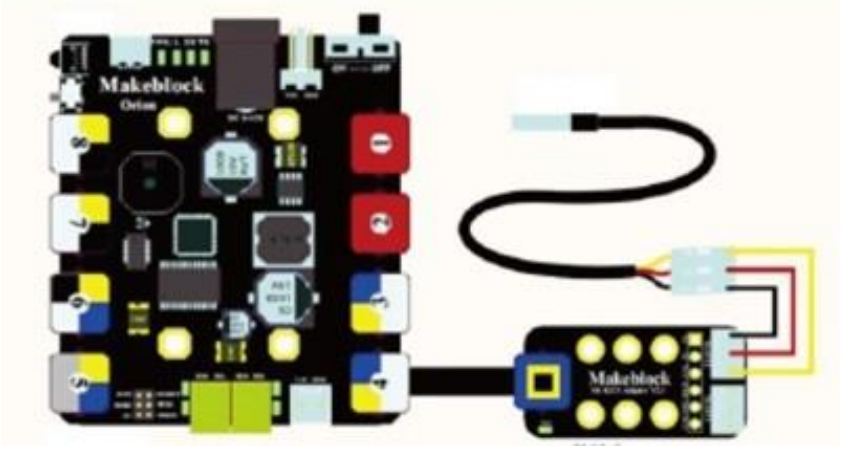
Sources:

http://learn.makeblock.com/temperature-sensor-waterproofds18b20/

Exploring Me Sensors…



RJ25 Adapter



Connecting the Me-Temperature Sensor to the Me-Orion Controller using a RJ25 cable and the RJ25 Adapter.

Sources:

http://learn.makeblock.com/temperature-sensor-waterproofds18b20/

Exploring Me Sensors…

Arduino Test code for the Me Temperature Sensor

```
#include "MeOrion.h"

MeTemperature myTemp(PORT_8, SLOT2);

void setup()
{
  Serial.begin(9600);
}

void loop()
{
  Serial.print("Temperature=");
  Serial.println(myTemp.temperature() );
  delay(1000);
}
```

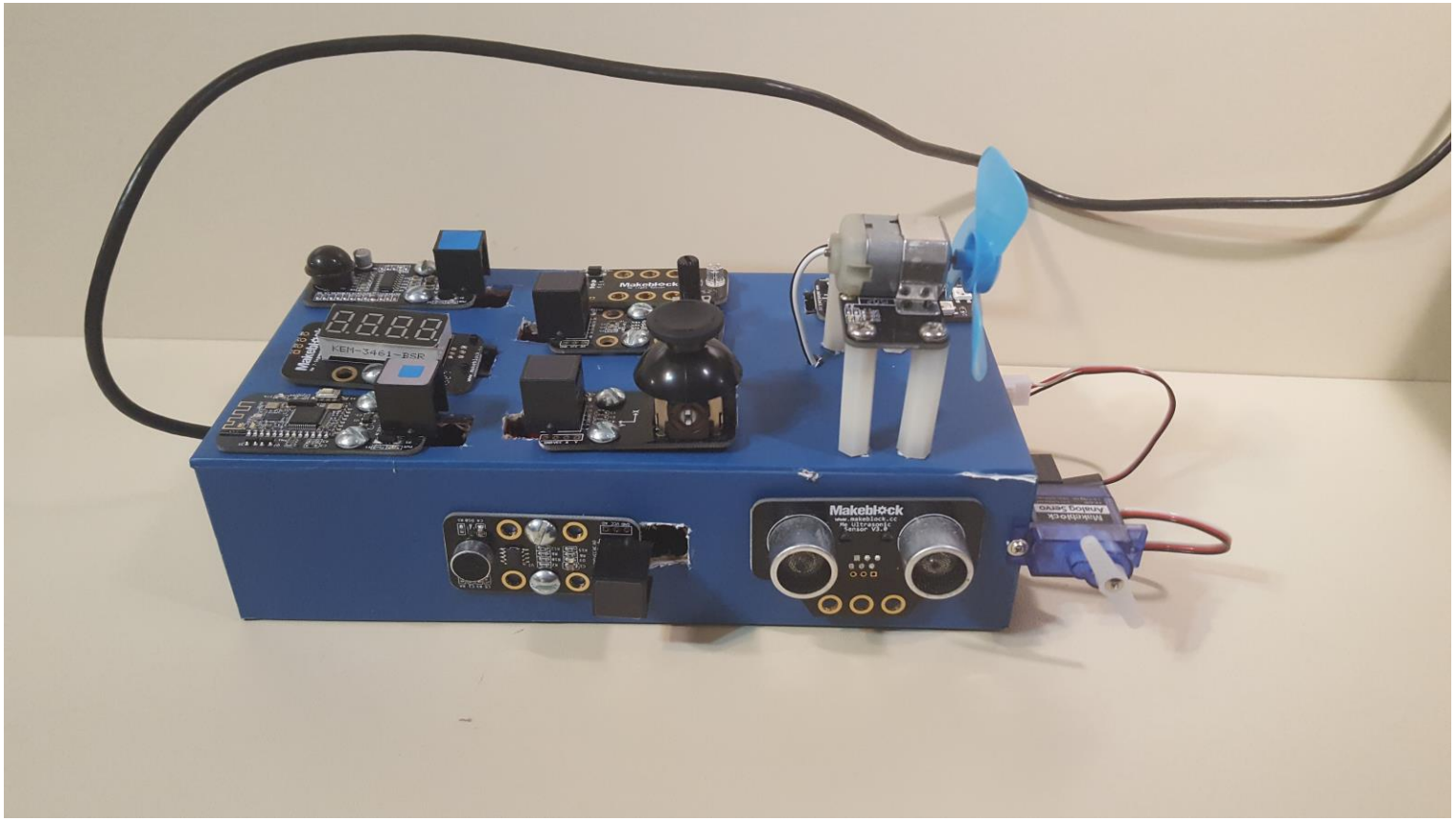
Exploring Me Sensors…

COM4

```
Temperature=26.62
Temperature=26.62
Temperature=26.62
Temperature=26.62
Temperature=26.62
Temperature=26.75
Temperature=27.06
Temperature=27.50
Temperature=27.94
Temperature=28.31
Temperature=28.62
Temperature=28.94
Temperature=29.19
Temperature=29.44
Temperature=29.69
Temperature=29.75
Temperature=29.81
Temperature=29.81
Temperature=29.75
Temperature=29.75
Temperature=29.69
Temperature=29.62
Temperature=29.62
Temperature=29.56
Temperature=29.50
Temperature=29.56
Temperature=29.75
Temperature=30.00
Temperature=30.19
Temperature=30.37
```

Results from the Me-Temperature Sensor

Hands-On Project: Motion Control Servo Motor



Question 4

Which Me Sensor uses a LM2904 Op-Amp IC?

a) Me-PIR Motion Sensor

b) Me-Temperature Sensor

c) Me-Sound Sensor

d) None of the above

Hands-On Project: Motion Control Servo Motor

Project Objectives:

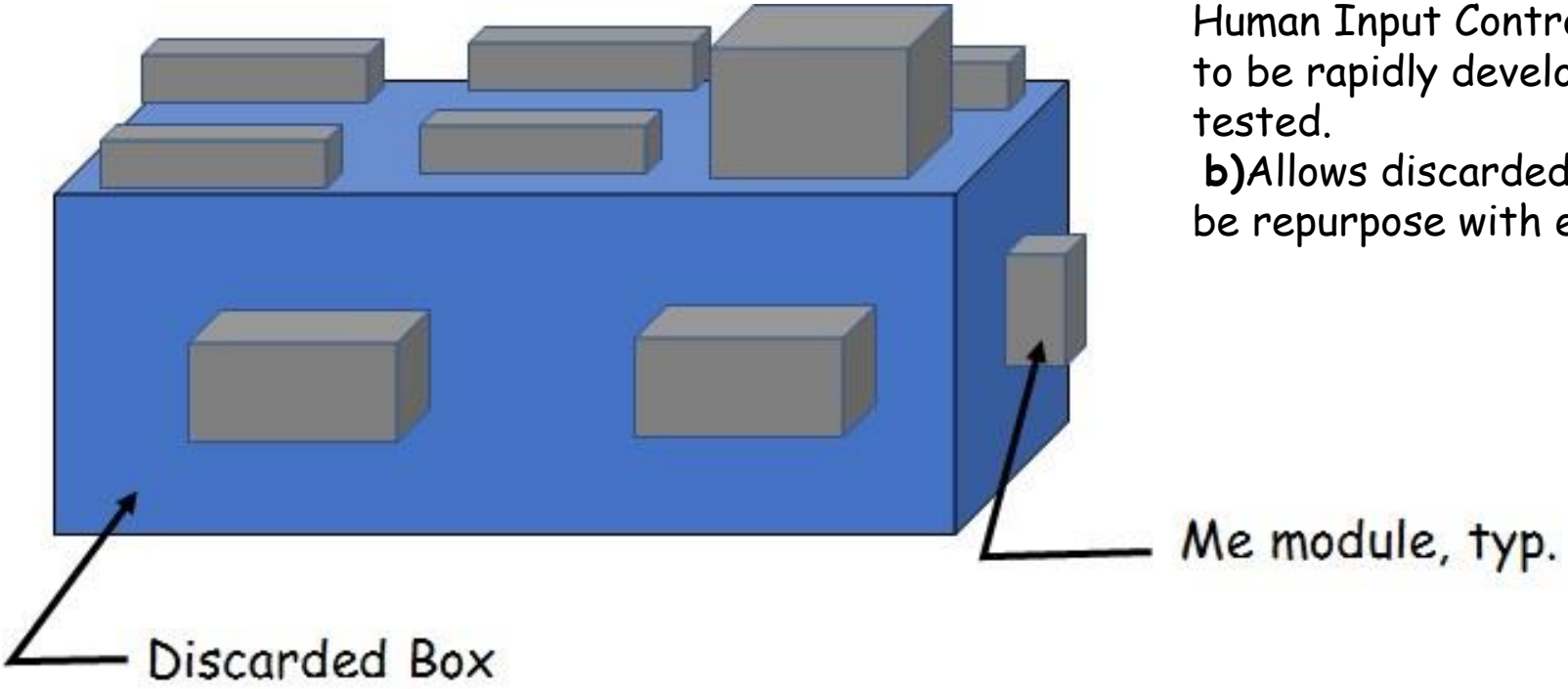
a) Build a prototyping technology trainer for testing Human Inputting Devices concepts.

b) Design a hand gesture control device where placing your hand in front of a sensor will turn on a servo.

c) Prototype the gesture input control device that performs Design Feature b.

Hands-On Project: Motion Control Servo Motor…

Human Inputting Device Technology Box: Concept Drawing

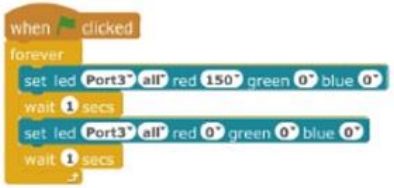


The BIG IDEAs:

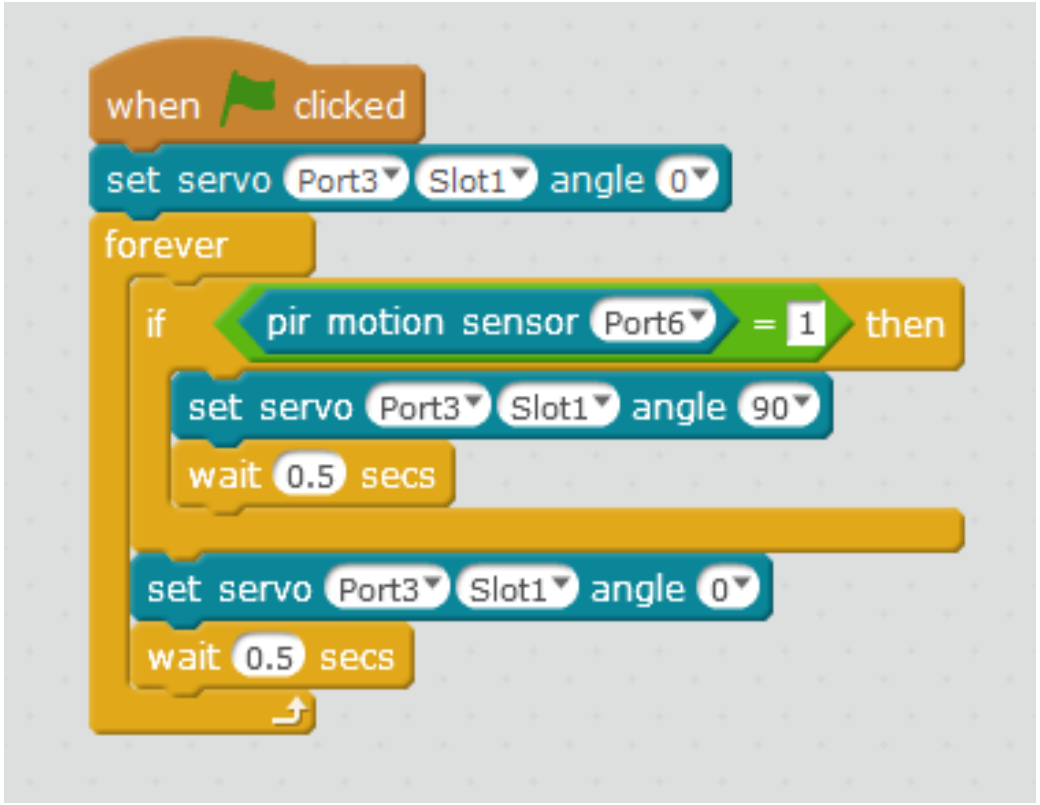
a) Technology Box allows Human Input Control Designs to be rapidly developed and tested.

b) Allows discarded items to be repurpose with electronics.

mBlock (VPL)Visual Programming Language…

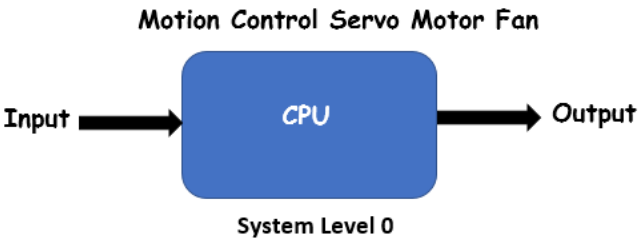


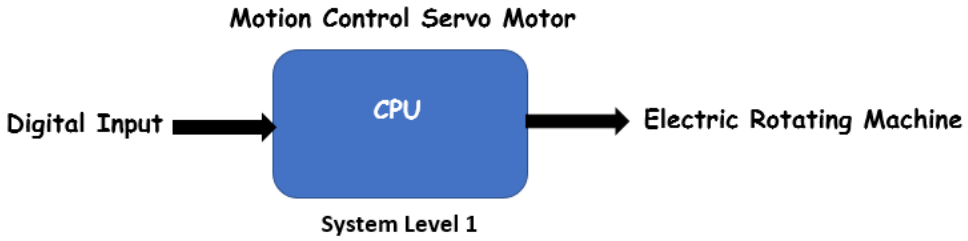
Project Code: **Motion Control Servo Motor: Hand Gesture Detection**



Hands-On Project: Motion Control Servo Motor…

Motion Control Servo Motor System Block Diagrams (3 Levels)





Hands-On Project: Motion Control Servo Motor…

Hand not present, Servo Motor OFF:
Angle = 0 degrees

Hand present, Servo Motor ON:
Angle = 90 degrees

Question 5

Using the mBlock VPL code on slide 32, write a conditional statement that rotate the servo motor when no hand is detected by the Me-PIR Motion sensor.