

A close-up photograph of a mechanical watch movement. The image shows various gears, a scale with numbers, and a textured metal component. The lighting is dramatic, highlighting the metallic surfaces and the intricate details of the watch mechanism.

Working with Human Machine Interfaces

# Physical Computing Workshop

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Amazing Old Calculator

# Today's Tasks

- Human Machine Interfaces





HMI, in its simplest terms, includes any device or software that allows you to interact with a machine. This can be as simple and ubiquitous as the traditional single-touch display mounted on a machine or as technologically advanced as a multi-touch-enabled control panel or even connected mobile technology such as smartphones and smartwatches.

<http://www.machinedesign.com/iot/what-are-human-machine-interfaces-and-why-are-they-becoming-more-important>



# Types (selected list)

*Wikipedia*

**Batch interfaces** are non-interactive user interfaces, where the user specifies all the details of the batch job in advance to batch processing, and receives the output when all the processing is done.

**Command line interfaces**, where the user provides the input by typing a command string with the computer keyboard and the system provides output by printing text on the computer monitor. Used by programmers and system administrators, in engineering and scientific environments, and by technically advanced personal computer users.

**Conversational interfaces** enable users to command the computer with plain text English (e.g., via text messages, or chatbots) or voice commands, instead of graphic elements. These interfaces often emulate human-to-human conversations

**Gesture interfaces** are graphical user interfaces which accept input in a form of hand gestures, or mouse gestures sketched with a computer mouse or a stylus.

**Graphical user interfaces (GUI)** accept input via devices such as a computer keyboard and mouse and provide articulated graphical output on the computer monitor.

**Hardware interfaces** are the physical, spatial interfaces found on products in the real world from toasters, to car dashboards, to airplane cockpits. They are generally a mixture of knobs, buttons, sliders, switches, and touchscreens.

**Holographic user interfaces** provide input to electronic or electro-mechanical devices by passing a finger through reproduced holographic images of what would otherwise be tactile controls of those devices, floating freely in the air, detected by a wave source and without tactile interaction.

**Intelligent user interfaces** are human-machine interfaces that aim to improve the efficiency, effectiveness, and naturalness of human-machine interaction by representing, reasoning, and acting on models of the user, domain, task, discourse, and media (e.g., graphics, natural language, gesture).

**Motion tracking interfaces** monitor the user's body motions and translate them into commands, currently being developed by Apple.[19]

**Multi-screen interfaces**, employ multiple displays to provide a more flexible interaction. This is often employed in computer game interaction in both the commercial arcades and more recently the handheld markets.

**Natural-language interfaces** - Used for search engines and on webpages. User types in a question and waits for a response.

**Tangible user interfaces** - which place a greater emphasis on touch and physical environment or its element.

**Text-based user interfaces** - are user interfaces which output a text.

**Touchscreens** - are displays that accept input by touch of fingers or a stylus. Used in a growing amount of mobile devices and many types of point of sale, industrial processes and machines, self-service machines etc.

**Touch user interface** - are graphical user interfaces using a touchpad or touchscreen display as a combined input and output device. They supplement or replace other forms of output with haptic feedback methods. Used in computerized simulators etc.

**Voice user interfaces** - which accept input and provide output by generating voice prompts. The user input is made by pressing keys or buttons, or responding verbally to the interface.

**Web-based user interfaces** or web user interfaces (WUI) that accept input and provide output by generating web pages which are transmitted via the Internet and viewed by the user using a web browser program.

Some simple interfaces you might have used before

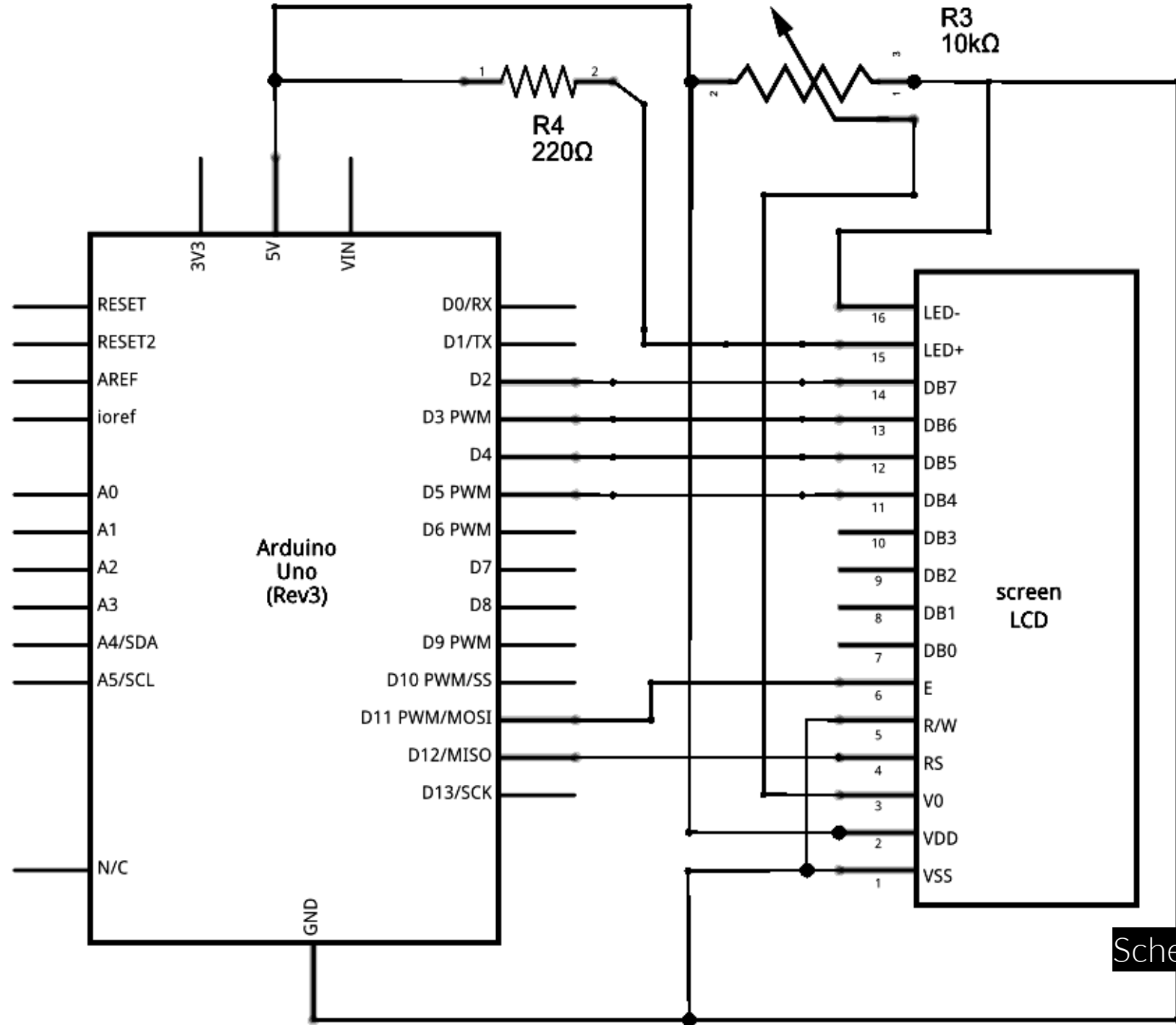


# Typical HMI Screen

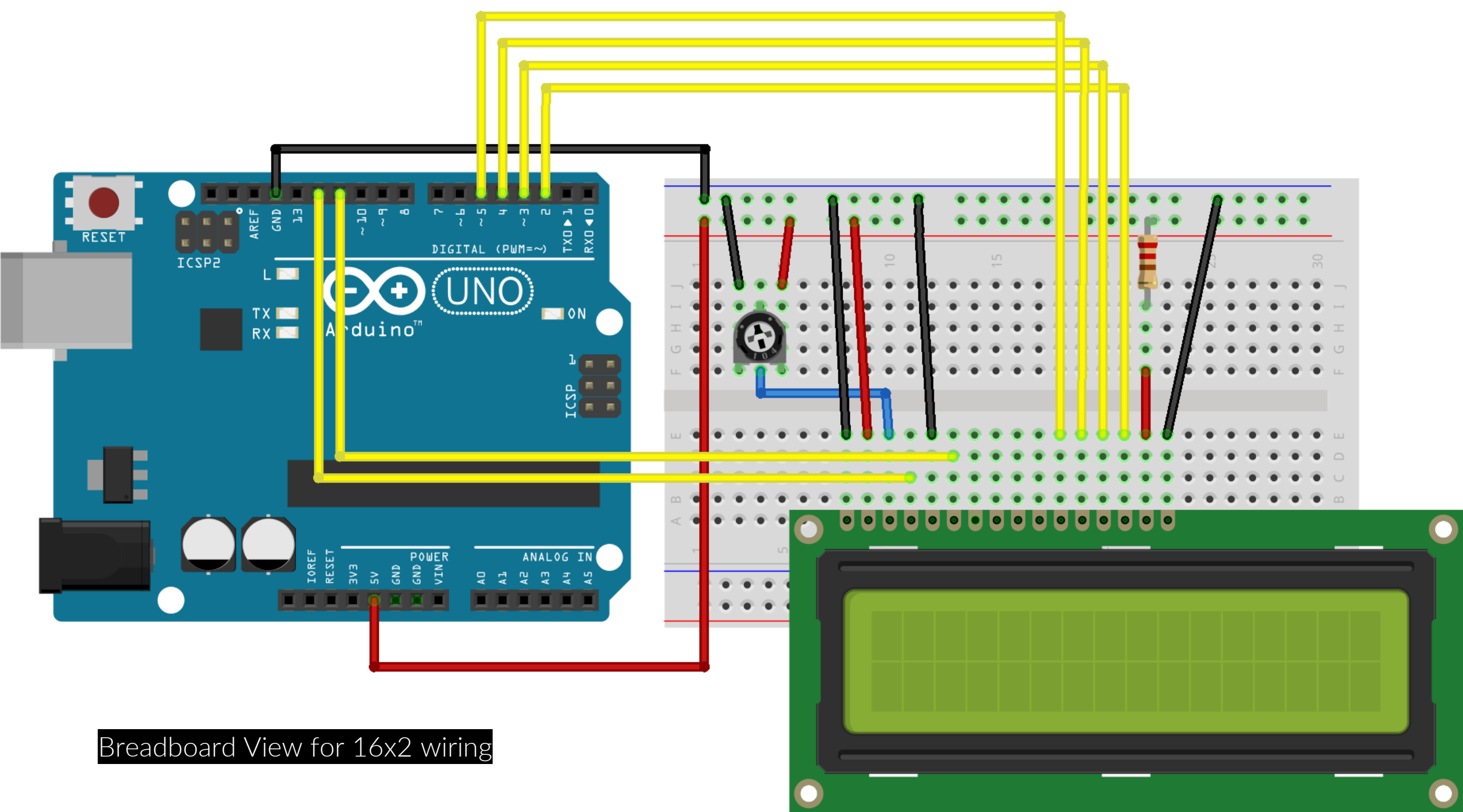








Schematic View for 16x2 wiring



Breadboard View for 16x2 wiring

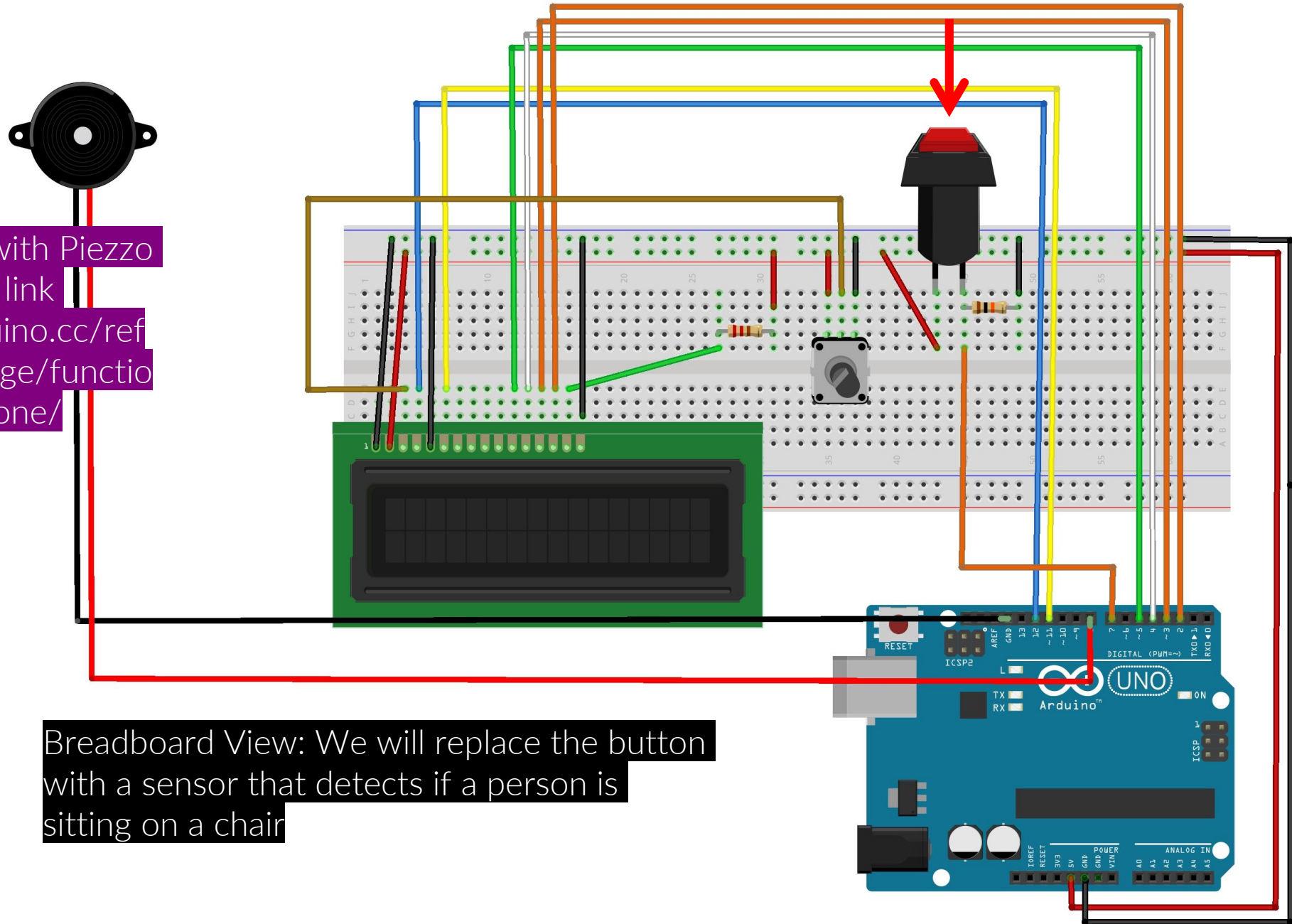
- Refer to the following website : <https://www.arduino.cc/en/Tutorial/HelloWorld>
- Apply the wiring and the code

## Design Challenge

- Build a smart chair that welcomes people when seated with a greeting message displayed on a LCD Screen. If a person sits there for a certain period of time, the system should remind the person to leave the seat to have an exercise, walk, etc. Reminder types: Buzzer, LCD Screen Messages

In order to work with Piezzo Buzzer follow the link  
<https://www.arduino.cc/reference/en/language/functions/advanced-io/tone/>

Breadboard View: We will replace the button  
with a sensor that detects if a person is  
sitting on a chair







How would you design a system that detects if a person is sitting on a chair?

Wassily Chair / Club Armchair (B3) (1970s Bauhaus)



562 4.10





**Proco P**

Uzun Adı	Geniřlik	Uretim Tarihi	Artikol Kodu
		2 mm P.E BEYA	60630270
		100 cm	
Metraj	Uretim No		

**GÜNEř IřINILARINDAN KORUYUNU**

# Coding and Testing

Hints: use millis to calculate the time interval, but you should worry about the variable type.

<https://www.arduino.cc/en/Reference/VariableDeclaration>

Example code:

```
unsigned long time;
void setup() {
    Serial.begin(9600);
}
void loop() {
    Serial.print("Time: ");
    time = millis();
    //prints time since program started
    Serial.println(time);
    // wait a second so as not to send massive amounts of data
    delay(1000);
}
```