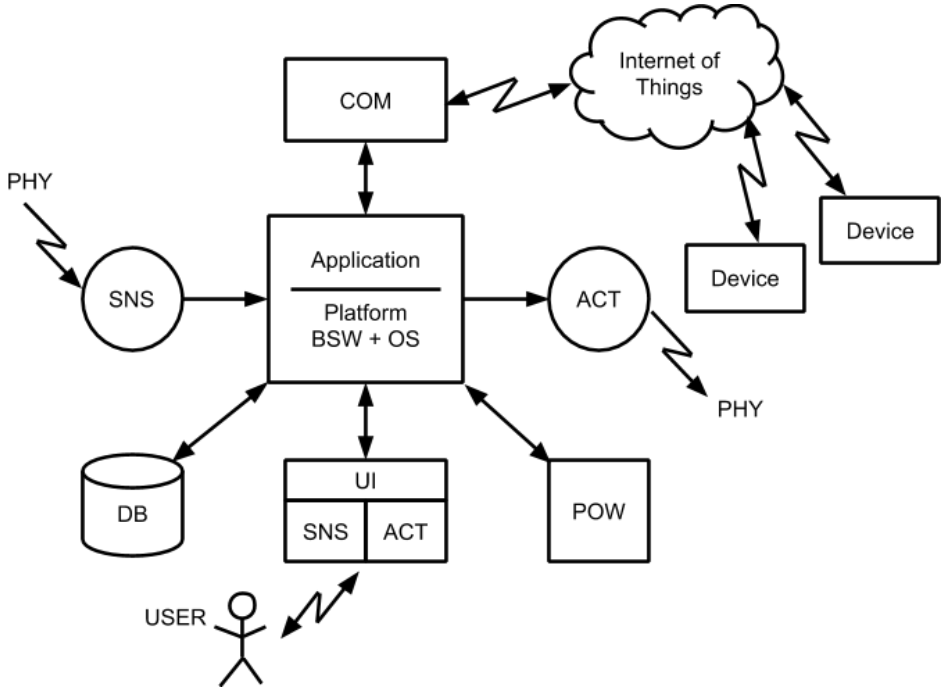
Internetul Lucrurilor

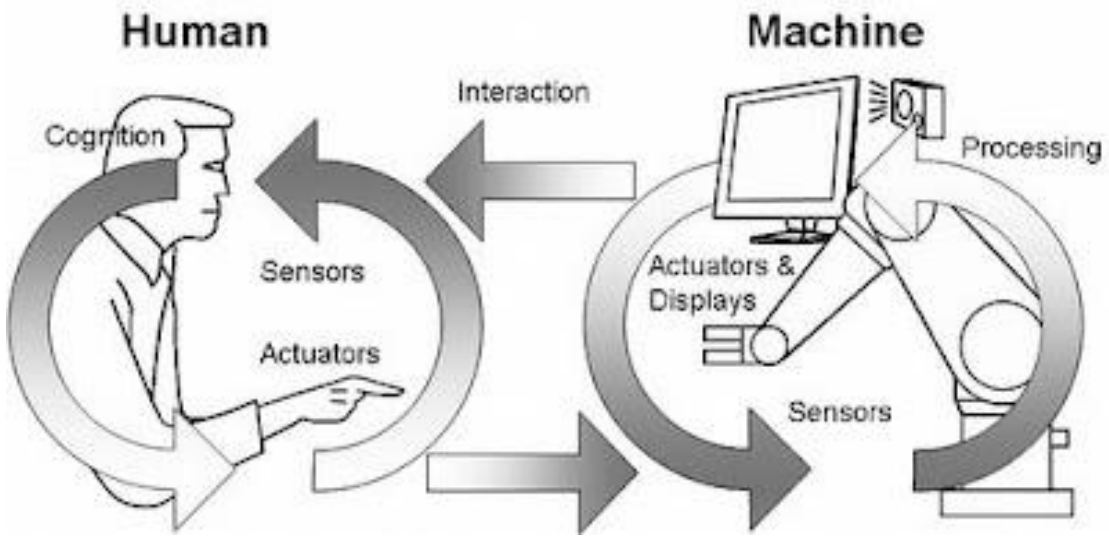
Interacțiunea cu Utilizatorul

Tipuri de interacțiuni

- Interacțiuni cu Utilizatorul
- Interacțiuni cu Mediul
- Interactiuni cu Dispozitive (IoT)



Schimb de informație utilizator cu sistemul

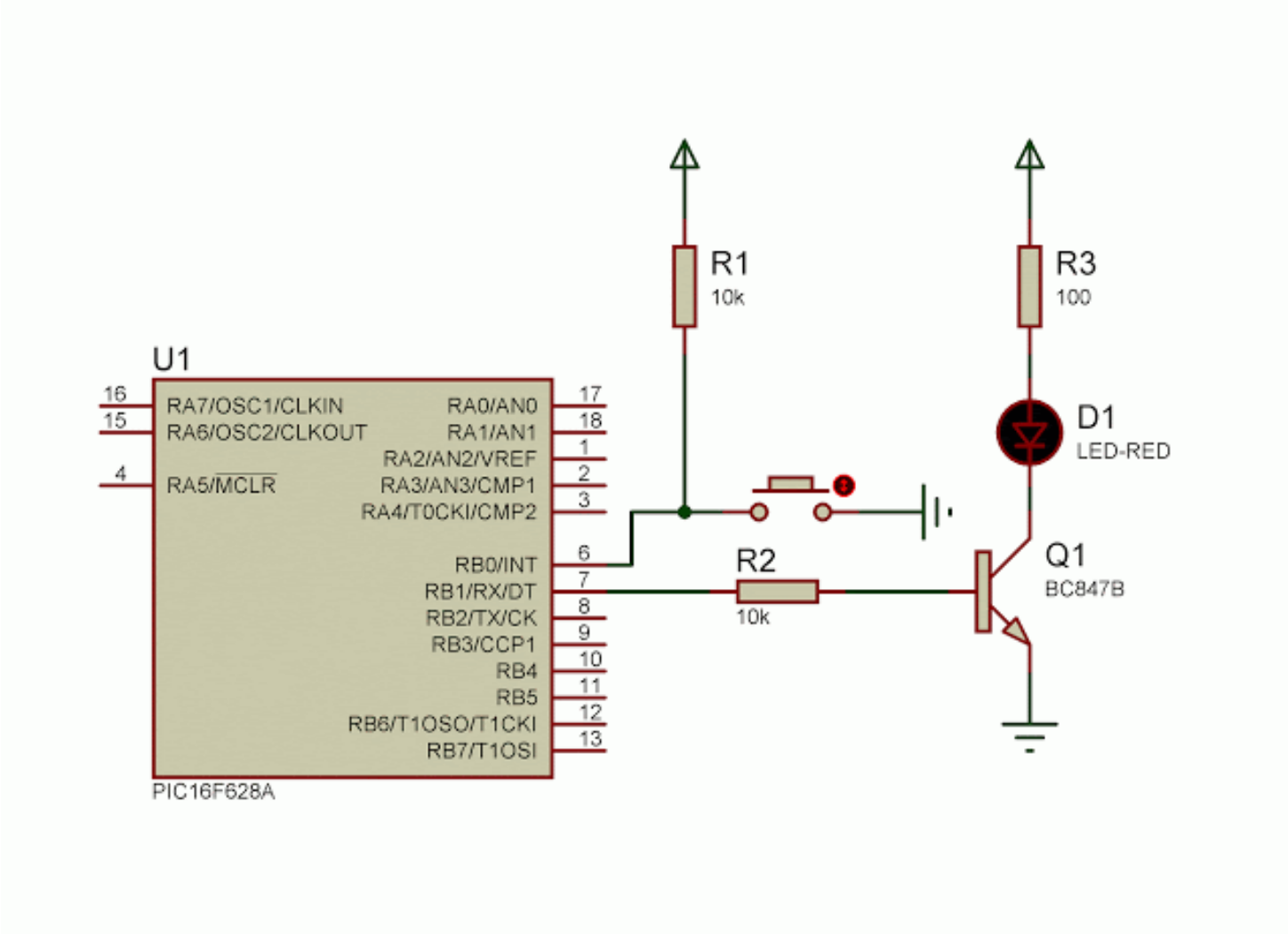


- Interfețe binare
- Interfețe binare scalate
- Interfațe digitale
- Interfata standard STDIO
- Interfețe analogice
- Interfețe complexe

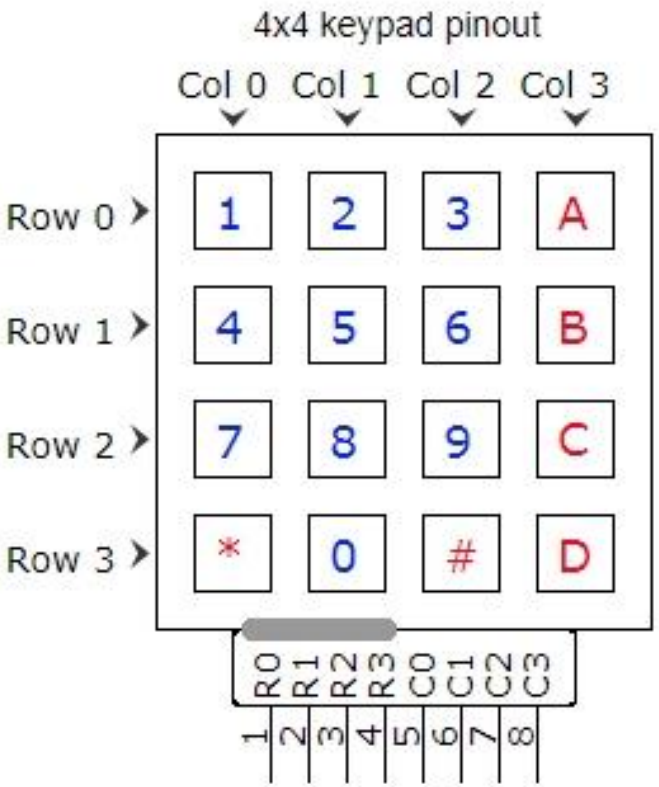
Personal Computer - PC

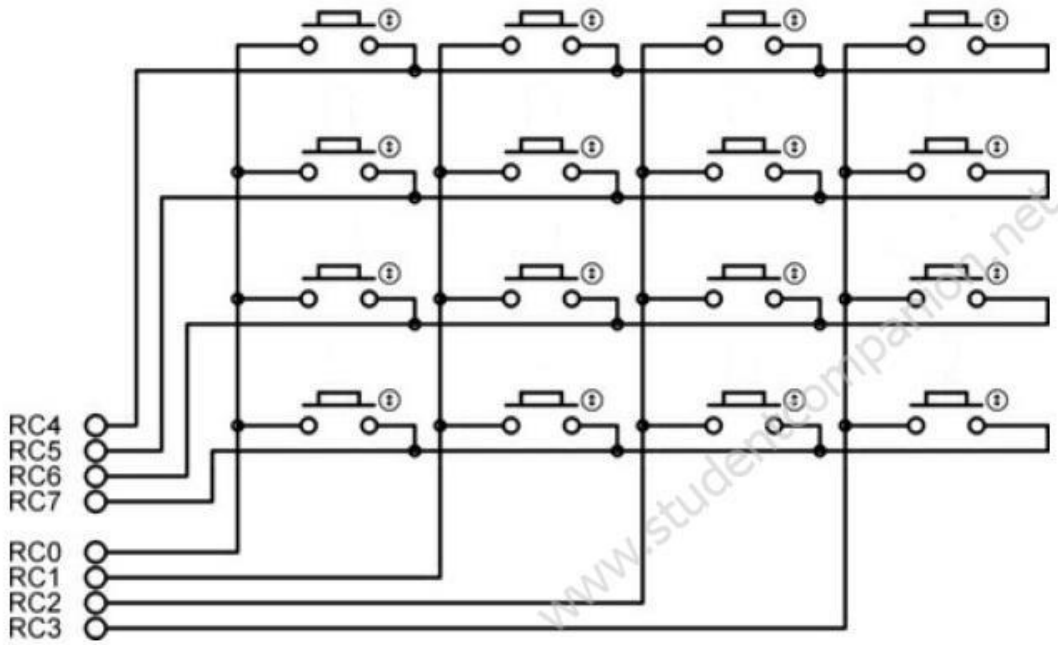
Interacțiune PC

Interfețe Binare – Buton / LED

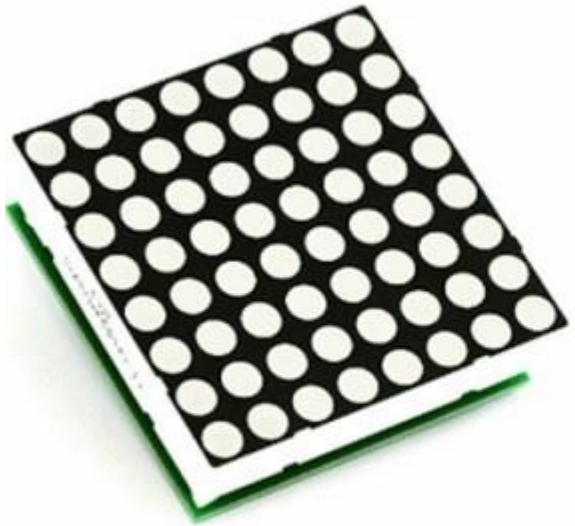


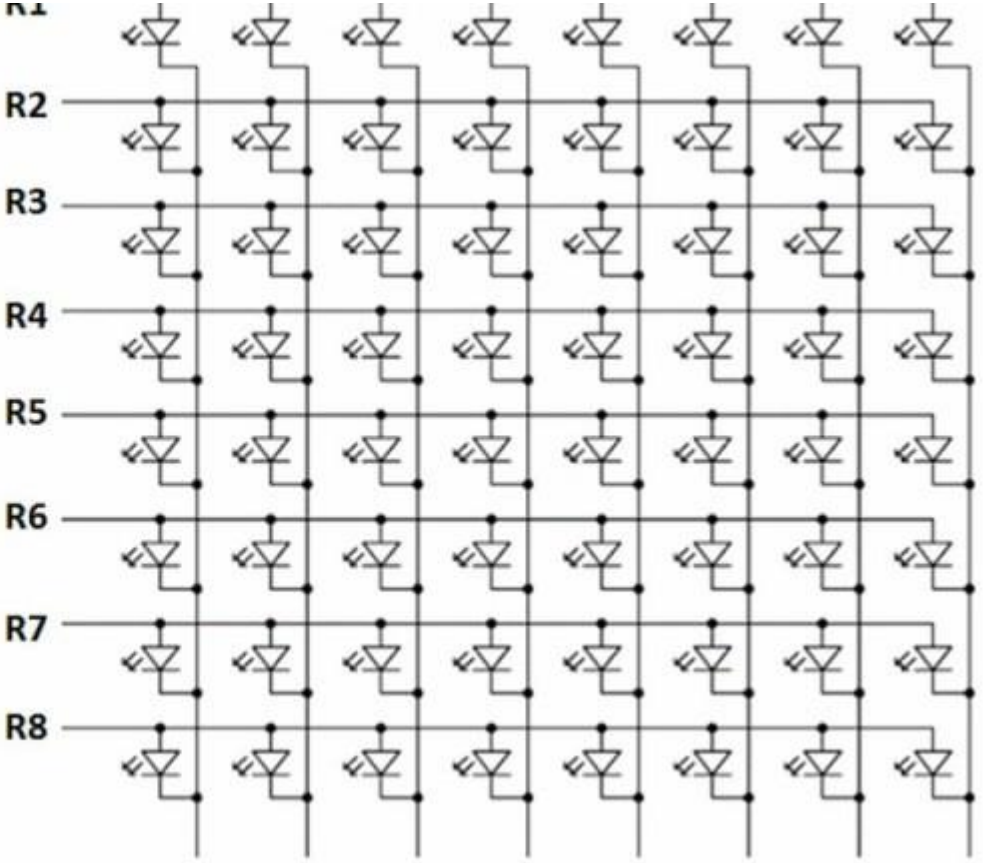
Matrice butoane



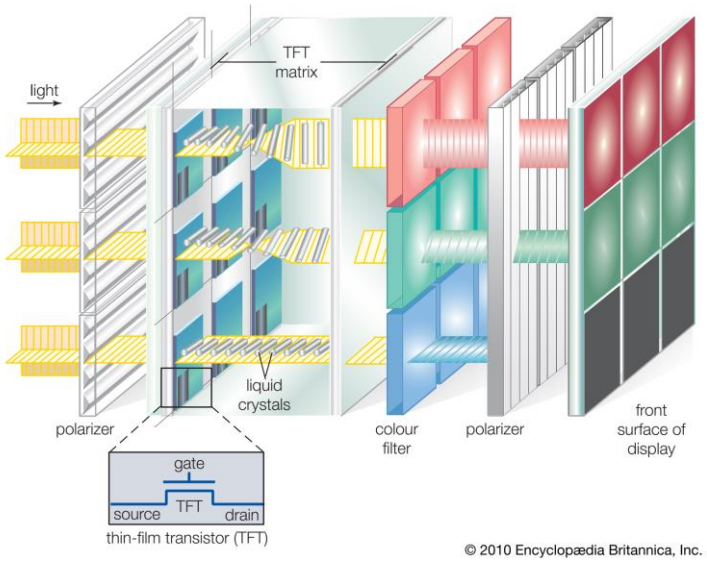


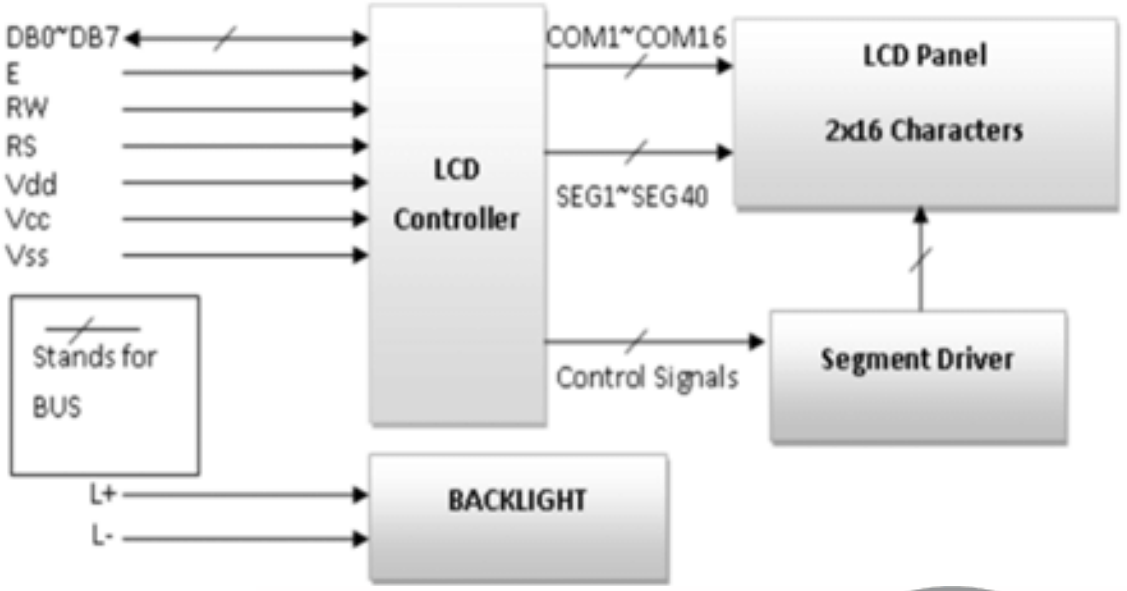
Matrice LED

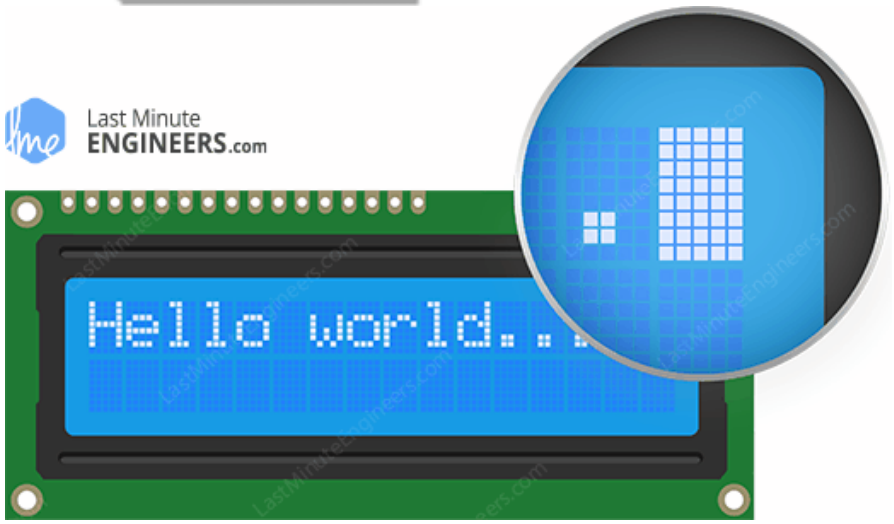




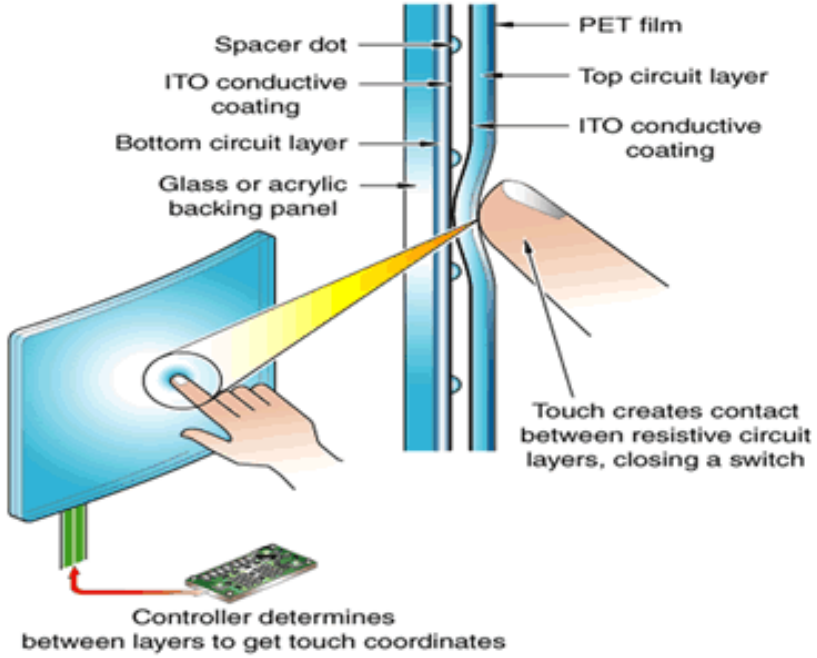
Matrice LCD

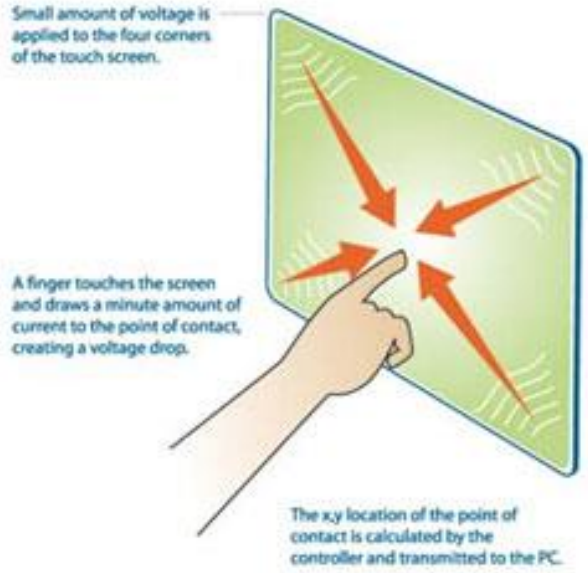

light
TFT matrix
liquid crystals
polarizer
colour filter
polarizer
front surface of display
gate
source
TFT
drain
thin-film transistor (TFT)
© 2010 Encyclopædia Britannica, Inc.

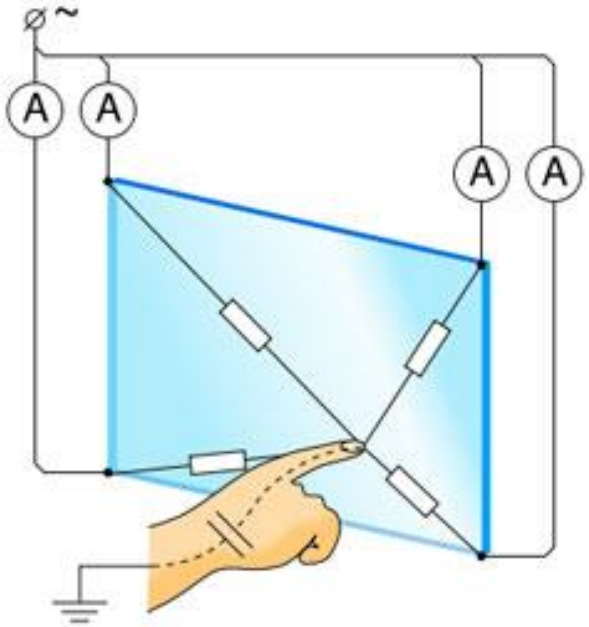

DB0~DB7
E
RW
RS
Vdd
Vcc
Vss
LCD Controller
COM1~COM16
SEG1~SEG40
LCD Panel
2x16 Characters
Segment Driver
Control Signals
Stands for BUS
L+
L-
BACKLIGHT


Last Minute
ENGINEERS.com
Hello world...

Rezistive touch sensor







Interacțiuni Tactile

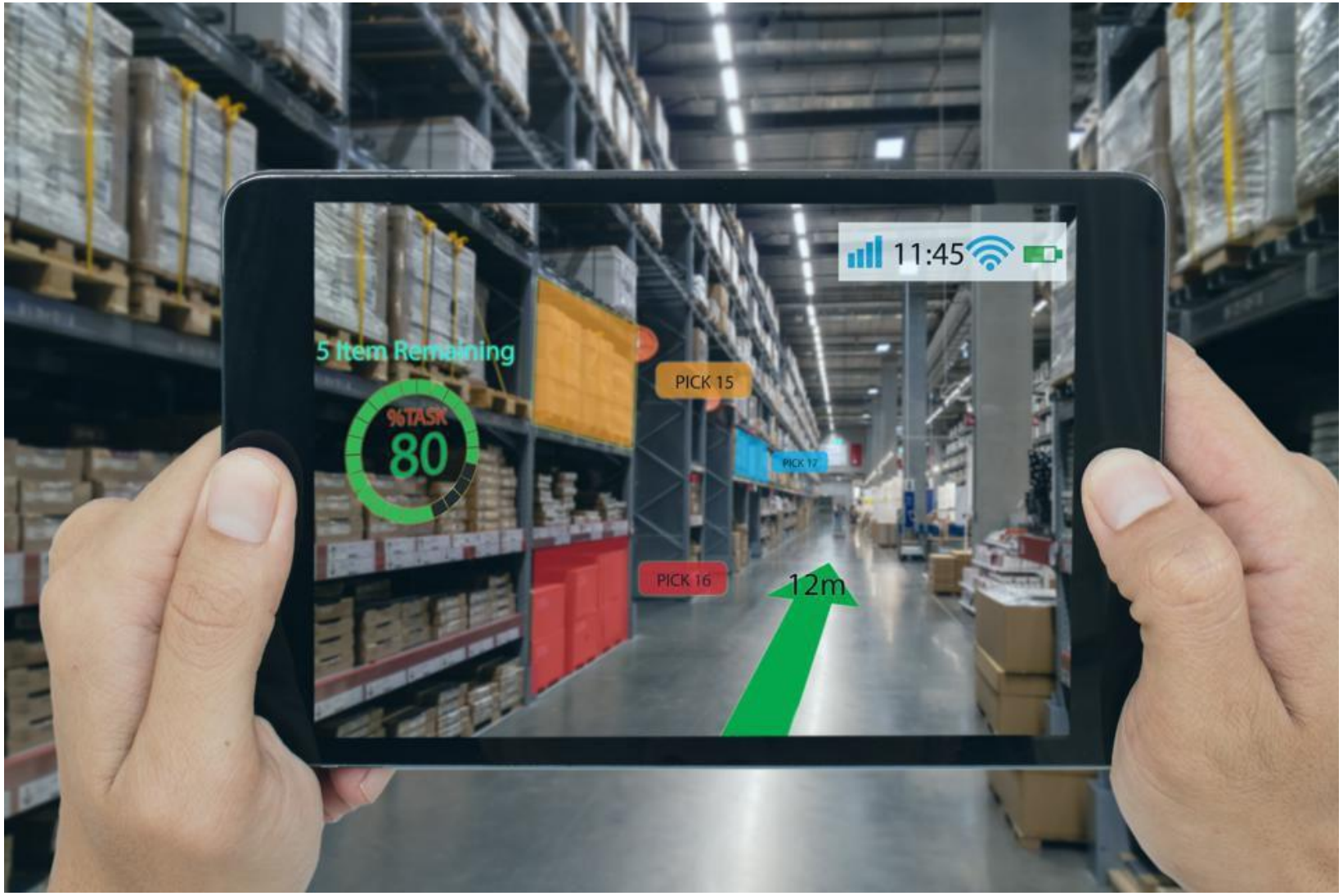
Varietăți


Camera 1
Camera 2
Camera 3
Camera 4
Blackmagicdesign


OK
73%
900 RPM
DURATIQ
EXTRA
P
R

Virtual Reality

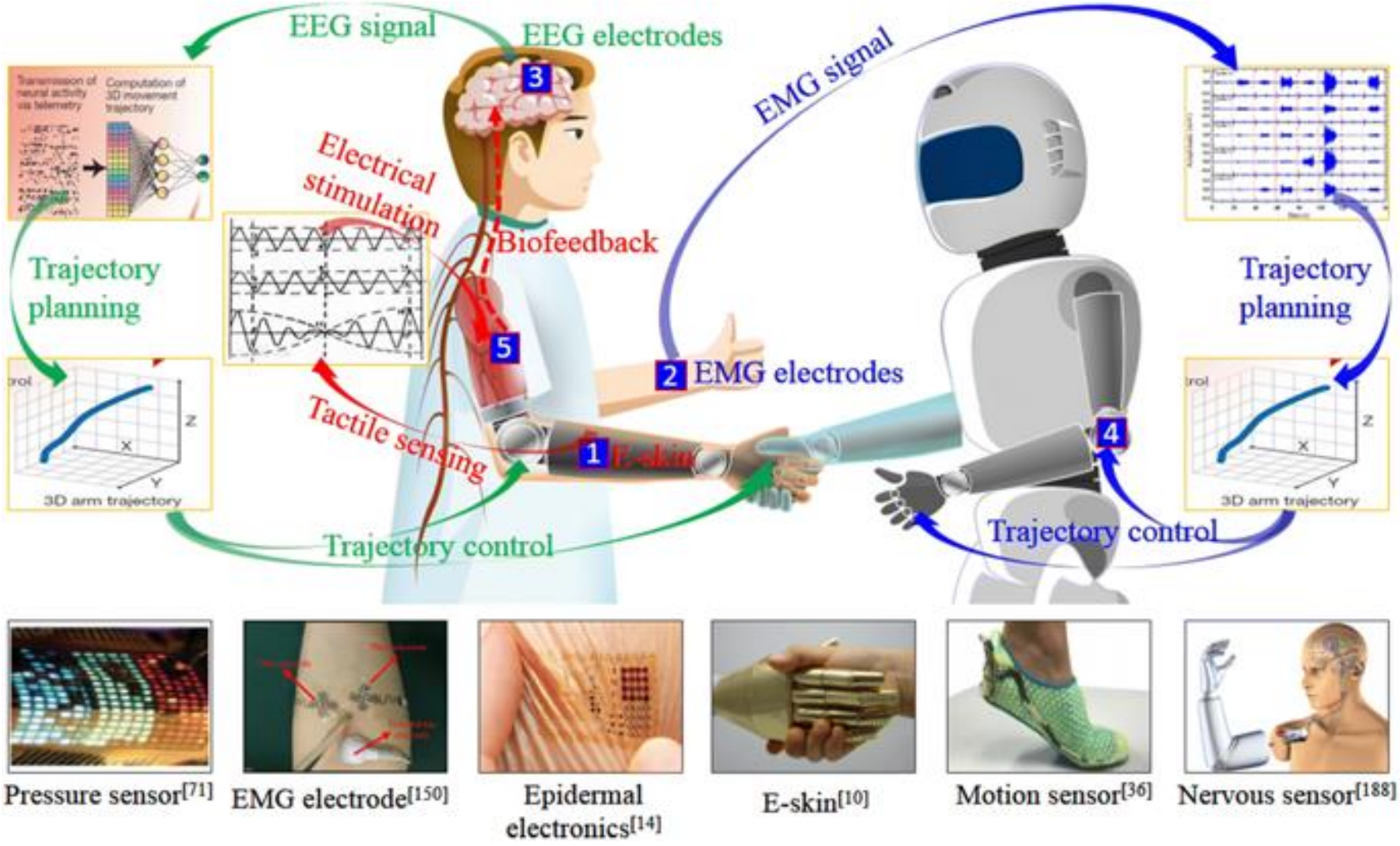
Augumented Reality



Interacțiuni Vizuale

Interacțiuni vocale - Boxe Smart

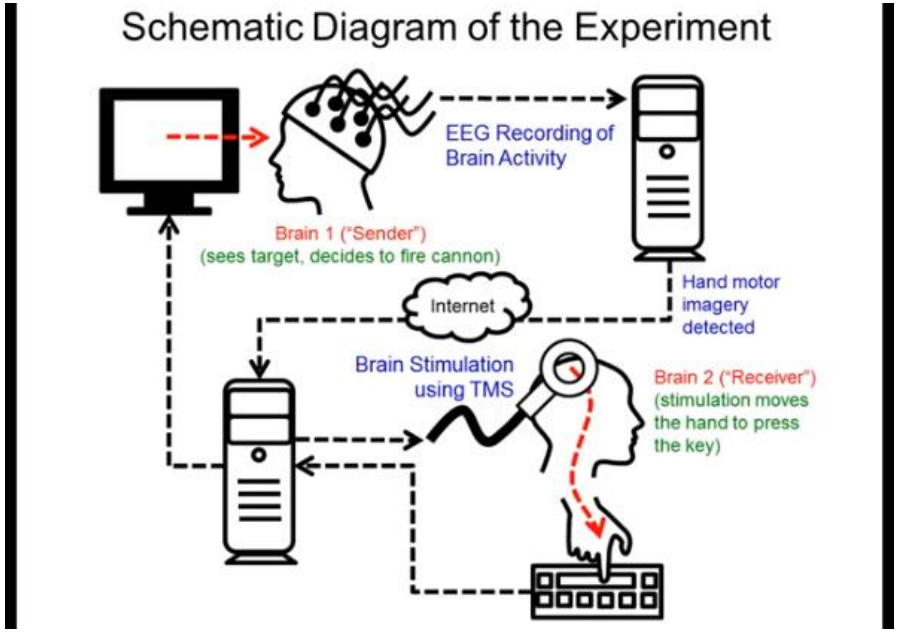
EMG Human Machine Interface



EEG – Human Machine Interface

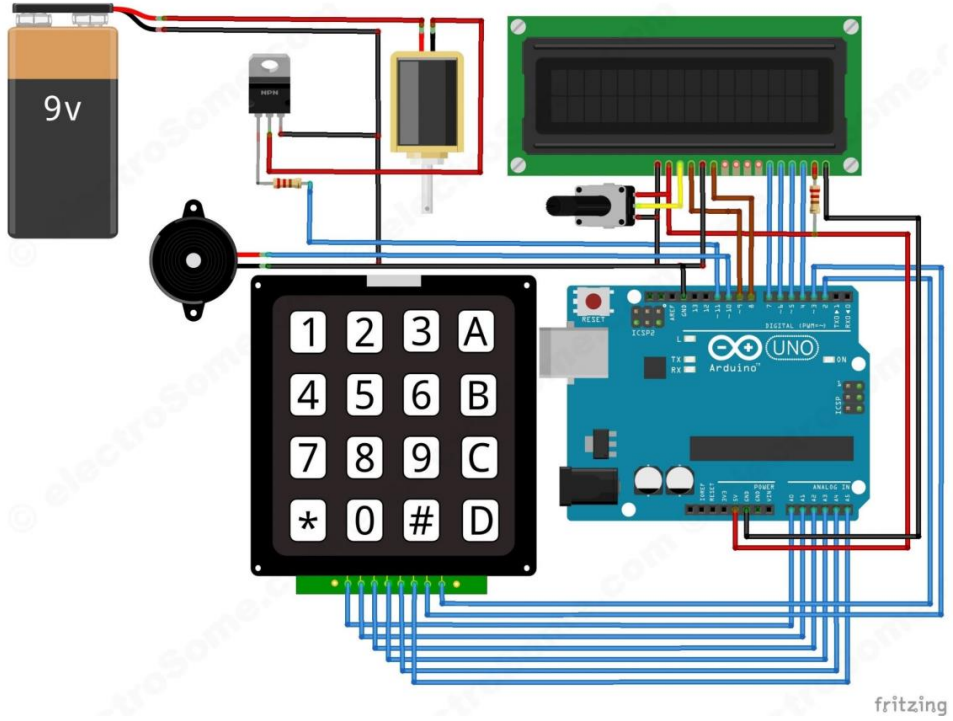
https://youtu.be/rNRDc714W5I

Researchers create first ever human-to-human interface, use it to

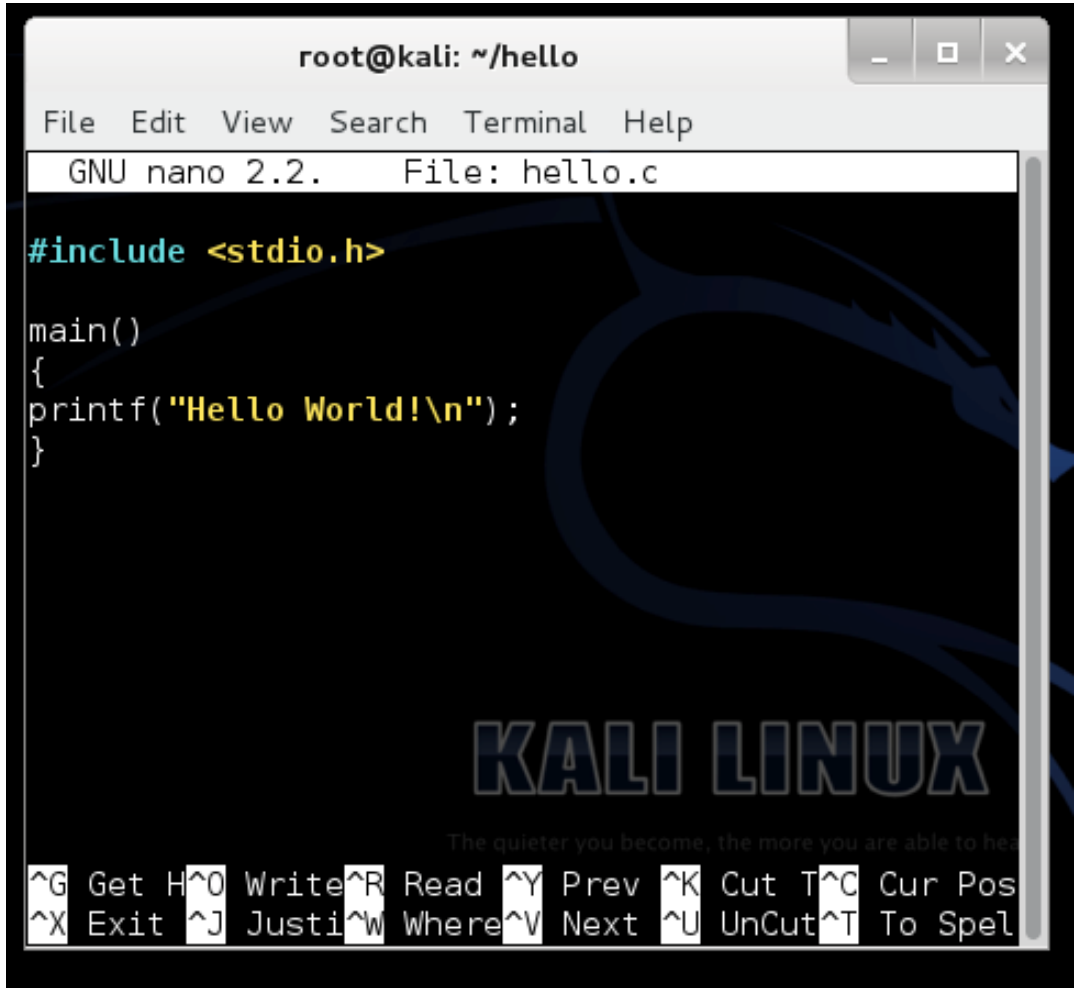


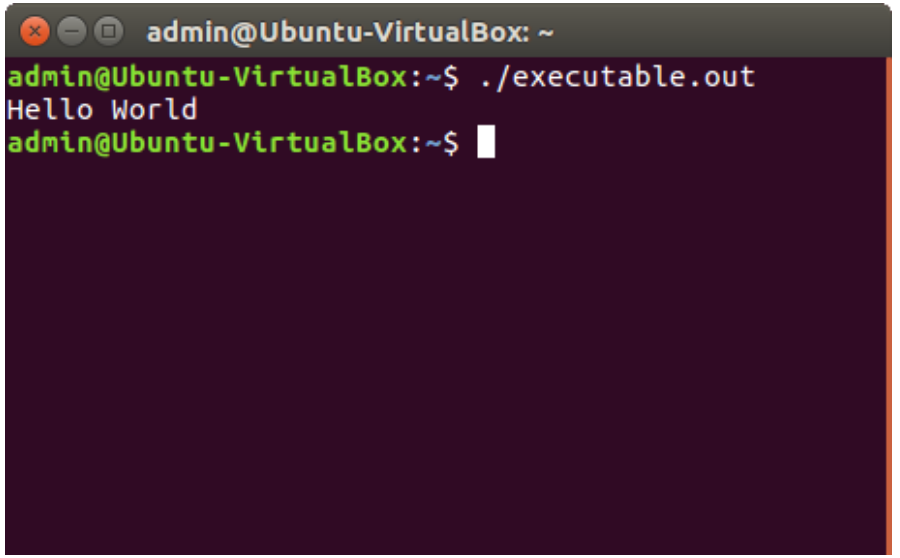
https://www.slashgear.com/researchers-create-first-ever-human-to-human-interface-use-it-to-play-a-game-27295122/

Desktop PC vs. Micro PC

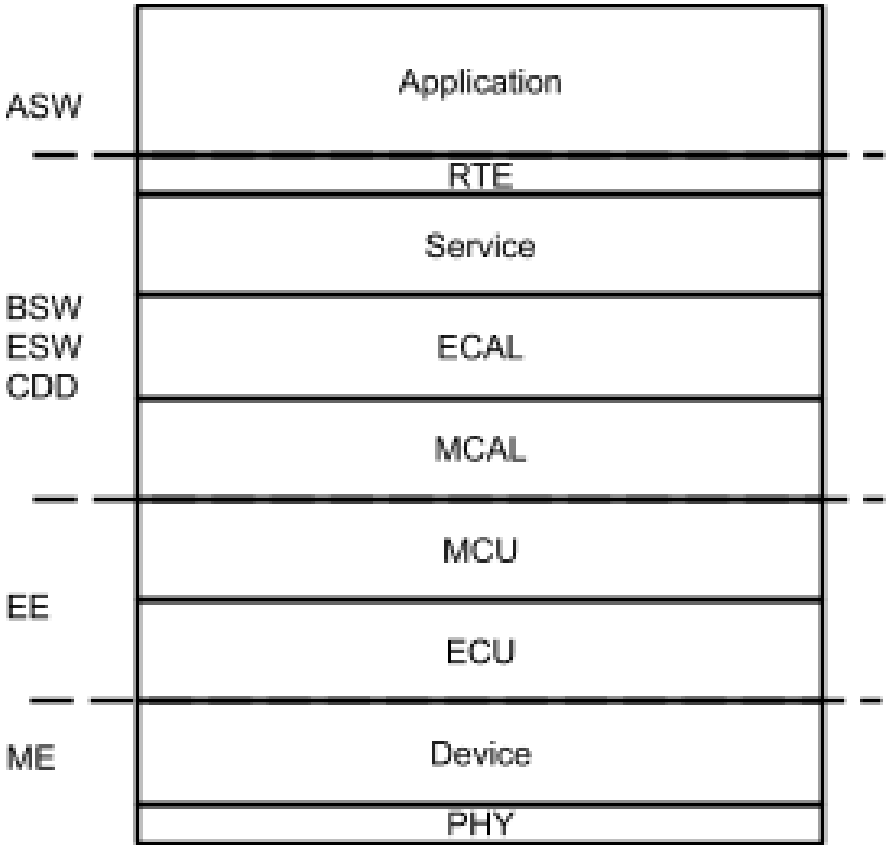


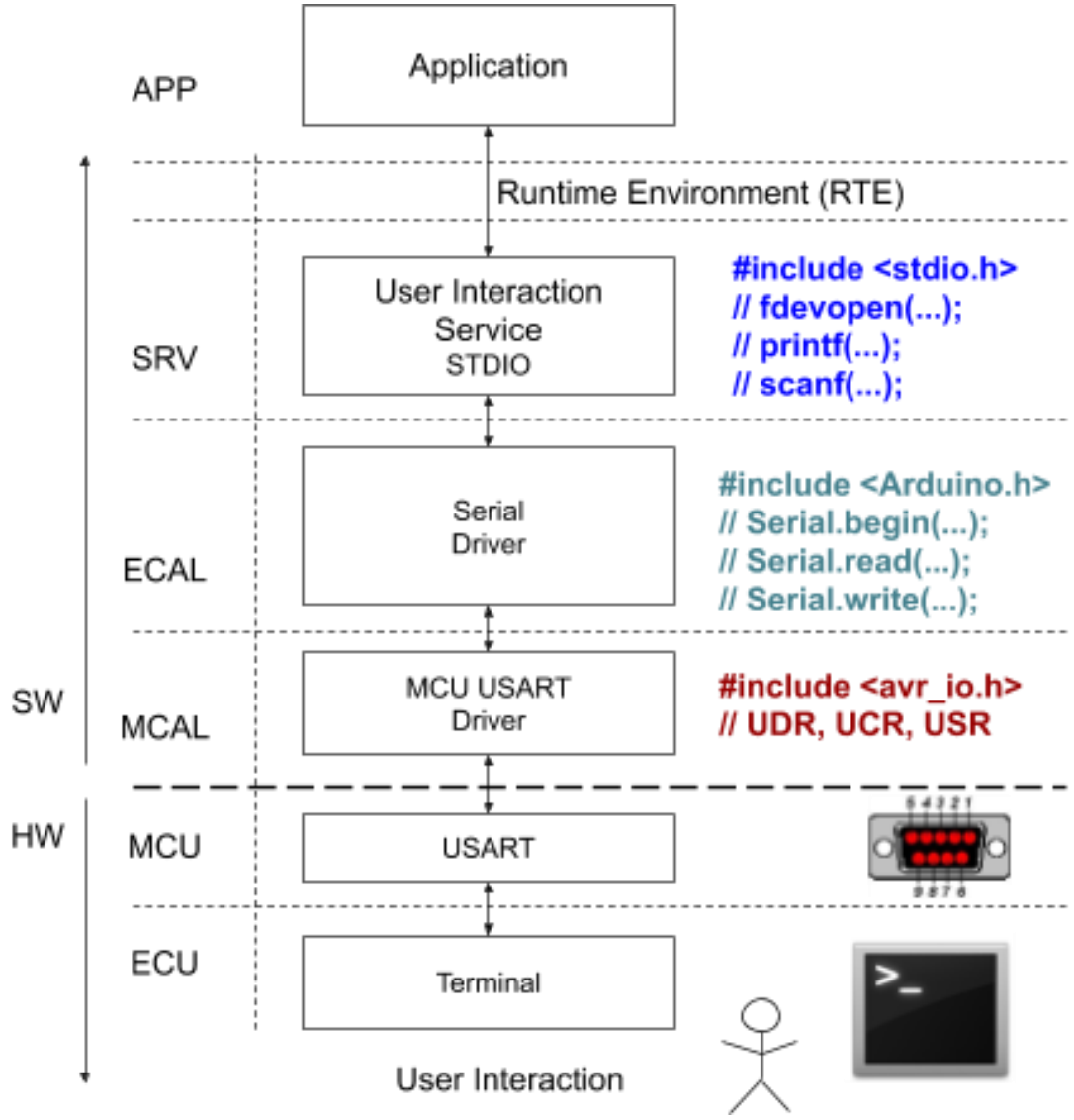
Interfața Standard de intrare/ieșire - STDIO





Serial Terminal User interaction





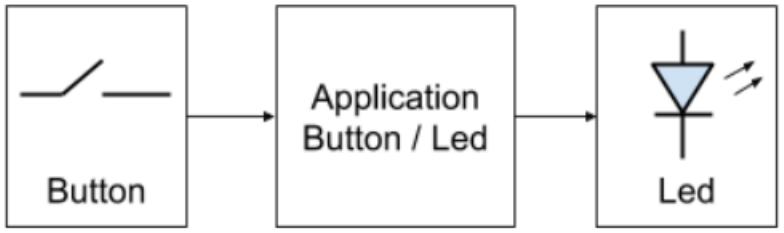
Conectare STDIO la MCU – Serial / UART

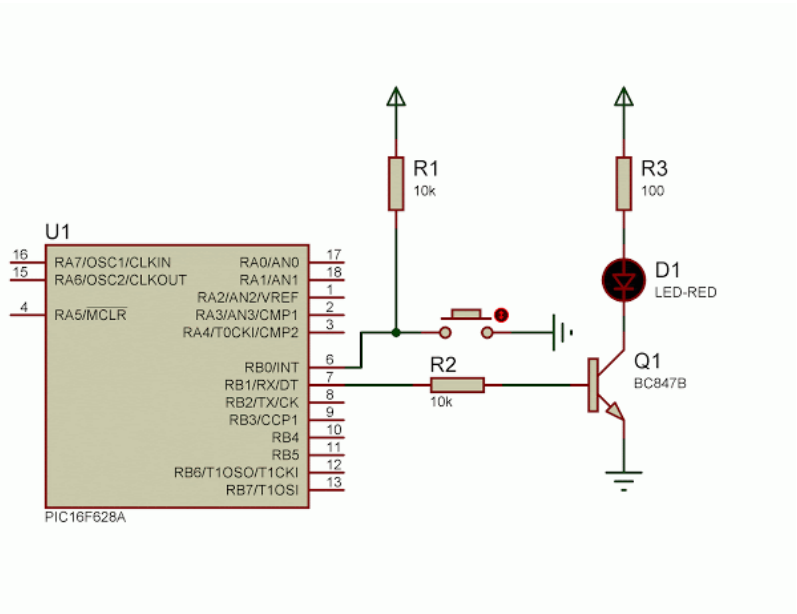
https://www.nongnu.org/avr-libc/user-manual/group__avr__stdio.html

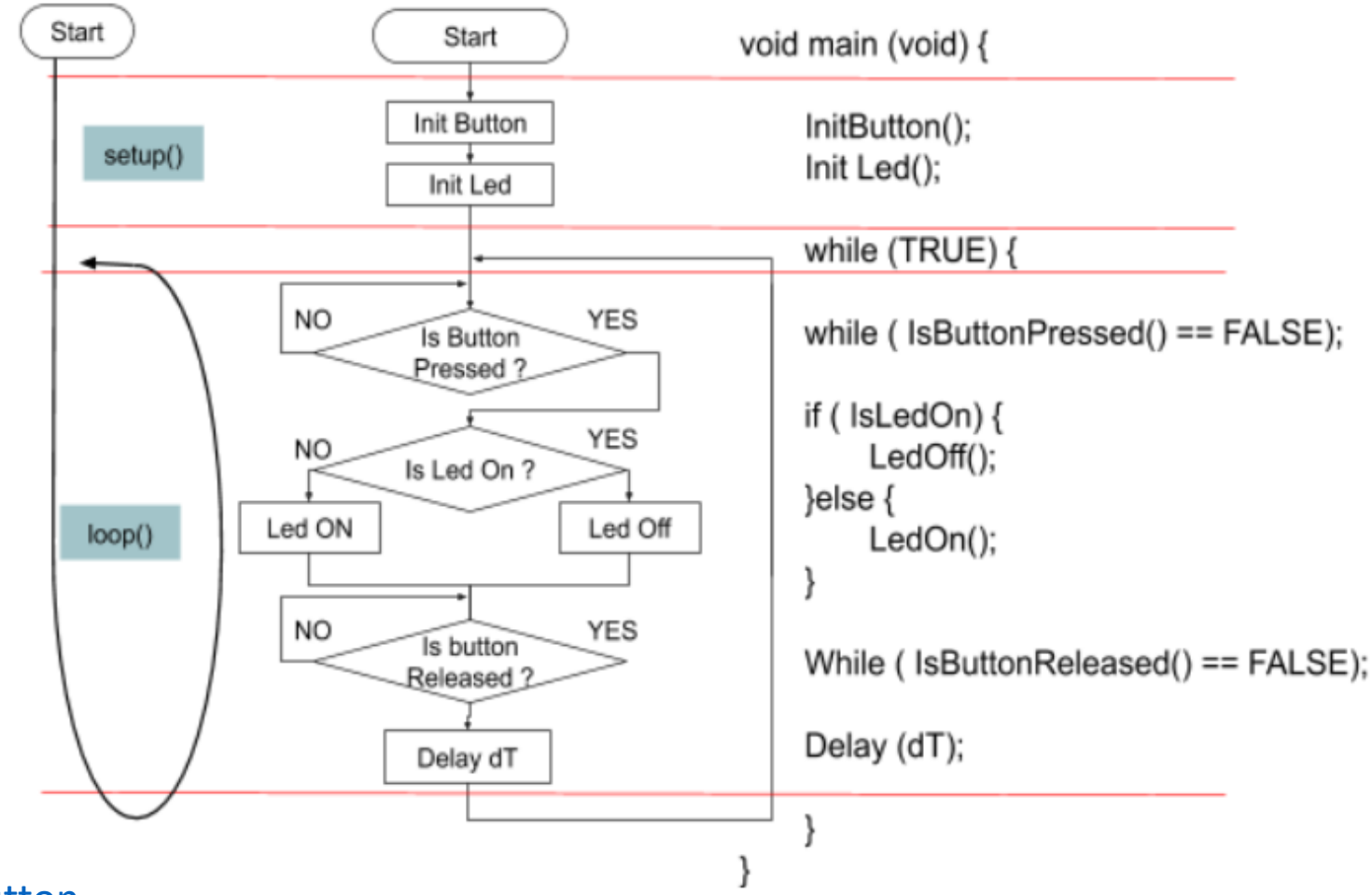
```
// 1. Includere Libraria STDIO
#include <stdio.h>
#include <Arduino.h>

// 2. Definire funcție scriere caracter
void my_putChar( char ch, FILE * f){
    return Serial.write( c );
}
// 3. Definire funcție citire caracter
char my_GetChar(FILE * f){
    while(!Serial.available());
    return Serial.read();
}
```

```
void main(void){
    // 4. inițializare periferii
    Serial.begin(9600)

    // 5. Definire stream
    FILE *my_stream = fdevopen(my_putChar,
    my_GetChar);

    // 6. înlocuire intrarea /ieșirea standard
    // (optional pentru prima initializare)
      stdin = stdout = my_stream ;

    // 7. Utilizare STDIO
      printf("Hello World")
}
```

Interfețe Binare – Buton / LED







https://arduinogetstarted.com/tutorials/arduino-button

https://arduinogetstarted.com/tutorials/arduino-led-blink

https://arduinogetstarted.com/tutorials/arduino-button-led

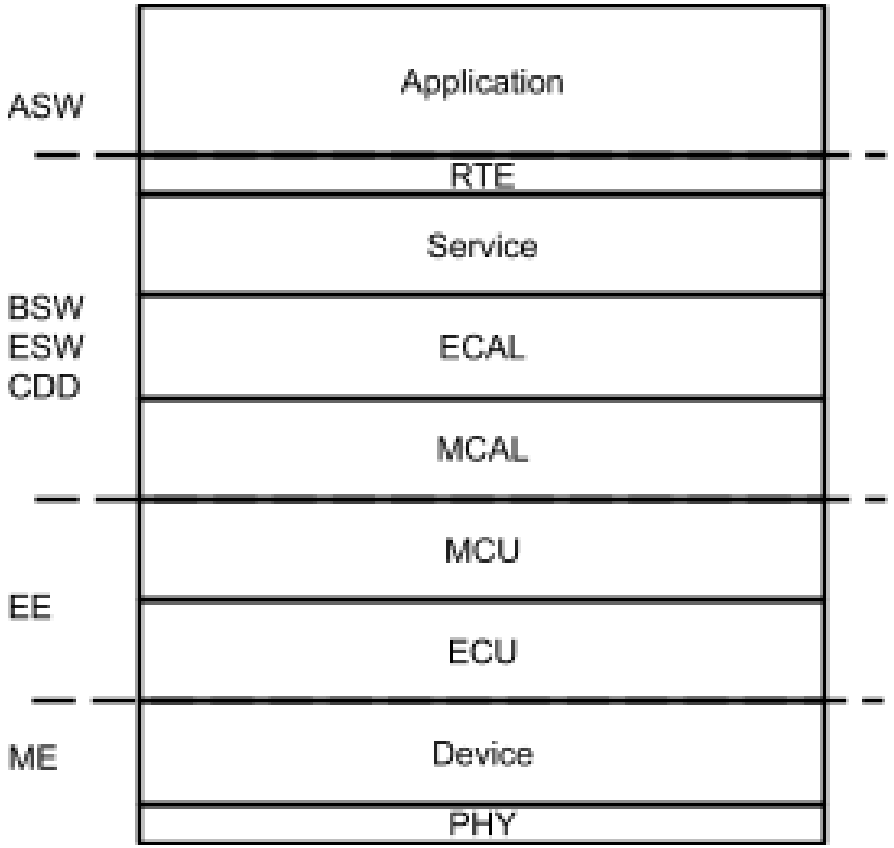
Conectare STDIO la MCU – Button/LED

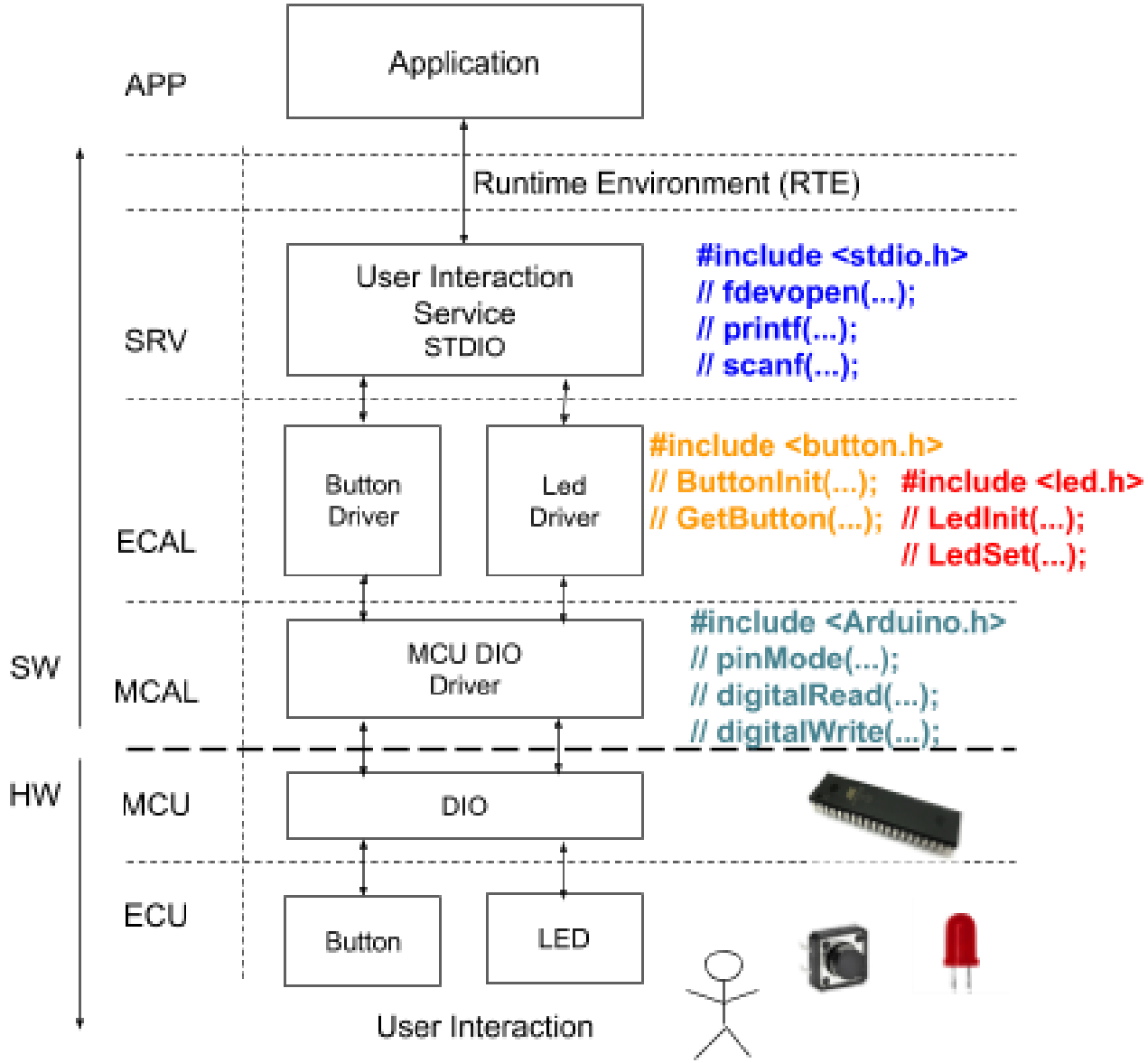
https://www.nongnu.org/avr-libc/user-manual/group__avr__stdio.html

```
// 1. Includere Libraria STDIO
#include <stdio.h>
#include “led.h”
#include “button.h”
// 2. Definire funcție setare LED
void SetLed( char ch, FILE * f){
        If(ch == ‘1’) LedOn();
        else  if (ch == ‘0’) LedOff();
}
// 3. Definire funcție citire Buton
char GetButton(FILE * f){
        while ( IsButtonPressed() == FALSE);
        return ‘1’
}
```

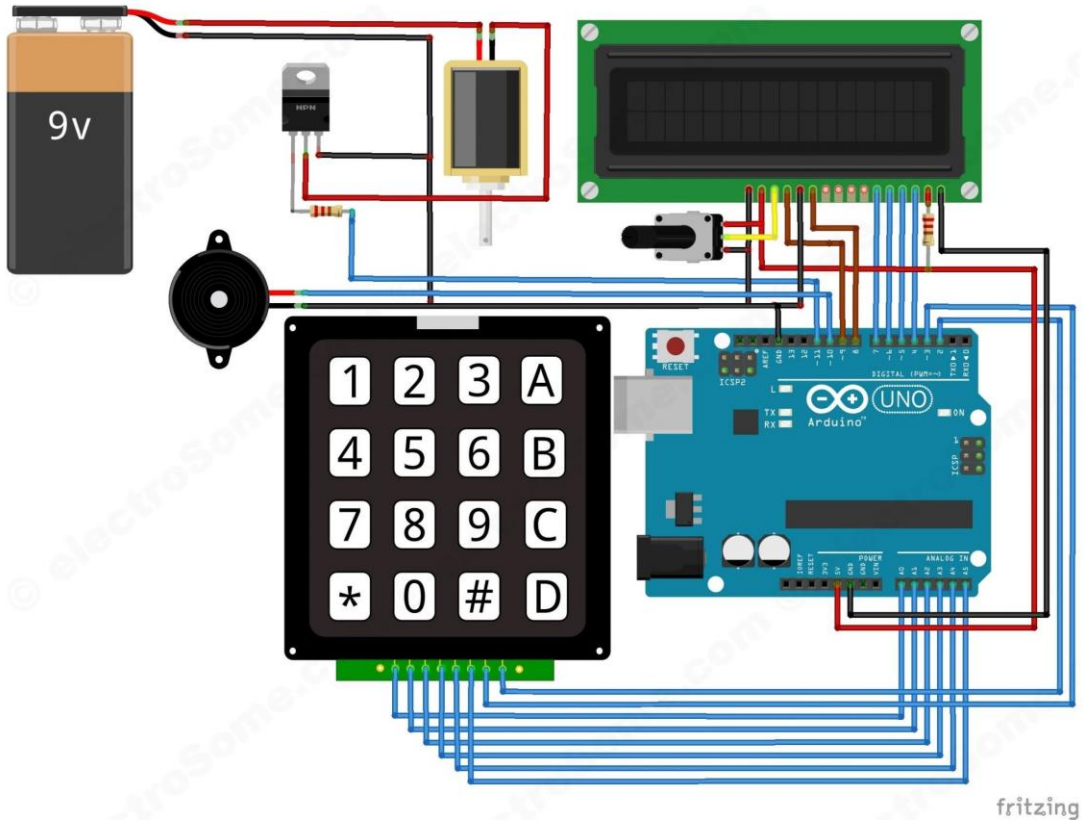
```
void main(void){
        // 4. inițializare periferii
        ButtonInit();
        LedInit();

        // 5. Definire stream
        FILE *my_stream = fdevopen(SetLed, GetButton);

        // 6. înlocuire intrarea /ieșirea standard
        // (optional pentru prima initializare)
          stdin = stdout = my_stream ;

        // 7. Utilizare STDIO
        scanf(“%d”, button_state)
        If (button_state == ‘1’)    LedToggle()
}
```

Button Led User interaction





Keypad LCD User Interaction




```
#include <LiquidCrystal.h>
//#include <LiquidCrystal_I2C.h>
LiquidCrystal lcd(...);
lcd.init();
lcd.print("Hello World !");
```

```
#include <Keypad.h>
Keypad keypad = Keypad(...);
char key = keypad.getKey();
```

https://arduinogetstarted.com/tutorials/arduino-keypad

https://arduinogetstarted.com/tutorials/arduino-lcd

https://arduinogetstarted.com/tutorials/arduino-keypad-lcd

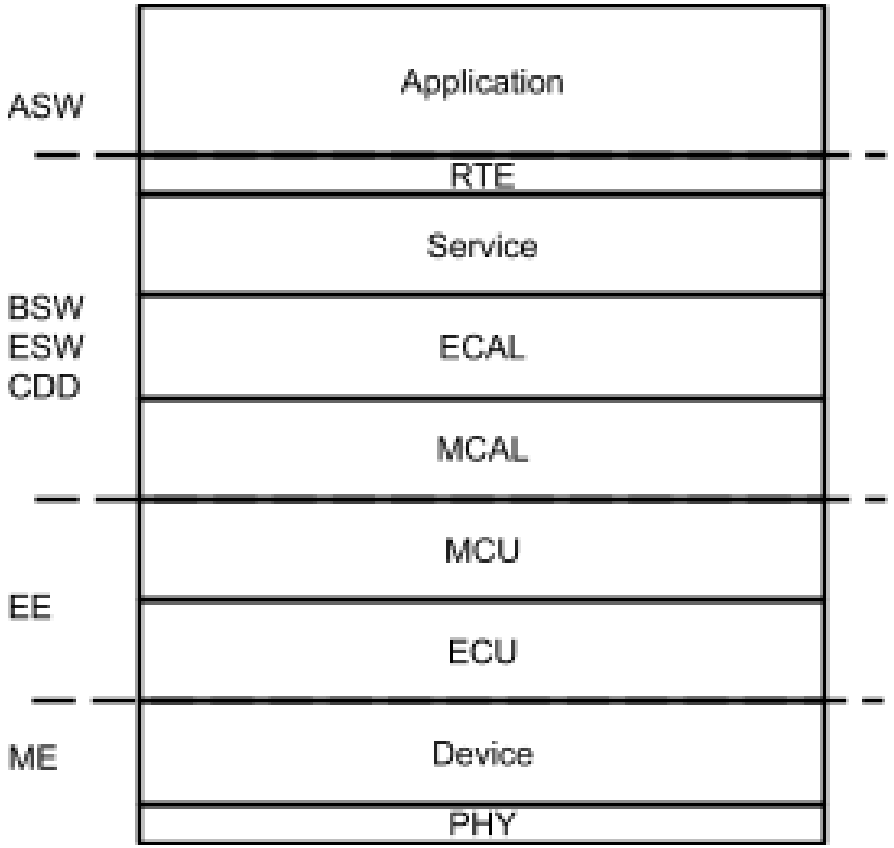
Conectare STDIO la MCU – KeyPad/Lcd

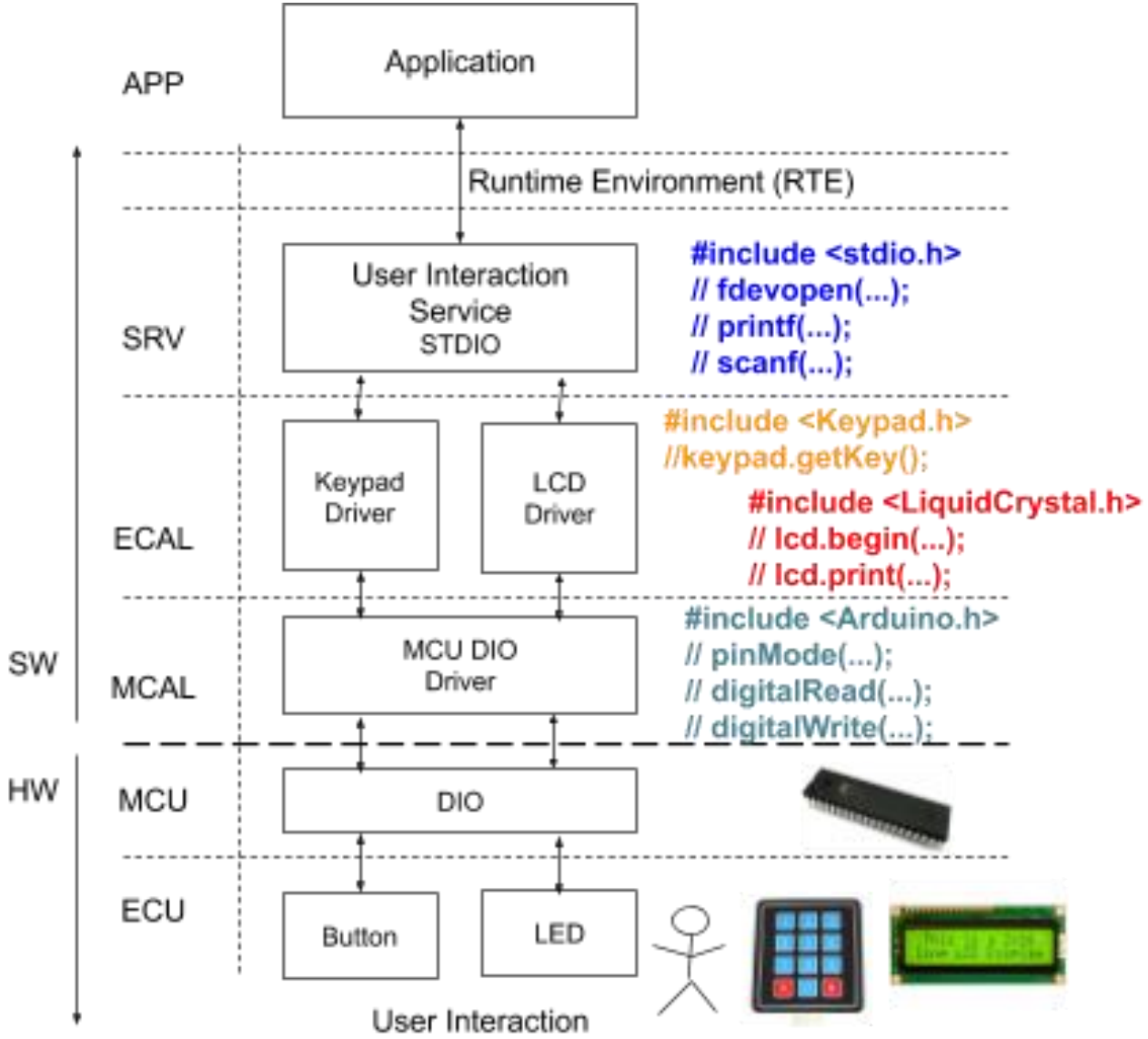
https://www.nongnu.org/avr-libc/user-manual/group__avr__stdio.html

```
// 1. Includere Libraria STDIO
#include <stdio.h>
#include <Keypad.h>
#include <LiquidCrystal.h>
// 2. Definire funcție setare LED
void LcdPutChar( char ch, FILE * f){
        lcd.print(ch);
}
// 3. Definire funcție citire Buton
char KeypadGetChar(FILE * f){
        char key;
        do{ key = keypad.getKey();
        }while ( key == 0);
        return key
}
```

```
void main(void){
        // 4. inițializare periferii
        lcd.begin(16, 2);

        // 5. Definire stream
        FILE *my_stream = fdevopen(LcdPutChar, KeypadGetChar);

        // 6. înlocuire intrarea /ieșirea standard
        // (opțional pentru prima inițializare)
          stdin = stdout = my_stream ;

        // 7. Utilizare STDIO
        scanf("%s", msg);
        printf("%s",msg);
}
```

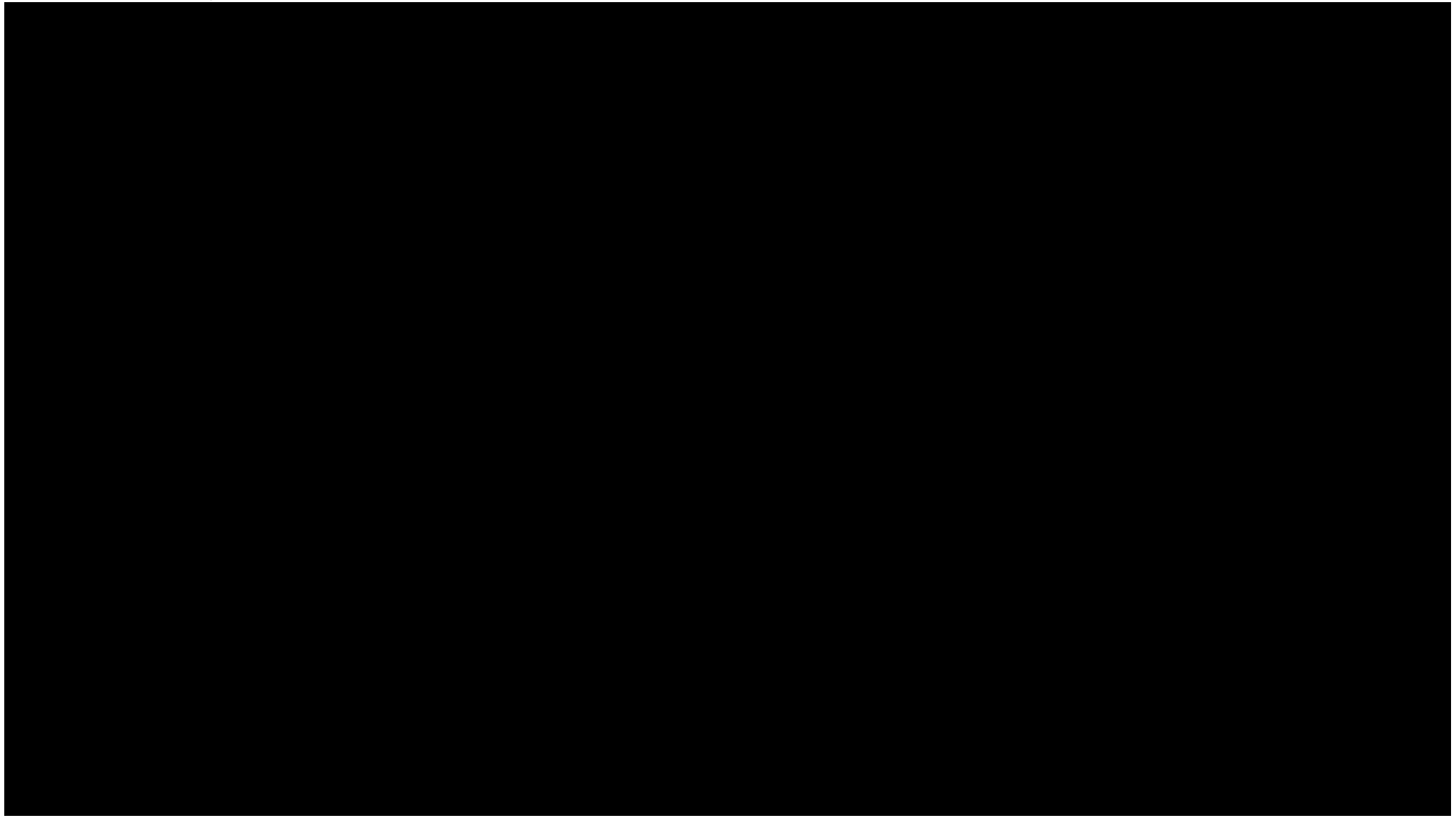
Button Led User interaction





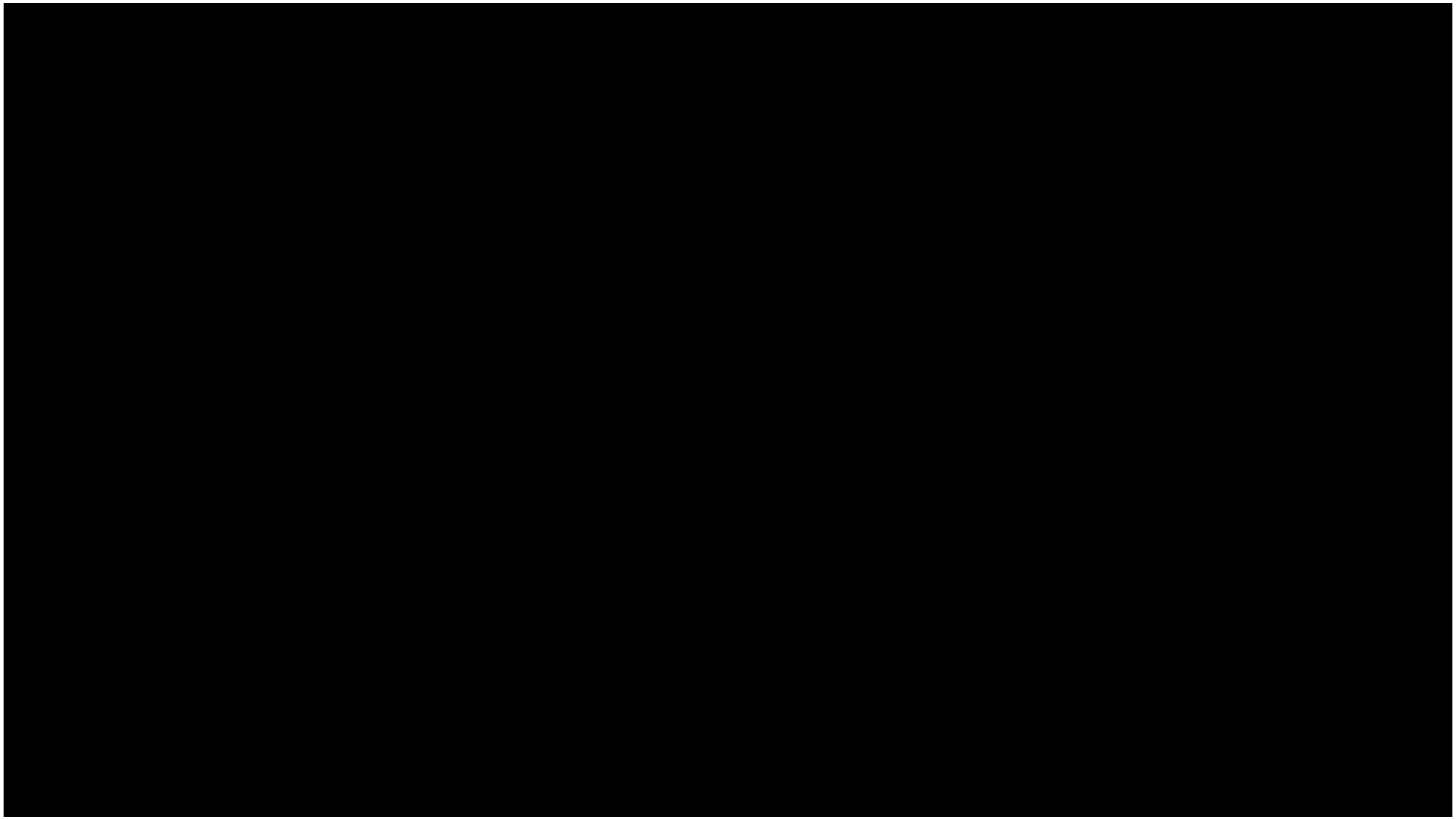
Interacțiuni Tactile

https://youtu.be/ZSFpxVc0Gm8



Interactiuni Sunet

https://youtu.be/6-1bvYNqw0A

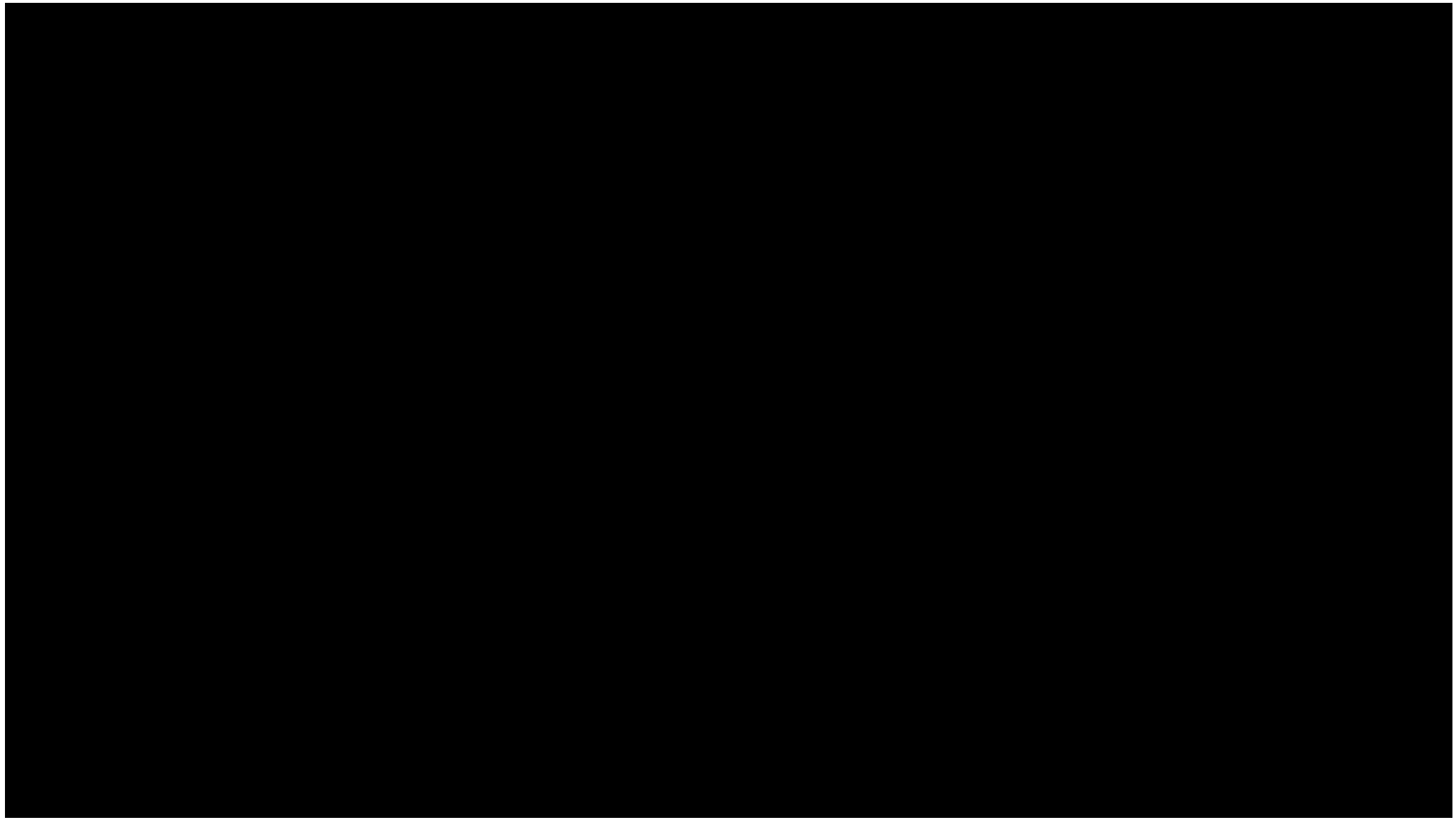


https://youtu.be/f9MwaH6oGEY

Virtual Reality vs Augumented reality

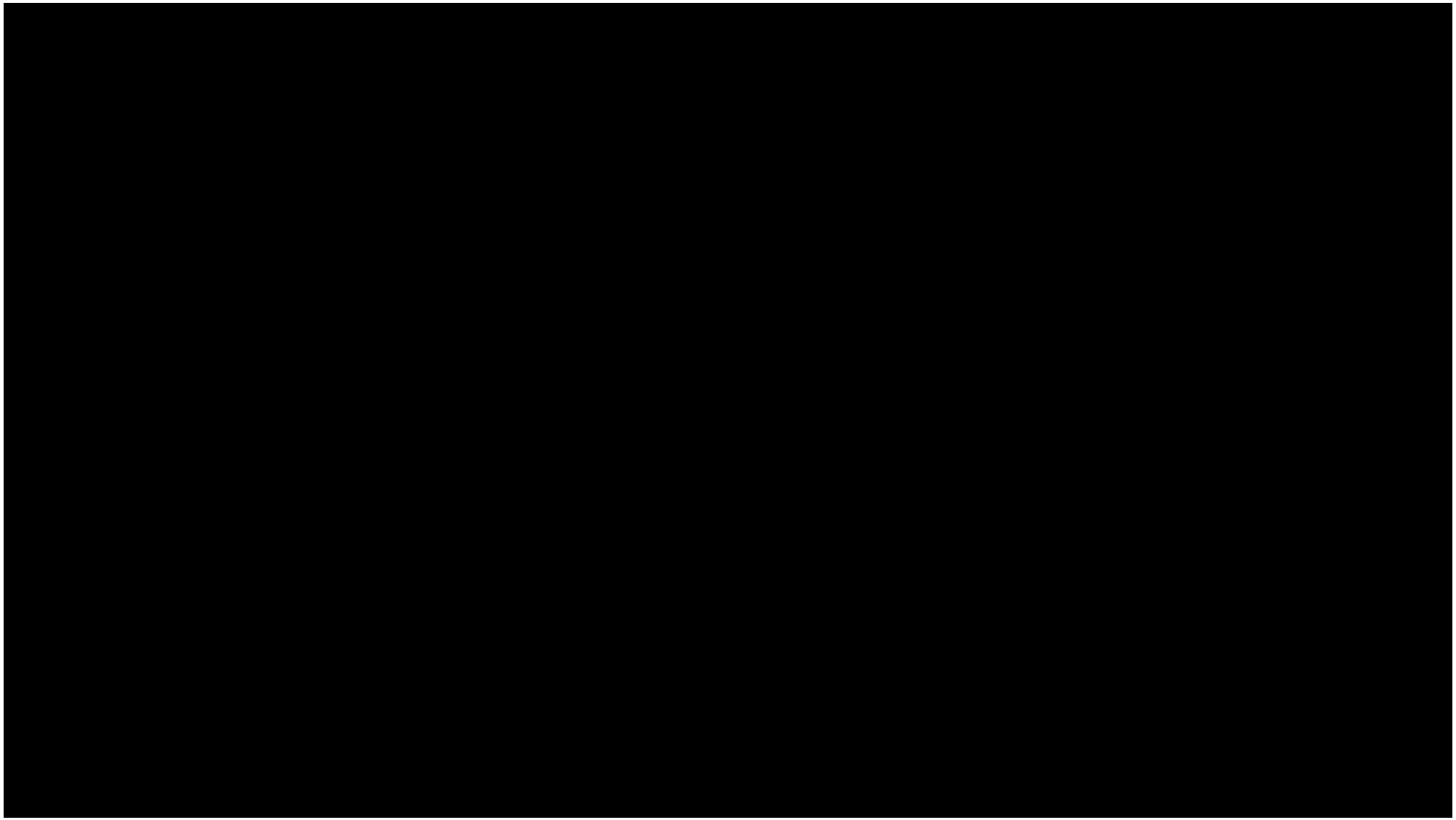
https://youtu.be/73yDRm8KaWY

Interacțiuni Vizuale Wii



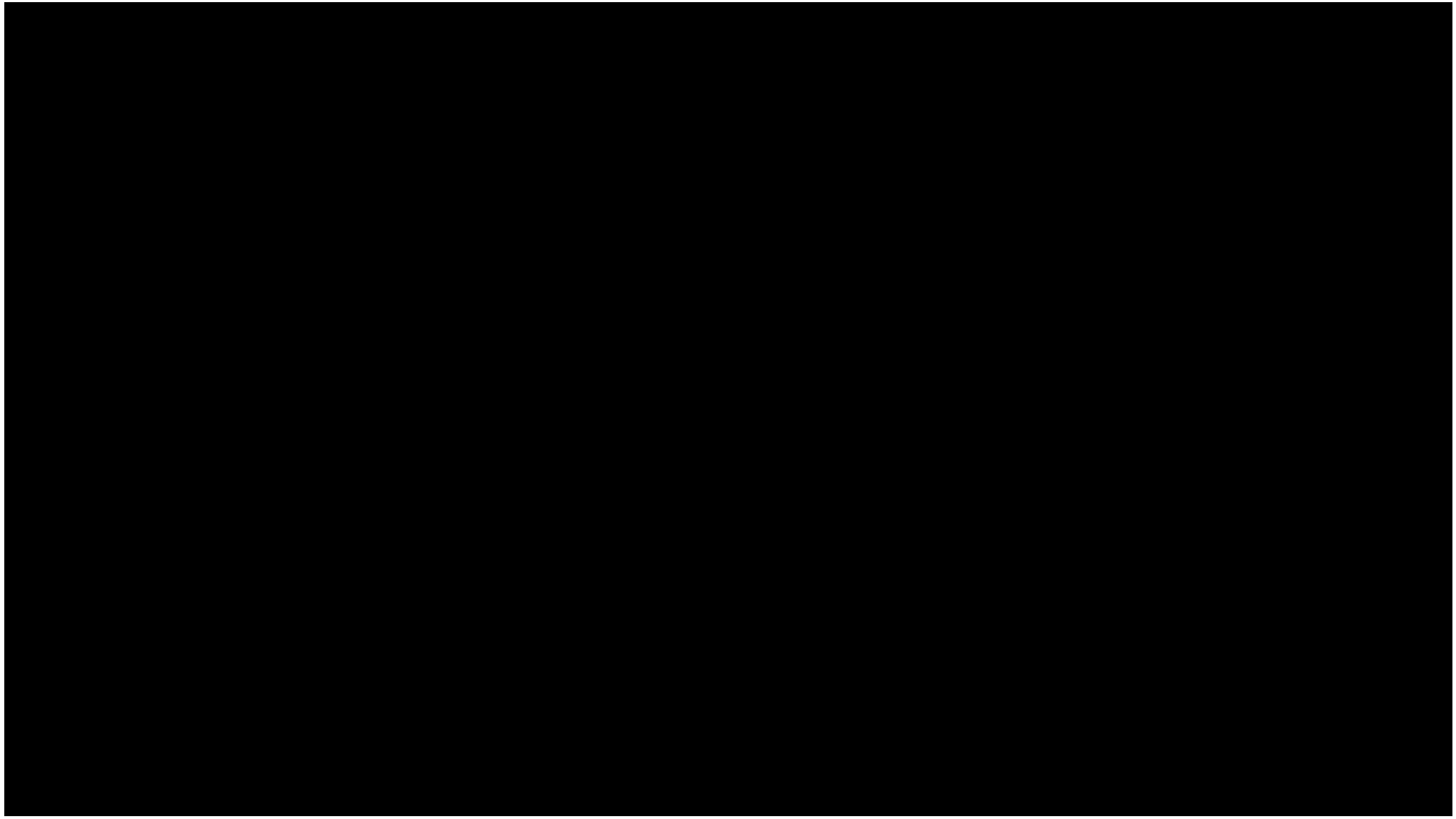
Interacțiuni Vizuale - Kinect

https://youtu.be/Ql2bUcLH0Pc



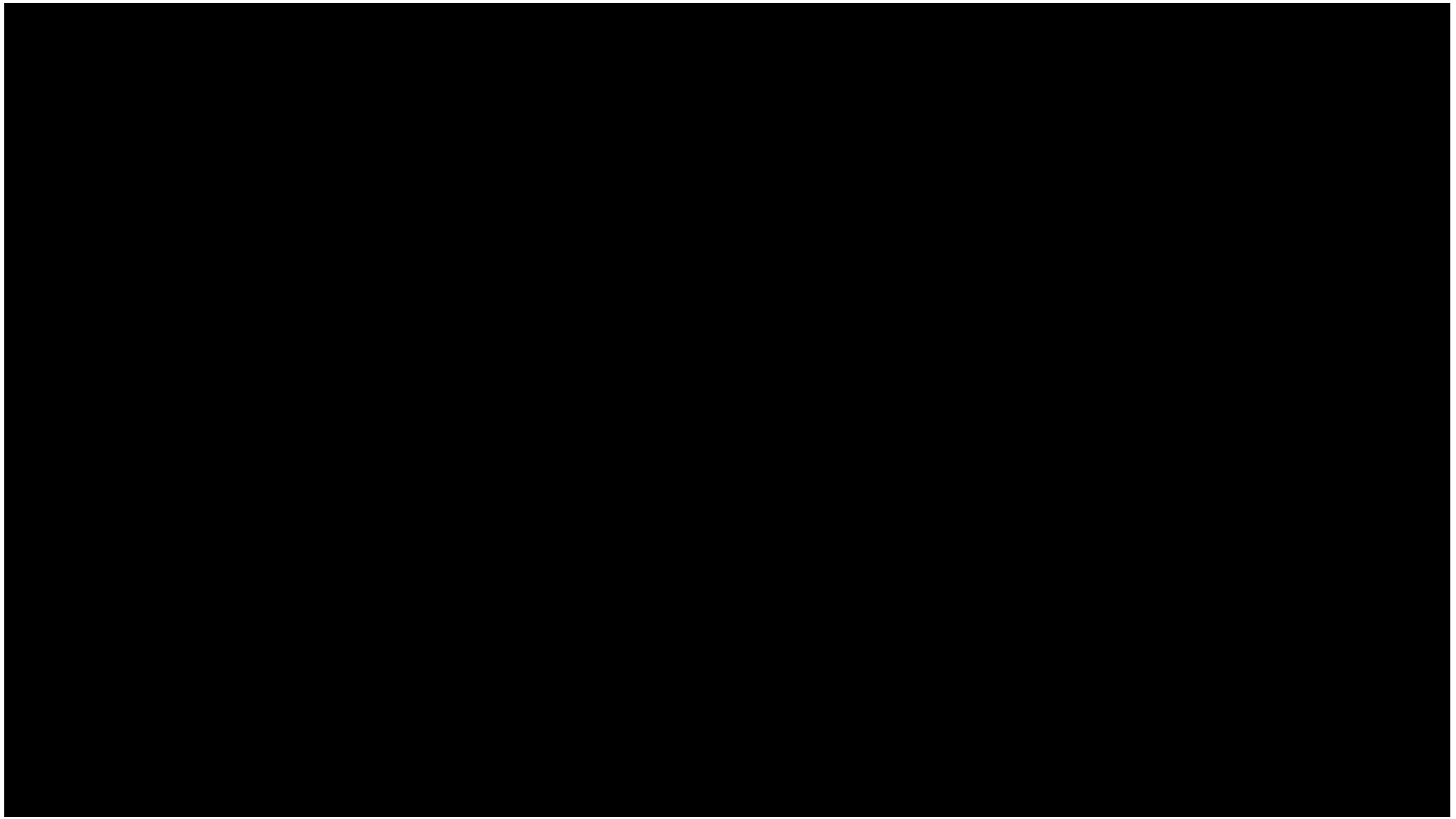
Bionic Arm

https://youtu.be/F_brnKz_2tI



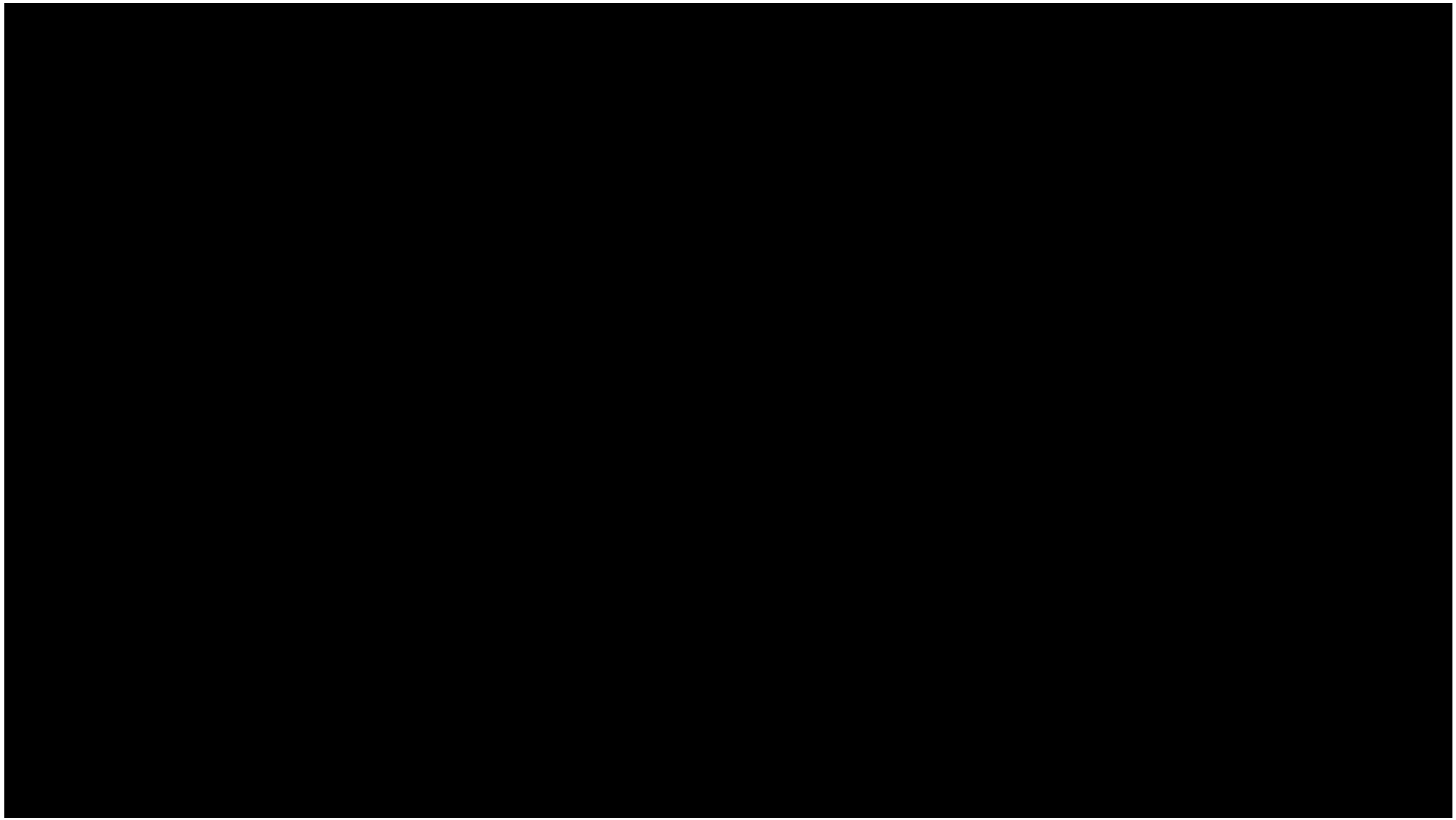
https://youtu.be/rSQNi5sAwuc

Mind interaction experiment TEDx



https://youtu.be/dn7l9q9RF5M

Human – Human Interface Gamer



https://youtu.be/oIAlGXpB3Fw

Human – Human Interface Movie- Nerve