INDUSTRIAL APPLICATIONS OF MICROCONTROLLERS

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BATCH NO. – 34

PROJECT TITLE – Drowsiness Detection System

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Problem Statement:

Driver drowsiness is a major cause of accidents on the road. To address this issue, we need a system that can detect the drowsiness of drivers and alert them to ensure safe driving.

Scope of the Solution:

The solution aims to create a drowsiness detection system that monitors the driver's condition in real-time. It will use a combination of image processing and sensors to detect signs of drowsiness, such as eye closure and head nodding. When drowsiness is detected, the system will trigger an alert to wake up the driver, preventing potential accidents.

Required Components to Develop Solutions:

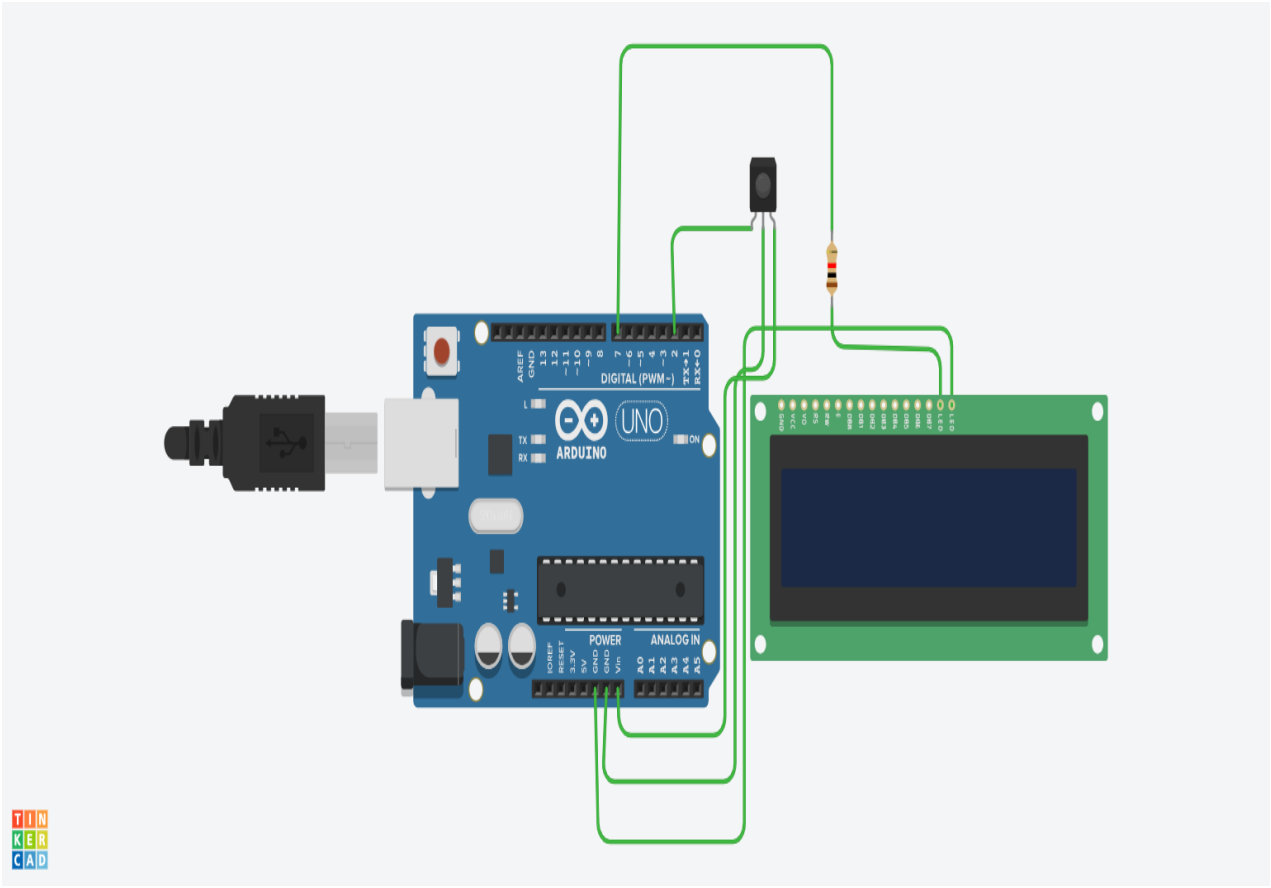
- Microcontroller: Arduino UNO R3
- Camera module
- LED Display
- IR proximity sensor
- Buzzer or speaker for alerts
- Power supply

- Wires and connectors

Code for the Solution :

```
const int irSensorPin = 2;  // Pin for the simulated IR proximity sensor (button)
const int alertLED = 7;     // Pin for the alert LED (simulated display)

bool isDrowsy = false;

void setup() {
  pinMode(irSensorPin, INPUT);
  pinMode(alertLED, OUTPUT);
  Serial.begin(9600);
}

void loop() {
  int irValue = digitalRead(irSensorPin);

  if (irValue == LOW) {
```

```
    // Object detected (simulated drowsiness)
    isDrowsy = true;
    digitalWrite(alertLED, HIGH); // Turn on the
alert LED
  } else {
    // No object detected (not drowsy)
    isDrowsy = false;
    digitalWrite(alertLED, LOW);  // Turn off the
alert LED
  }

  if (isDrowsy) {
    Serial.println("Drowsiness Detected");
    // Add additional actions or alerts here
  }

  delay(100);  // Delay for stability
}
```



Text

```ino
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  if (irValue == LOW) {
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Arduino Uno R3:

Arduino Uno R3 is a popular microcontroller board based on the ATmega328P microcontroller. It's the most commonly used Arduino board for a wide range of projects, thanks to its simplicity and versatility. Some key features and components include:

- Microcontroller: The ATmega328P microcontroller, which forms the heart of the Arduino Uno, is responsible for executing the code and controlling connected components.
- Digital and Analog Pins: Arduino Uno has a variety of digital and analog input/output pins that allow you to interface with external sensors, devices, and components.
- USB Interface: It includes a USB interface for programming and powering the board.
- Power Supply: The board can be powered via USB, a battery, or an external power supply. It provides 5V and 3.3V power outputs.
- Integrated LEDs: There are built-in LEDs on the board, such as the power LED, "L" LED

(used for basic testing), and the TX/RX LEDs for serial communication.

- I/O Protocols: Arduino Uno supports various communication protocols, including UART (Serial), SPI, and I2C, making it suitable for a wide range of applications.

IR Sensors (Infrared Sensors):

Infrared (IR) sensors are electronic devices that can detect and respond to infrared radiation. They are commonly used for a variety of applications, including object detection, proximity sensing, and remote-control systems. Key points include:

- Working Principle: IR sensors work by detecting changes in the intensity of infrared radiation. They often consist of an IR emitter (LED) and an IR receiver (photodiode). The emitter sends out infrared light, and the receiver measures the intensity of the reflected light. When an object comes within a certain range, it reflects the IR light back to the receiver, causing a change in output.
- Types: There are various types of IR sensors, including passive infrared (PIR) motion sensors, IR proximity sensors, and IR

photodiodes. Each type is designed for specific applications.

- Applications: IR sensors are used in various applications such as motion detection in security systems, proximity sensing in smartphones, remote controls for electronics, and line-following robots.

Link for TinkerCad:

https://www.tinkercad.com/things/cglgToSs5fJ-swanky-bigery-rottis/editel?sharecode=bL0G7M-OT-avR4SgjmhWB0QZO_lrsP1fthK94ndaniQ