UNIVERSITY INSTITUTE OF ENGINEERING AND TECHNOLOGY

(SUMMER TRANING: - PRODUCT RE-ENGINEERING AND INOVATION)

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DR.SARVJIT SINGH AND DR. GARIMA JOSHI:-

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Thank you.

Sincerely,

TOPIC:- DETECTION OF ADULTRATION IN MILK (VEGETABLE OIL)

Table of Content: -

Adulteration of milk

1. Introduction

- Adulteration in milk has become a significant issue globally, posing a threat to public health and consumer trust. The deliberate addition of low-quality substances to milk compromises its nutritional value, leading to severe health consequences. This report aims to provide an overview of the adulteration problem in milk, its causes, consequences, and potential solutions. The adulterants like detergents in milk, synthetic components, urea, caustic soda, formalin leads to catastrophic effects on health if taken for a long time as it can cause severe health problems like food poisoning, gastrointestinal complications, impairments, heart problems, cancer or even death.

2. Types of Milk Adulteration

- Water Dilution: The most common form of milk adulteration involves adding water to increase its volume and profitability.
- Addition of Synthetic Milk: Unscrupulous vendors may add substances such as detergents, urea, or vegetable oil to mimic the appearance and texture of real milk.
- Mixing with Substandard Milk: Some milk producers mix good quality milk with substandard or expired milk to cut costs and extend the supply.
- Adding vegetable oil: The adulteration of milk with vegetable oil poses a significant health risk to consumers and can have negative
- impacts on the dairy industry. Hence, it is crucial to have effective detection techniques to ensure the quality and for all

Vegetable oil in milk

In milk, vegetable oil is typically present in the form of an emulsion. The process of homogenization is used to disperse the oil droplets throughout the milk, creating a stable mixture. Vegetable oil itself is not inherently harmful. In fact, it can be a healthy source of dietary fats when consumed in moderation. However, excessive consumption of vegetable oil, like any type of oil, can lead to negative health effects. Some of the potential harmful effects associated with consuming excessive amounts of vegetable oil include: High calorie content: Vegetable oils are calorie-dense, meaning they contain a significant amount of calories in a small volume. Consuming excessive amounts of vegetable oil can contribute to weight gain and increase the risk of obesity. Imbalance of essential fatty acids: Vegetable oils are often rich in omega-6 fatty acids, which are important for our health. However, an excessive intake of omega-6 fatty acids without a balanced intake of omega-3 fatty acids can disrupt the ideal ratio of these essential fatty acids in the body. This imbalance has been associated with increased inflammation and certain health conditions. Increased risk of cardiovascular disease: Some studies suggest that a high intake of certain types of vegetable oils, particularly those high in polyunsaturated fats, may increase the risk of cardiovascular disease. This is because polyunsaturated fats can become oxidized in the body, leading to inflammation and potential damage to blood vessels. Potential for rancidity and formation of harmful compounds: Vegetable oils can become rancid over time, especially when exposed to light, heat, and air. Rancid oils may contain harmful compounds, such as free radicals, which can contribute to oxidative stress and have negative effects on health when consumed. It's important to note that these harmful effects are primarily associated with excessive consumption of vegetable oil, rather than the small amounts typically present in milk. Milk naturally contains some fat, including milk fat, which provides essential nutrients. However, if you have specific concerns about the presence of vegetable oil in a particular milk product, it's advisable to check the ingredient list or consult with a healthcare professional.

Detection of vegetable oil by LDR sensor

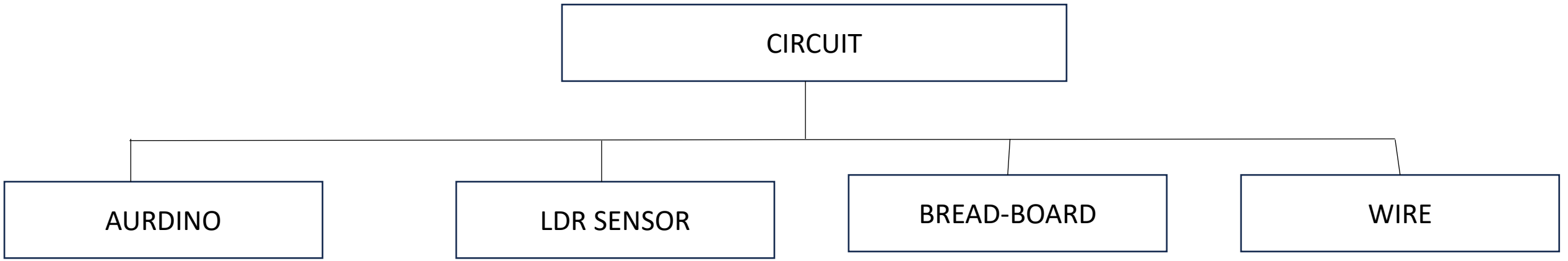
Adding vegetable oil in milk , makes fat globules . So, if when we passes the light through the adultrated milk it does not allow the to transmit .

Here ldr sensor comes in action . Due to fat globules the light doesn't pass and ldr sensor doesn't get the light to detect from here we can conclude

that the milk is impure and contain vegetable oil in the setup frequency .

METHOD OF MAKING CIRCUIT

ELEMENTS WE USED IN CIRCUIT



AURDINO

1. Open-Source Platform: Arduino is an open-source hardware and software platform. This means that the designs and code for Arduino boards and software are freely available for anyone to use, modify, and distribute. It encourages collaboration, innovation, and a vibrant community of Arduino enthusiasts worldwide.

2. Microcontroller-Based: Arduino boards are based on microcontrollers, which are small integrated circuits that contain a processor, memory, and input/output (I/O) pins. The most commonly used microcontroller in Arduino boards is the Atmel AVR series, although other microcontrollers like ARM-based ones are also supported. Arduino boards provide an easy-to-use interface and a simplified programming environment for interacting with the microcontroller.

3. User-Friendly Programming Environment: Arduino IDE (Integrated Development Environment) is a user-friendly software tool used for writing, compiling, and uploading code to Arduino boards. The IDE utilizes a simplified version of the C/C++ programming language, making it accessible even for beginners. It provides a straightforward way to control digital and analog inputs and outputs, communicate with other devices, and create interactive projects.

4. Extensive Library Support: Arduino has a vast library of pre-written code called libraries, which simplifies the process of programming complex functions and components. These libraries offer ready-to-use functions and examples for various purposes, such as controlling motors, reading sensors, communicating with displays, and more. The Arduino community actively develops and shares libraries, enhancing the capabilities of Arduino for a wide range of applications.

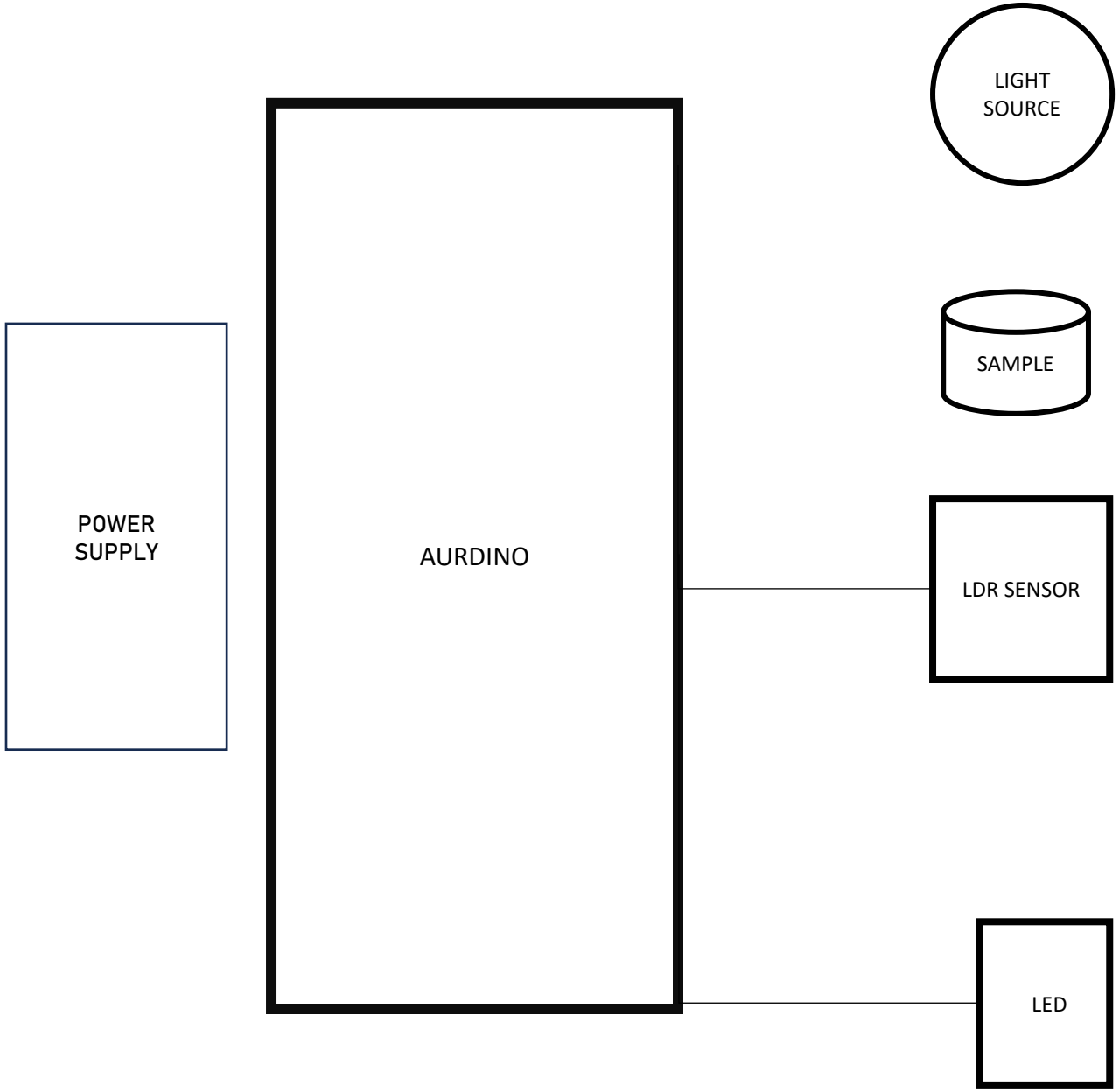
5. Versatile Applications: Arduino is widely used in various fields and applications, including robotics, home automation, Internet of Things (IoT), art installations, scientific experiments, and prototyping. Its flexibility, low cost, and ease of use make it an ideal platform for both hobbyists and professionals to bring their ideas to life. Arduino boards are available in different form factors and configurations, catering to different project requirements.

LED

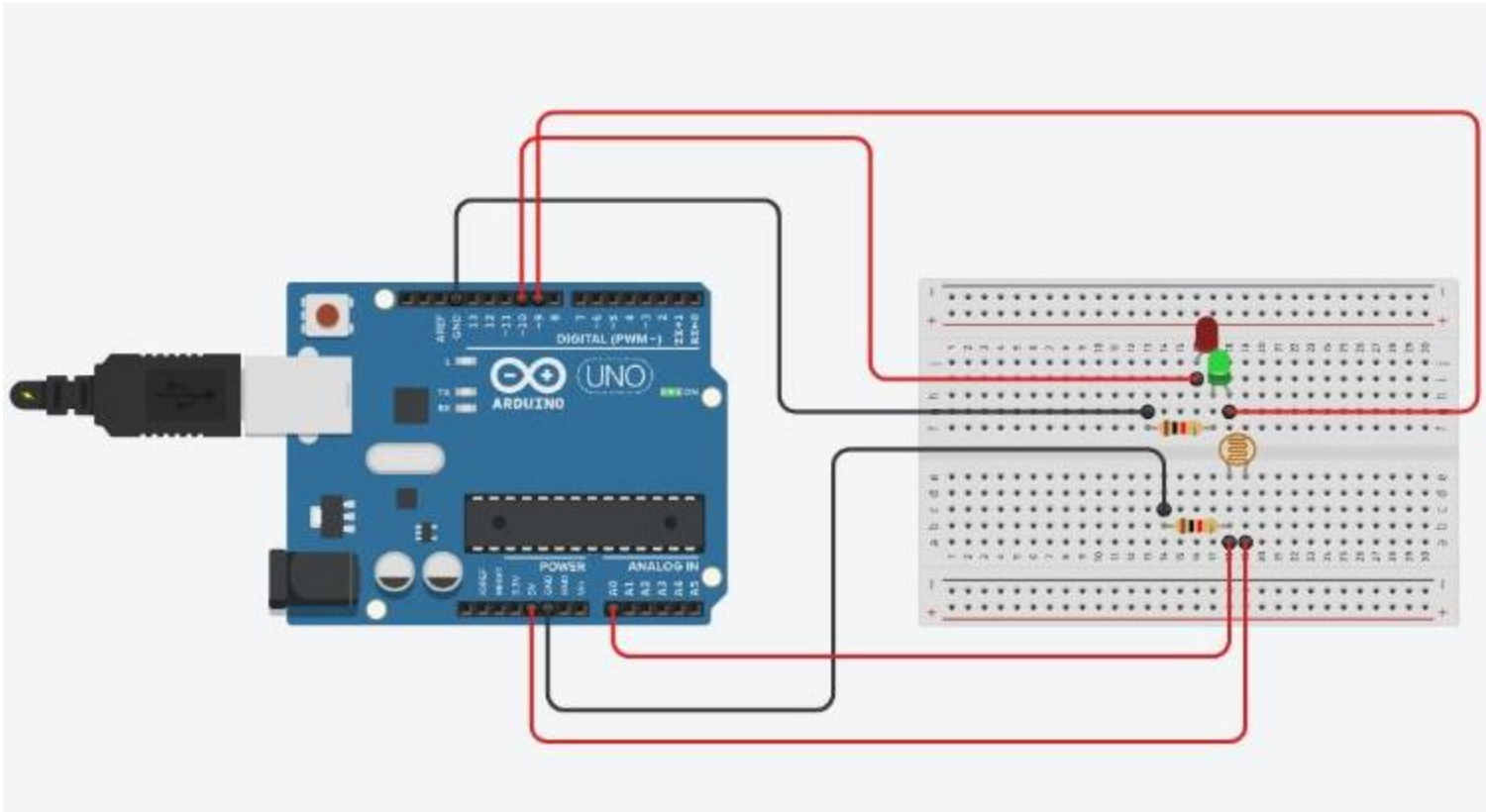
1. Energy Efficiency: LEDs are highly energy-efficient compared to traditional lighting sources such as incandescent bulbs and fluorescent lights. They convert a higher percentage of electrical energy into light, minimizing energy wastage in the form of heat. This energy efficiency makes LEDs an environmentally friendly lighting option and can result in significant energy savings.
2. Long Lifespan: LEDs have an exceptionally long lifespan compared to conventional bulbs. On average, LEDs can last up to 50,000 hours or more, depending on the quality of the LED and usage conditions. This longevity makes LEDs a cost-effective lighting solution as they require less frequent replacement, reducing maintenance costs.
3. Compact and Versatile: LEDs are compact semiconductor devices, available in various sizes and shapes, making them highly versatile for different applications. They can be used as individual indicator lights, incorporated into light strips, panels, or integrated into electronic devices. The small size and flexibility of LEDs allow for creative and innovative lighting designs.
4. Instantaneous On/Off: LEDs offer instant illumination when powered on, without any warm-up time. Unlike some other lighting technologies that may take a moment to reach full brightness, LEDs provide immediate light output. This feature is particularly advantageous in situations where quick response times are required, such as in automotive brake lights or traffic signals.
5. Wide Range of Colors: LEDs are available in a wide range of colors, including red, green, blue, and various shades in between. By combining these primary colors, LEDs can create an extensive spectrum of hues, allowing for vibrant and customizable lighting effects. Additionally, RGB LEDs (Red, Green, Blue) enable the generation of millions of colors by adjusting the intensity of each primary color.

LDR SENSOR

1. Light Sensing Capability: LDR sensors, also known as photoresistors, are devices that change their electrical resistance based on the intensity of light falling on them. They exhibit a high resistance in the absence of light and a low resistance when exposed to light. This property allows LDR sensors to be used for detecting and measuring light levels in various applications.
2. Simple Construction: LDR sensors are relatively simple devices constructed using a semiconductor material, typically cadmium sulfide (CdS), that exhibits the photoconductive effect. The sensor consists of a thin film of the semiconductor material on a substrate, enclosed in a protective casing. The resistance of the LDR changes in proportion to the amount of light incident on its surface.
3. Widely Used in Light Control: LDR sensors find extensive use in light control applications, such as automatic street lighting, outdoor security systems, and indoor lighting control. By measuring ambient light levels, LDR sensors can trigger the activation or deactivation of lights, providing energy efficiency and convenience by adapting to changing lighting conditions.
4. Voltage Divider Circuit: LDR sensors are typically used in combination with a voltage divider circuit to convert changes in resistance into voltage variations. The LDR is connected in series with a fixed resistor, forming a voltage divider network. The output voltage across the LDR is then measured and used to determine the light intensity. By monitoring the voltage output, the light level can be quantified or used to trigger further actions.
5. Calibration and Sensitivity: LDR sensors may require calibration to account for variations in different lighting conditions and environments. The sensitivity of an LDR can be adjusted by selecting an appropriate fixed resistor in the voltage divider circuit. This allows customization of the sensor's response to match the specific requirements of the application.



BLOCK DIAGRAM OF CIRCUIT



CIRCUIT DIAGRAM

```
const int LEDRin = 10;
const int LDRPin = A0;
const int LEDGin = 9;
void setup()
{
    Serial.begin(9600);
    pinMode(LEDRin,OUTPUT);
    pinMode(LEDGin,OUTPUT);
    pinMode(LDRPin,INPUT);
}
void loop()
{
  int LDRStatus = analogRead (LDRPin);

  if (LDRStatus >= 500)
  {
    digitalWrite(LEDRin, LOW);
    digitalWrite(LEDGin, HIGH);
    Serial.print("Current Light Intensity Value is - ");
    Serial.println(LDRStatus);
  }
  else
  {
    digitalWrite(LEDRin, HIGH);
    digitalWrite(LEDGin, LOW);
    Serial.print ("Current Light Intensity Value is - ");
    Serial.println(LDRStatus);
  }
  delay(500);
}
```

CODES FOR CIRCUIT