VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

AN INTERNSHIP REPORT ON

INTERNET OF THINGS(IoT)

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Under the Guidance of

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CERTIFICATE

This is to certify that B PRAKASH bearing USN 4AL21CG009 has successfully completed an internship on "Internet of Things(IoT)" and has submitted a report during the academic year 2022–23 odd Semester. It is certified that all corrections/suggestions indicated in the presentation session have been incorporated into the report and deposited in the departmental library.

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CHAPTER 1

INTRODUCTION

The Internet of Things (IoT) refers to a network of physical devices, vehicles, home appliances, and other objects that are embedded with sensors, software, and connectivity that enables them to collect and exchange data. These devices can be controlled and monitored remotely, making them an integral part of our daily lives.

The IoT has emerged as a key technological innovation that is transforming the way we interact with the world around us. With the rapid growth of connected devices, the IoT has the potential to revolutionize various industries, including healthcare, manufacturing, transportation, and smart homes.

The IoT works by enabling devices to communicate with each other through a network of sensors, software, and connectivity. These devices can collect and share data in real time, allowing for better decision-making, automation, and efficiency.

The IoT has brought about a range of benefits, including improved safety, enhanced productivity, and reduced costs. However, it also poses challenges related to data privacy and security, interoperability, and scalability.

Overall, the IoT has the potential to revolutionize the way we live, work, and interact with our environment, and is expected to play a major role in shaping the future of technology.

1.1 Definition:

The Internet of Things (IoT) refers to a network of physical devices, vehicles, home appliances, and other objects that are embedded with sensors, software, and connectivity that enables them to collect and exchange data. These devices can be controlled and monitored remotely, making them an integral part of our daily lives. The IoT works by enabling devices to communicate with each other through a network of sensors, software, and connectivity. These devices can collect and share data in real time, allowing for better decision-making, automation, and efficiency. The IoT has brought about a range of benefits, including improved safety, enhanced productivity, and reduced costs. However, it also poses challenges related to data privacy and security, interoperability, and scalability.

CHAPTER 2

SENSORS

Sensors are a crucial component of the Internet of Things (IoT) technology. They are electronic devices that can detect and measure physical parameters such as temperature, humidity, pressure, light, sound, motion, and many others. Sensors are embedded in IoT devices, and they work by detecting changes in the physical environment and converting them into electrical signals that can be interpreted by a microcontroller or a computer. In the context of IoT, sensors play a critical role in collecting data from the physical environment and transmitting it to a cloud or a central server for processing and analysis. This data can then be used to monitor and control various processes, automate decision-making, and optimize resource utilization. Some examples of sensors used in IoT devices include temperature sensors in smart thermostats, motion sensors in security systems, light sensors in smart lighting systems, and GPS sensors in vehicle tracking systems. The integration of sensors in IoT devices has led to significant advancements in various industries, including healthcare, manufacturing, transportation, and agriculture. By providing real-time data on the physical environment, sensors enable more efficient and effective decision-making, resulting in improved safety, enhanced productivity, and reduced costs.

2.1 TYPES OF SENSORS:

There are various types of sensors that can be used in IoT (Internet of Things) systems, including:

Temperature sensors: These sensors measure the temperature of the surrounding environment and can be used in applications such as home automation, climate control, and food storage monitoring.

Humidity sensors: These sensors measure the humidity of the surrounding environment and can be used in applications such as climate control, indoor air quality monitoring, and greenhouse management.

Motion sensors: These sensors detect motion or movement in the surrounding environment and can be used in applications such as security systems, lighting control, and energy management.

Light sensors: These sensors measure the level of light in the surrounding environment and can be used in applications such as smart lighting, energy management, and automatic window shades.

Pressure sensors: These sensors measure the pressure of the surrounding environment and can be used in applications such as weather monitoring, air quality monitoring, and industrial process control.

Gas sensors: These sensors detect the presence of various gases in the surrounding environment and can be used in applications such as air quality monitoring, industrial process control, and gas leak detection.

Moisture sensors: These sensors measure the moisture content of the surrounding environment and can be used in applications such as agriculture, soil moisture monitoring, and water level monitoring.

Sound sensors: These sensors detect the level of sound in the surrounding environment and can be used in applications such as noise pollution monitoring, security systems, and home automation.

CHAPTER 3

ARDUINO UNO

Arduino UNO is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button.

Programming Arduino UNO in Arduino ide:

To program an Arduino UNO using the Arduino IDE, you can follow these steps:

Install the Arduino IDE software: Download the latest version of the Arduino IDE software from the official website and install it on your computer.

Connect your Arduino UNO board to your computer: Use a USB cable to connect the Arduino UNO board to your computer. Ensure that the board is properly connected, and the power LED is lit.

Select your board and port: Open the Arduino IDE software, select the correct board from the "Tools" > "Board" menu, and select the appropriate port from the "Tools" > "Port" menu.

Write your code: Write the code you want to upload to your Arduino UNO in the Arduino IDE's code editor.

Verify your code: Click the "Verify" button (checkmark icon) in the toolbar to check if there are any errors in your code. If there are any errors, fix them before proceeding.

Upload your code: Click the "Upload" button (arrow icon) in the toolbar to upload your code to the Arduino UNO board. The Arduino IDE software will compile your code, and upload it to the board. Once the upload is complete, the onboard LED on the Arduino UNO board will start blinking to indicate that the code is running.

3.1 Steps for simulation of Arduino UNO in tinker cad:

Tinker cad is an online platform that allows you to simulate the behaviour of electronic circuits, including Arduino boards. Here are the steps to simulate an Arduino UNO board in Tinker cad:

- Go to Tinkercad's website and create a new account if you don't already have one.
- Once you are logged in, click on the "Circuits" button in the top menu.

- Click on "Create new Circuit" and then select "Arduino" from the list of available components.
- In the "Components" panel, select "Arduino UNO" from the list of available boards.
- Drag and drop the Arduino UNO board onto the workspace.
- Now you can add other components to the circuit, such as LEDs, resistors, and sensors. To do this, click on the "Components" panel, select the component you want to add, and drag it onto the workspace.
- Connect the components together by dragging wires between them. To connect a wire, click on the pin of the component you want to connect from, and then click on the pin you want to connect to.
- Once you have built your circuit, you can simulate its behaviour by clicking on the "Start Simulation" button in the top right corner of the screen. This will open the simulation panel, where you can interact with the components and see how they behave.
- You can also write and upload code to the Arduino UNO board in Tinkercad. To do this, click on the "Code" panel, write your code in the Arduino IDE, and then click on the "Upload" button to upload it to the board.

CHAPTER 4

Implementation

We have implemented IoT devices in two ways during our internship.

1. Using "ARDUINO UNO" board (Hardware).
2. Using "Thinker cad" at Google chrome (Simulation).

Here are some of the programs we have done in internship using Thinker cad.

Ultrasonic sensor Interfacing:

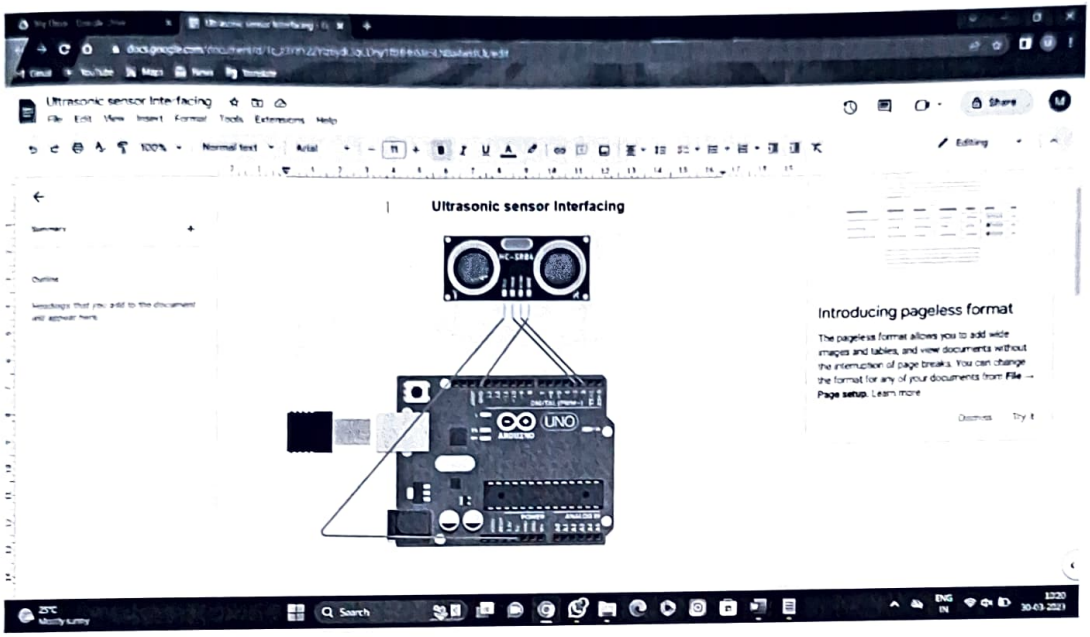

Figure 4.1 Ultrasonic sensor Interfacing

Program:

```
#define echoPin 2 // attach pin D2 Arduino to pin Echo of HC-SR04
#define trigPin 3 //attach pin D3 Arduino to pin Trig of HC-SR04
// defines variables
long duration; // variable for the duration of sound wave travel
int distance; // variable for the distance measurement
void setup() {
 pinMode(trigPin, OUTPUT); // Sets the trigPin as an OUTPUT
 pinMode(echoPin, INPUT); // Sets the echoPin as an INPUT
 Serial.begin(9600); // // Serial Communication is starting with 9600 of baudrate speed
 Serial.println("Ultrasonic Sensor HC-SR04 Test"); // print some text in Serial Monitor
 Serial.println("with Arduino UNO R3");
}
void loop() {
 // Clears the trigPin condition
 digitalWrite(trigPin, LOW);
 delayMicroseconds(2);
 // Sets the trigPin HIGH (ACTIVE) for 10 microseconds
 digitalWrite(trigPin, HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin, LOW);
```

```
// Reads the echoPin, returns the sound wave travel time in microseconds
duration = pulseIn(echoPin, HIGH);
// Calculating the distance
distance = duration * 0.034 / 2; // Speed of sound wave divided by 2 (go and back)
// Displays the distance on the Serial Monitor
Serial.print("Distance: ");
Serial.print(distance);
Serial.println(" cm");
}
```

Gas sensor interface:

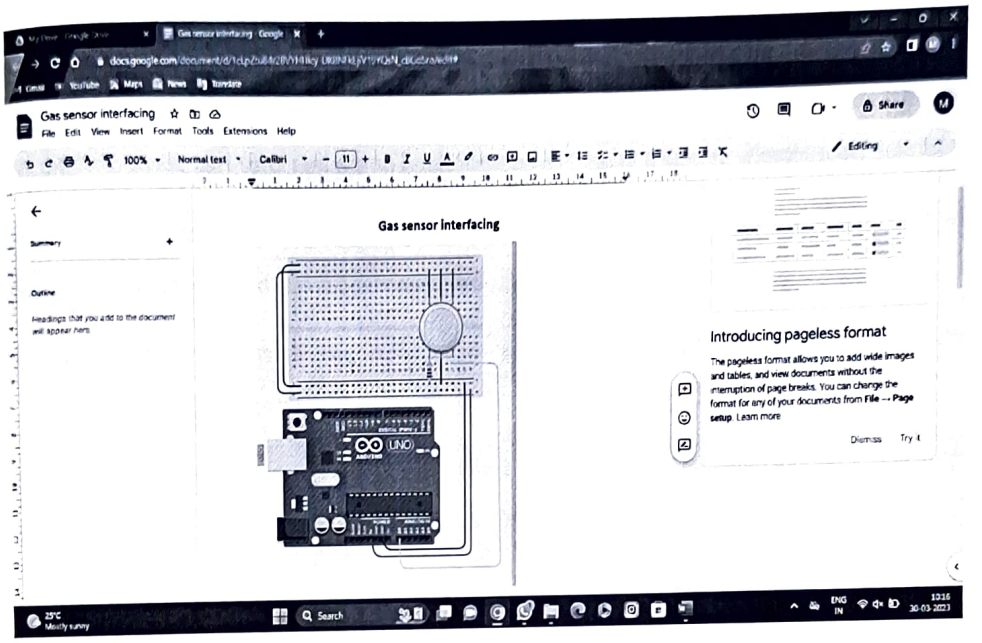

Figure 4.2 Gas sensor interface

Program:

```
//defining pins for the inputs and outputs
const int gas_input = A0;
int gas = 0;
const int led = 6;
const int buzzer = 12;
void setup()
{
  //setting up the correct pin modes
  pinMode(led,OUTPUT);
  pinMode(buzzer,OUTPUT);
  //initializing the serial monitor
  Serial.begin(9600);
}
void loop()
{
  //read the input from mq2 gas sensor
  gas  = analogRead(gas_input);
  //print the input om serial monitor
  Serial.println(gas);
 delay(100);
}
```

CHAPTER 5

APPLICATIONS

The Internet of Things (IoT) has a wide range of applications across various industries. Some of the most common applications of IoT include:

Smart Homes: IoT-enabled devices such as smart thermostats, lighting systems, and home security systems allow homeowners to control and monitor their homes remotely.

Healthcare: IoT devices such as wearables and medical sensors can monitor patient health remotely, provide real-time updates to healthcare providers, and enable telemedicine services.

Manufacturing: IoT sensors can be used to monitor the performance of machines and equipment, optimize production processes, and improve quality control.

Transportation: IoT devices can be used to monitor and manage traffic, track vehicle performance, and enable autonomous driving.

Agriculture: IoT devices can be used to monitor soil conditions, weather patterns, and crop growth, enabling farmers to optimize their crop yield and reduce waste.

Energy Management: IoT sensors can be used to monitor energy usage, optimize energy consumption, and enable more efficient energy distribution.

Retail: IoT-enabled devices such as beacons and RFID tags can be used to track inventory, personalize customer experiences, and optimize supply chain management.

Smart Cities: IoT devices can be used to monitor and manage traffic, optimize public transportation, and improve public safety and emergency response.

Overall, the application of IoT is limitless, and it has the potential to revolutionize various industries and improve the quality of life for people around the world.

CHAPTER 6

CONCLUSION

In conclusion, sensors and Arduino UNO play a critical role in IoT (Internet of Things) projects. Sensors are used to collect data from the environment, while Arduino UNO serves as the microcontroller that processes the data and communicates with other devices. Together, they enable the creation of intelligent and connected systems that can be remotely controlled and monitored. Arduino UNO provides an easy-to-use platform for IoT development, with a range of programming languages and libraries that make it accessible to beginners and experienced developers alike. Sensors come in many different types and can be used to measure temperature, humidity, pressure, light, and many other environmental parameters.

In IoT applications, sensors and Arduino UNO can be used to monitor and control a wide range of systems, from smart homes and buildings to industrial automation and environmental monitoring. As the IoT continues to grow, sensors and Arduino UNO will remain essential components for collecting and processing data and enabling new forms of automation and intelligent decision-making.