**Phase 4: Smart Water Management Based on IOT.**

**Development Part 2:**

**Smart Water Management:**

This IOT-based project involves building a smart water management system that can remotely monitor a particular liquid’s level and prevent it from overflowing. This project holds immense value for the industrial sector that uses large volumes of fluids in its day-to-day operations. Apart from detecting a liquid’s level, this monitoring system can also be used to track the usage of specific chemicals and to detect leaks in pipelines.

The system is fitted with ultrasonic, conductive, and float sensors. A Wi-Fi module helps connect the system to the Internet and facilitates data transmission. Four ultrasonic sensors help transmit the data on the liquid level and alert the user on the same.

**Benefits of smart water management System-**

* Allows to access fluid level
* Temperature monitoring
* Updates
* Alarms
* Automatic On/ OFF pumps
* Level Control

**Features of smart water management System-**

* Remotely monitor liquid levels
* Access fluid level information
* Buzzer/ Trigger Alarms
* Wi-Fi Modem
* Display levels of liquid.

Web Development Based on IOT:

**1. Improved Efficiency and Productivity**

One of the primary advantages of IOT projects is the ability to streamline processes and optimize resource usage. Businesses can monitor and manage operations in real time by deploying IOT-enabled sensors and devices. This leads to enhanced efficiency, reduced downtime, and improved overall productivity. For instance, in manufacturing, IOT sensors can track production lines, identifying bottlenecks and potential failures, allowing for timely maintenance and minimal disruptions.

**2. Enhanced Data Collection and Analysis**

IOT projects generate vast amounts of data from connected devices and sensors. This data offers valuable insights into operations, customer behavior, and equipment performance. Businesses can make informed decisions, identify trends, and predict outcomes through data analysis, leading to better planning and resource allocation.

**3. Cost Savings and Resource Management**

Optimizing resource usage not only improves efficiency but also leads to cost savings. IOT projects help organizations monitor energy consumption, water usage, and other resources, allowing for better control and conservation. Smart grids, for instance, can adjust energy distribution based on real-time demand, reducing waste and cutting costs for both providers and consumers.

**4. Remote Monitoring and Control**

IOT projects enable remote monitoring and control of devices and systems, offering convenience and safety. For example, IOT-enabled medical devices can transmit patient data to healthcare providers, enabling remote monitoring and timely intervention. Similarly, farmers can remotely monitor crops and irrigation systems in agriculture, optimizing agricultural practices and minimizing manual labor.

**5. Enhanced Customer Experience**

IOT applications can potentially revolutionize the customer experience by providing personalized and connected services. Smart homes with IOT devices offer seamless automation and control, enhancing comfort and convenience for residents. Retailers can leverage IOT data to offer personalized recommendations and targeted marketing, increasing customer satisfaction and loyalty.

**6. Predictive Maintenance**

One of the most significant advantages of IOT projects is predictive maintenance. By continuously monitoring the condition of equipment and machinery, businesses can predict when maintenance is needed before a breakdown occurs. This approach reduces downtime, extends the lifespan of assets, and minimizes maintenance costs.

**7. Safety and Security**

IOT projects ideas can significantly improve safety in various environments. In industrial settings, IOT sensors can monitor workplace conditions, detect potential hazards, and ensure safety regulations compliance. Smart cities can use IOT to monitor traffic and public spaces, enhancing security and emergency response capabilities.

**8. Sustainable and Eco-Friendly Solutions**

IOT projects contribute to sustainability efforts by promoting smart and eco-friendly practices. Smart buildings can optimize energy consumption based on occupancy levels, reducing carbon footprints. IOT-enabled waste management systems can also improve recycling efforts and reduce waste generation.

**9. Innovation and Competitiveness**

Organizations that embrace IOT projects ideas gain a competitive edge by offering innovative solutions and services. IOT-driven insights and data analytics open new opportunities for businesses to differentiate themselves in the market and adapt to evolving customer needs.

**10. Transforming Industries and Creating Smart Cities**

They are instrumental in transforming industries and creating smart cities. IOT enables remote patient monitoring and telemedicine in healthcare, revolutionizing healthcare delivery. IOT-based precision farming techniques enhance crop yields while minimizing resource usage in agriculture. For transportation, IOT applications improve logistics and public transportation efficiency, reducing congestion and carbon emissions in smart cities.

**Source code:**

**import RPi.GPIO as gpio**

**import time as time**

**import Adafruit\_CharLCD as LCD**

**trigger=26**

**echo=27**

**buzzer=12**

**lcd\_rs = 25**

**lcd\_en = 24**

**lcd\_d4 = 23**

**lcd\_d5 = 17**

**lcd\_d6 = 18**

**lcd\_d7 = 22**

**lcd\_backlight = 2**

**lcd\_columns = 16**

**lcd\_rows = 2**

**lcd = LCD.Adafruit\_CharLCD(lcd\_rs, lcd\_en, lcd\_d4, lcd\_d5, lcd\_d6, lcd\_d7, lcd\_columns, lcd\_rows, lcd\_backlight)**

**gpio.setup(trigger,output)**

**gpio.setup(echo,input)**

**gpio.setup(buzzer,output)**

**def distance\_func():**

**gpio.output(trigger,True)**

**time.delay(0.0001)**

**gpio.output(trigger,False)**

**while(gpio.input(echo)==0):**

**start=time.time();**

**while(gpio.input(echo)==1):**

**end=time.time()**

**time\_taken=end-start**

**distance=(timetaken\*34300)/2**

**return distance**

**lcd.message("Water Level:")**

**#consider 1000ltr water tank height is 60cm**

**while(1):**

**distance=distance\_func()**

**percentage=distance\*100/60**

**lcd.setCursur(0,12)**

**lcd.message(perentage,"%")**

**lcd.setCursur(1,0)**

**if(percentage<50):**

**gpio.output(buzzer,False)**

**lcd.message("Itz Not Enough")**

**elif(percentage<75):**

**gpio.output(buzzer,False)**

**lcd.message("wait a minute")**

**elif(percentage<85):**

**gpio.output(buzzer,False)**

**lcd.message("Itz Enough")**

**elif(percentage>95):**

**gpio.output(buzzer,True)**

**lcd.message("Alert")**

**time.delay(5)**