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1)Problem Statement Understanding- Here you need to describe your problem statement understanding.

A landslide, also known as a landslip, is a geological phenomenon that includes a wide range of ground movements, such as rock falls, deep failure of slopes and shallow debris flows.

Landslides can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability.

Causes

- 1.Heavy rains
- 2.Earthquakes
- 3.Volcano eruptions
- 4.Floods
- 5.Ground water changes

Damage

- 1.Destroyes the slope/hill
- 2.Eliminates all vegetation
- 3.Buries houses and sometimes entire villages
- 4.Weakens the slope and makes it more susceptible to further landslides

A landslide, also known as a landslip, is a geological phenomenon that includes a wide range of ground movements. Monitoring is essential to predicting the behavior of landslides and forecasting which storms can trigger large numbers of landslides. This can help saving number of lives and prevent loss of life and property as people will be aware of the upcoming danger and can take necessary steps for safety.

2)Software and Hardware Requirement

Hardware

ATmega8 (CU05) -

The **ATmega8** is a low-power CMOS 8-bit **microcontroller** based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the **ATmega8** achieves throughputs approaching 1 MIPS per MHz, allowing the

system designer to optimize power consumption versus processing speed.

Set up the breadboard and connect ATmega8 to Arduino UNO board.

1. Step One: Adding **ATmega8** Support to Arduino IDE **Using** Board Manager.
...
2. Step Two: Programming Arduino as an ISP (In-system programming) ...
3. Step Three: Burning Bootloader. ...
4. Step Four: Setting up the Connections. ...
5. Step Five: Uploading the Sketch to **ATmega8**.

GPRS Modem(MOD9)-

GPRS is classed as being a packet switched network whereby radio resources are used only when users are actually sending or receiving data. Rather than dedicating a radio channel to a mobile data user for a fixed period of time, the available radio resource can be concurrently shared between several user

Moisture strips (SN23)

Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors. One common type of soil moisture sensors in commercial use is a frequency domain sensor such as a capacitance sensor. Another sensor, the neutron moisture gauge, utilize the moderator properties of water for neutrons.

Range

1. Rating 25 °C ambient temperature unless otherwise specified. Single phase, half wave, 60 Hz, resistive or inductive load. For capacitive load, derate current by 20%.

2. Peak Forward Surge Current 8.3ms Single half sine wave Superimposed on rated load (JEDEC Method) Maximum Forward Voltage = 3.0 Amps. Maximum DC Reverse Current at rated DC Blocking Voltage 100 °C

Regulated power supply(PS01)

Power supplies are designed to convert high voltage AC mains to a suitable low voltage supply for electronic circuits and other devices. In our project the various electronic modules are being used for which power supply requirement is +5V DC. The Microcontroller unit needs a pure regulated +5V DC.

Buzzer(HM16)

A Buzzer will be used as an audio alarm in our project. A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke

Liquid crystal displays (LCD)

Liquid crystal displays (LCD) are widely used in recent years as compared to LEDs or seven segment displays. Because LCD can be used to display alphanumeric as well as special characters (like * @ ! # % & etc.). Also due to the declining prices of LCD, the ability to display numbers, characters and graphics, incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD and also the ease of programming for characters and graphics. HD 44780 based LCDs are most commonly used.

IoT Hardware Module(IOTH1)

IoT Hardware includes a wide range of devices such as devices for routing, bridges, sensors etc. These **IoT** devices manage key tasks and functions such as system activation, security, action specifications, communication, and detection of support specific goals and actions.

Internet Of Things (Telemetry)(IOT_Telemetry)

IoT devices communicate using several network protocols. IoT devices used for telemetry such as remote sensors have the following requirements:

- **Low Power** – Many IoT devices are powered from an embedded battery. New battery technologies have life expectancies of 10 to 20 years.
- **Low-Code Footprint** – IoT devices are required to be as small as possible. This requires lightweight protocols that do not need heavy computing or wireless transmission power requirements.
- **Low Bandwidth** – Higher bandwidth transmissions require higher power and additional hardware footprints.
- **Local Intelligent IoT Gateways** – The closer this system is to the IoT device, the lower the power required to transmit to this receiving system.

IoT telemetry communications between the devices and the receiving system are performed by several protocols. Each protocol has benefits and flaws.

- **MQTT** – The Message Queuing Telemetry Transport (MQTT) protocol runs over TCP/IP and was designed for embedded hardware devices with limited embedded components and low power requirements. This protocol uses a publish-subscribe approach, which is inactive between transmissions and

data retrievals. MQTT requires an intelligent IoT gateway.

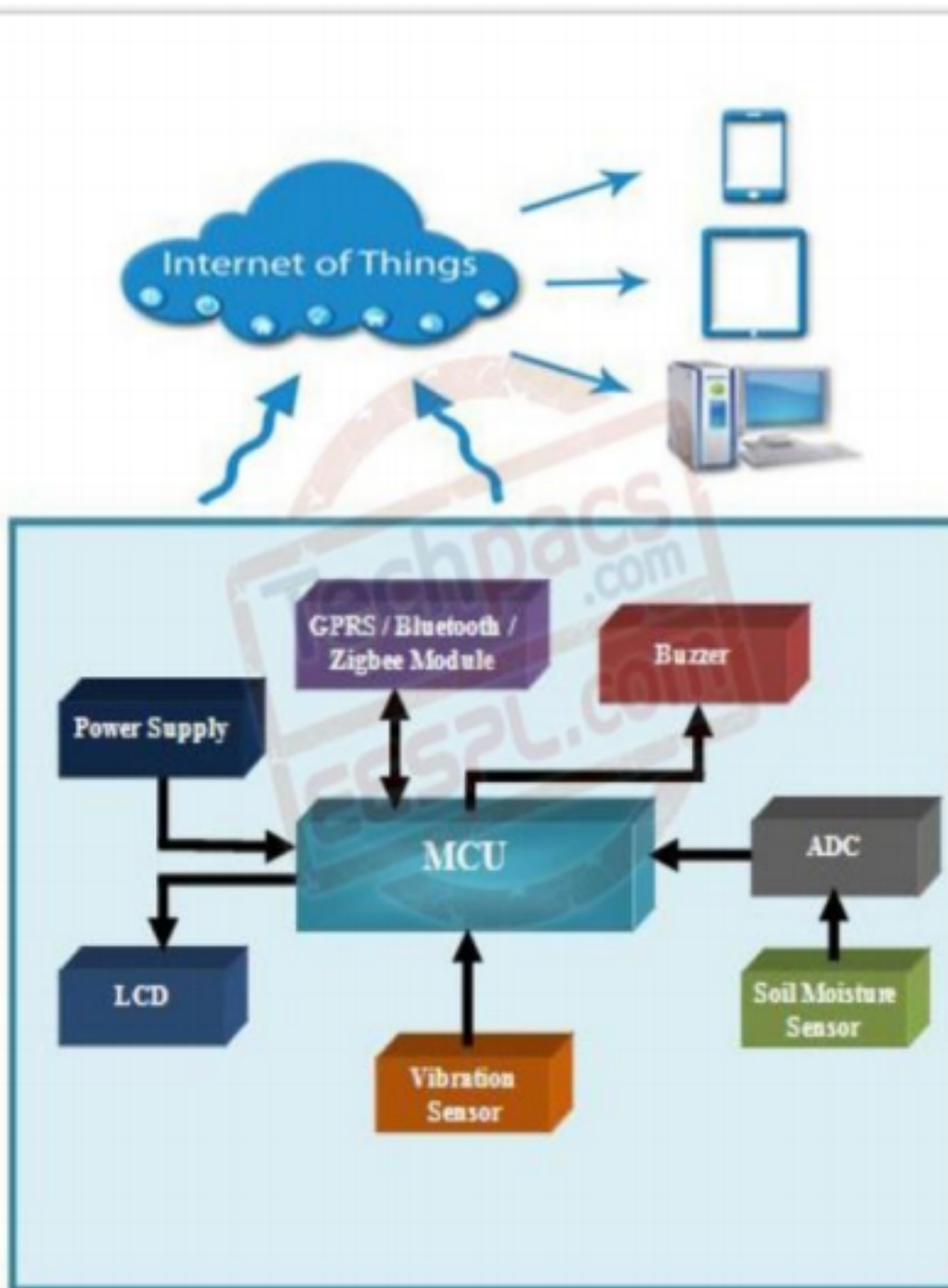
- **CoAP** – Constrained Application Protocol (CoAP) was designed to run on devices constrained by low power and lossy networks. The protocol runs on UDP and is easily translatable to HTTP. CoAP can be routed over IP networks and supports IP multicast for M2M communications between other IoT devices.
- **HTTP** – This protocol is often combined with the Restful API protocol and is routable across the internet but is insecure.
- **HTTPS** – This protocol is secure and robust but has high power and processing requirements to encrypt data traffic and requires remote management of certificates.
- **Alternative protocols**
 - XMPP – IM-based protocol, simple addressing scheme
 - Advanced Message Queuing Protocol (AMQP) – Server to Server
 - Streaming Text-Oriented Messaging Protocol (STOMP)
 - Data Distribution Service (DDS) – Device to Device
 - OPC UA
 - Web Application Messaging Protocol (WAMP)

3) Addition and Updates

1) The building of weather stations, one for each cluster nodes. On sending this additional data to the sink node, analysis can be done more efficiently with the help of weather -based switching between high and low frequencies.

2) Providing solar panels at each sensor node will allow for the seamless functioning of the sensor nodes in remote locations. This will eliminate the need for periodic charging of batteries for the nodes, which may involve human interference or need for power lines.

Project Work Flow Diagram



Advantage

- help saving number of lives and present loss of life.
- helps updating the information on the internet.
- help notify the residents about the coming disaster.

Disadvantages-

- Delay efficient
- need good internet connection

Application

1. If a landslide is detected early enough, it would be easy to avoid any accidents because any human life can be migrated to a safe area
2. roads can be blocked to save vehicles which can get stucked under the debris

Challenges

- Reliably detect and estimate small displacements
 - Determine column that moved
 - Estimate new locations of dislocated columns
 - Estimate location of slip surface

5)Conclusion

Real time monitoring of landslides is one of the challenging research areas available nowadays within the field of geophysical research. The event of an actual field deployment of a wireless device network primarily based landslide detection system. This system uses wireless sensor nodes, MQTT protocol for efficient delivery of real time data to the system for monitoring and provide warnings and risk assessments to the inhabitants of the area. This network will be used for understanding the capability and usability of wireless sensor network for critical and emergency application.

6)References

“Capstone Project on IOT Based Landslide Alerting System,” *techpacs*. [Online]. Available: <https://www.techpacs.com/category/Project/10-193-401/IOT-Based-Landslide-Detection--Its-Remote-Avalanche-Prevention-Alerting-System->. [Accessed: 17-Jun 2021].