

# Disaster Management Warning System

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**Abstract** - In disaster management, information is very important. If people don't get information on time, it can cause more damage. The systems used before have some problems. They are slow sometimes, not automatic, and real-time checking is not proper. Because of this, warning may come late. To solve this, an IoT based disaster monitoring system is used. This system works in two steps. First step is data collection. Different sensors are used. Vibration sensor is used for earthquake. Water level sensor is used for flood. Temperature and humidity sensor is also used. These sensors keep checking again and again and send data. Second step is processing. The data goes to ESP32. It checks the data and sends it to IoT platform. Using Blynk app, alert is received quickly. So user can see data and take action. This system works better than old methods. It is faster and does not need manual checking. It gives alert automatically. So it is useful for safety. It helps to protect people and property during disaster.

**Keywords** - IoT, disaster monitoring, earthquake detection, flood detection, environmental sensing, smart alert system, realtime monitoring, automated disaster response, sensor-based disaster management, remote disaster alert system.

## INTRODUCTION

Natural disasters like floods and earthquakes are things that people talk about a lot. The big problem is that they happen really fast. Most of the time people do not get time to prepare. Because of this it is hard to react. The systems that are already in use are not always fast. Sometimes they do not give the right information at the right time. So warnings can be late. That delay can make things worse instead of better. To avoid this kind of problem a monitoring system that uses Internet of Things technology can be used.

In this system many different sensors are put in place to check the environment. These sensors keep working all the time. Send information over and over again. For example a vibration sensor like SW-420 is used to detect movement in the ground. If the vibration is not normal it might be a sign that an earthquake is coming. Then there is the DHT11 sensor, which measures how hot or cold it is and how humid it is. It is a sensor but it is still useful for basic monitoring. Along with that a water level sensor is used. It checks whether the water is rising, which helps in detecting floods.

All these sensors are connected to an ESP32 microcontroller. This part is like the brain of the system. It collects all the information from the sensors. Keeps checking it. If something unusual

happens like the water level going up a sudden vibration the system reacts right away. It does not wait for someone to check it manually. The warnings are sent in ways. It can show a warning on an LCD display. At the same time it can send messages to mobile phones. So both people who are nearby and the authorities can know what is happening quickly.

Another important thing is power. The system runs on a battery so even if the power goes out during a disaster it will still keep working. This makes it more reliable in situations. Also the information that is collected is sent to the cloud. Because of this officials or emergency teams can see the information from anywhere. They do not need to be in the location. This helps them understand what is happening faster and take action without delay.

In terms Natural disasters like floods and earthquakes are things that the system helps with by giving early warnings and reducing the time it takes to respond. Natural disasters like floods and earthquakes cannot be stopped completely. The system can help in reducing damage and improving

safety. In the future more improvements can be made. If Artificial Intelligence or machine learning is added the system can become even smarter. It may learn from information and give better predictions instead of only detecting things after they happen. The Internet of Things technology can make a difference in dealing with Natural disasters, like floods and earthquakes

### RELATED WORK

Natural disasters like earthquakes and floods are something we keep hearing about. The main problem is they do not really give much warning. When they happen suddenly people do not get time to react properly. Even though there are systems for monitoring disasters they are not always reliable and sometimes the alerts come late which makes things worse.

So to improve this situation an IoT-based disaster monitoring system can be used. This IoT-based disaster monitoring system uses types of sensors to observe the environment. These sensors keep checking things instead of only at certain times. For example a vibration sensor called SW-420 is used to detect ground movement. If the vibration is not normal it may be a sign of an earthquake.

There is also a sensor which measures temperature and humidity. It is not very advanced but still useful for environmental data. Another sensor is the water level sensor, which checks if the water is rising helping to identify floods. All these sensors are connected to an ESP32. The ESP32 acts like the unit where everything is controlled. It collects the data from sensors. Checks whether the values are normal or not.

If something unusual is found, like vibration or increase in water level the IoT-based disaster monitoring system immediately sends an alert. The alert can be shown on an LCD screen. Sent to a mobile phone. So people nearby and also authorities can get the information quickly. Take action. One good thing about this IoT-based disaster monitoring system is that it works on battery.

So even if there is no electricity during a disaster the IoT-based disaster monitoring system will still keep running. This is important because power failure is very common during situations. Also the IoT-based disaster monitoring system sends data to the cloud. Because of this the information can be seen from anywhere. Emergency teams can check the situation without going to the location, which saves time.

Another point is that the IoT-based disaster monitoring

system does not send alerts for everything. It only sends alerts when certain limits are crossed. This helps to reduce warnings. It also stores data, which can be used later for study or analysis. The IoT-based disaster monitoring system is simple to use. Can be expanded by adding more sensors if needed.

So it can be used in areas depending on the requirement. Overall the IoT-based disaster monitoring system helps in giving warning and reduces delay, in response. The IoT-based disaster monitoring system cannot stop disasters. It can definitely help in reducing damage and improving safety. In future if Artificial Intelligence is added to the IoT-based disaster monitoring system the system may become smarter. Could even predict disasters before they happen which would be more useful.

### PROPOSED SYSTEM

Natural disasters like earthquakes and floods are pretty common. They often happen without giving us much warning. When they strike all of a sudden people do not get time to react properly. Even though there are systems for monitoring disasters they are not always reliable and sometimes the alerts come late which makes things worse. So to improve this situation an IoT-based disaster monitoring system can be used.

The system uses sensor types to observe the environment. These sensors keep checking things instead of only at certain times. The SW-420 vibration sensor for instance monitors ground movement. Anomalous vibrations could indicate an earthquake. Then there is the DHT11 sensor, which tracks temperature and humidity. While not the most sophisticated it is still handy for gathering environmental information. Also included is a water level sensor, designed to detect rising water levels and signal flooding.

All these sensors are connected to an ESP32. It acts like the unit where everything is controlled. The ESP32 collects the data from sensors. Checks whether the values are normal or not. If something unusual is found, like vibration or increase in water level it immediately sends an alert. The IoT-based disaster monitoring system can send the alert on an LCD screen. Send it to a mobile phone. So people nearby and also authorities can get the information quickly. Take action.

One good thing about the IoT-based disaster monitoring system is that it works on battery. So even if there is no electricity during a disaster the IoT-based disaster monitoring system will still keep running. This is important because power failure is very common during situations. Also the IoT-based disaster monitoring system sends data to the cloud. Because of this the information can be seen from

anywhere. Emergency teams can check the situation without going to the location, which saves time.

Another point is that the IoT-based disaster monitoring system does not send alerts for everything. The IoT-based disaster monitoring system only sends alerts when certain limits are crossed. This helps to reduce warnings. The IoT-based disaster monitoring system also stores data, which can be used later for study or analysis. The IoT-based disaster monitoring system is simple to use. Can be expanded by adding more sensors if needed. So the based disaster monitoring system can be used in different areas depending on the requirement.

Overall the IoT-based disaster monitoring system helps in giving warning and reduces delay, in response. The IoT-based disaster monitoring system cannot stop disasters. It can definitely help in reducing damage and improving safety. In future if Artificial Intelligence is added to the IoT-based disaster monitoring system the IoT-based disaster monitoring system may become smarter. Could even predict disasters before they happen which would be more useful.

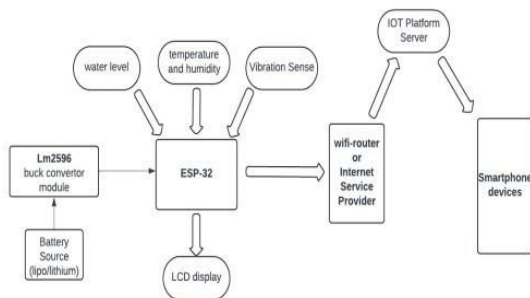


Fig.1. Overview of proposed model

### WORKING PRINCIPLE

In our project we made a system by connecting components and each component has its own job. All the components are connected,. If one component changes the result also changes. Our system works in a way. It takes input processes the input and then gives output.

At the beginning we used sensors to check what is happening around us. We used temperature sensors, humidity sensors, motion sensors and water level sensors. These sensors keep reading values all the time. Send the data to the controller. While testing our system we noticed that sometimes the readings were not stable so we had to adjust the setup a bit.

The controller, which is a microcontroller is like the part of

our system. It reads the sensor values and checks whether they are normal. If something is different it decides what action to take based on the program we wrote for our system. So our system depends a lot on the coding of our system.

After that our system gives output. It can turn on a motor light an LED show data on a display or give a buzzer alert. For example when the temperature increased during testing our system switched on a fan automatically. This showed that our system was working properly.

To connect all the components an interface is used. This helps different components communicate properly since they do not all work in the way. Without this interface errors can happen in our system.

Our system can also store data. This is useful if we want to check readings of our system. The data can be stored in memory, SD card or in the cloud if internet is available for our system.

Power supply is also important for our system. Our system can run on battery or direct power. During testing we saw that unstable power affected the performance of our system. Proper power supply is necessary for our system.

If Internet of Things or IoT is used modules, like Wi-Fi, Bluetooth or GSM can be added to our system. This allows our system to send data to web applications so it can be monitored from anywhere.

Our system keeps running in a loop. It continuously takes input processes the input and updates the output of our system. If the input changes the output of our system also changes. Because of this our system can respond quickly to changes.

### RESULTS AND DISCUSSION

This project is about using a microcontroller-based system to make things automatic in a way. The microcontroller-based system has all the parts like the controller, sensors, memory and other components connected and working together. The microcontroller-based system keeps taking input from the environment and gives output based on that so the whole process becomes automatic without manual work.

The working of the microcontroller-based system is not very complicated. Sensors like DHT11, which is used for temperature and humidity vibration sensor and water level sensor are used to check conditions. These sensors keep monitoring. When there is any change the data is sent to the

microcontroller-based systems controller. Then the controller checks the values. Takes action. It can give an alert switch on a device like a fan or stop something like a pump. So everything happens step by step.

One thing that was noticed in this project is that microcontroller-based systems are flexible. If we want to change the working of the microcontroller-based system we don't have to change the hardware. We can just update the code and the microcontroller-based system will behave differently. Because of this the same setup can be used for applications like greenhouse monitoring or water tank control. Another advantage of the microcontroller-based system is cost. The microcontroller-based system does not need complex hardware. Most of the work is done by the program inside the microcontroller-based systems controller. So it reduces the cost. Also saves space. Of using many separate circuits one controller can handle multiple tasks.

While doing this project the performance of the sensors was important. The DHT11 sensor worked fine for temperature and humidity checking. The DHT11 sensor is simple but useful. The vibration sensor was also able to detect movements, which can be useful in safety or machine monitoring. The water level sensor helped in control of water like avoiding overflow in tanks. These are uses but very practical. One important thing is the feedback system of the microcontroller-based system. The microcontroller-based system does not just work once. Stop. It keeps checking again. Based on data it changes the output. Because of this the microcontroller-based system stays stable. Works properly even when conditions change. Also features like data storage and connectivity made the microcontroller-based system better. Data can be. Checked later. With Wi-Fi or Bluetooth the microcontroller-based system can be monitored from another place. This is useful in applications where we don't need to be physically present.

There were some problems also. Sensors need setup otherwise the readings may not be correct. Small mistakes in placement can affect the output of the microcontroller-based system. Another issue is that microcontrollers have limits in memory and speed so they cannot handle large systems easily. In future the microcontroller-based system can be improved. Better sensors and faster controllers can be used. If AI or machine learning is added the microcontroller-based system can learn from data and make better decisions. Also connecting it fully to cloud systems can make monitoring easier, from anywhere.

### FUTURE WORKS

The system has a lot of future scope and it can be used in

many places like agriculture, industries, homes and also for environment monitoring. As technology is improving, this system can also be improved by adding new features like AI, IoT and cloud. Because of this, it can become more useful and work better than before.

One main improvement is using AI and machine learning. At present, the system only reacts when something happens. But in future, it can also predict things before they happen. By using old data, it can understand patterns. For example, if a machine is giving small vibrations again and again, the system can give warning before it gets damaged. Same way, changes in temperature and humidity can show problems in greenhouses. This helps to avoid loss. Another thing is IoT. If the system is connected to internet, then we can see the data from anywhere. We don't need to be near the system. Using mobile or laptop, we can monitor and also control it. This is helpful for farmers and also in industries. Sensors can also be improved. The sensors used now are basic. They work fine but not very accurate. In future, better sensors can be used to get more correct values. Also using more than one sensor together can give better results.

Communication also can be improved. Instead of normal methods, faster technologies like Wi-Fi, LoRa or 5G can be used. This helps in sending data faster and also over long distance. It is useful in big areas. Power supply is also important. In future, solar power can be used so that the system can work in places where there is no electricity. This reduces the need of wires and also maintenance. Security is another issue. Since the system is connected to internet, data can be unsafe. So some protection like password and secure connection should be used. Overall, the system can be improved in many ways. With new technology, it can become more smart and useful in real life.

### CONCLUSION

This project is about making a disaster monitoring system using IoT. The idea is simple, to detect things like vibration, temperature, humidity and water level and give alert when something is not normal. For this, sensors like SW-420, DHT11 and water level sensor are used. These sensors keep checking the condition again and again and send values to the controller. When there is any sudden change, like high vibration or water level increase, the system gives alert. It does not need manual checking, it works automatically. This is useful in situations where quick response is needed.

One main advantage is IoT. Because of this, data can be sent fast and can be seen from other place also. So even if a person is not near the system, they can still know what is happening. The system also does not use much power. It can

run in low power, so it is useful in areas where electricity is not proper. Also the cost is not too high, so it can be used in many places. Another thing is the system is simple. It is not very complicated. It can be changed easily by adding sensors or changing program. So it can be used in villages, small areas, schools or even houses. From this project, it is clear that electronics and communication can be used for real problems. It is not only theory, it has practical use. In future, more things can be added like AI and cloud. This can make the system better and more useful.

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