Predister
("An Intelligent Device To Predict Cloud Burst")

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Abstract: Torrential rains in and around the hills are elusive in terms of their location and time of occurrence. Most downpour signs are limited due to their danger and destructive nature. Most of these events are quickly reported to have impacts in terms of life and property loss in downstream habitats. In addition, they are usually associated with flash floods as a result of heavy rains. A basic understanding of torrential rains includes sudden floods at very short time intervals in very small areas. Little is known about these events, except for this understanding and the definition of N100 mm / h precipitation in a geographic area of about 20-30 km2 by the India Meteorological Department (IMD). There is little research to understand these events. This white paper summarizes the available information and research on torrential rain events and the physical processes that lead to torrential rain events. It has been found that torrential rain events are triggered convectively, followed by a topographically locked system. These intertwined mechanisms lead to the formation of torrential rain events. Even if these mechanisms do not exist, the cloud burst mechanism will not be formed. This paper introduces an intelligent system for predicting heavy rains and warns people in vulnerable situations. Atmospheric pressure, humidity, precipitation intensity, temperature, etc. were monitored and analyzed by using data science and artificial intelligence to analyze the situation in Koottickal village, and the idea was to design something that could predict heavy rainfall. We also called our project "PREDISTER" so that people can move to a safer place.

Index Terms—**Cloud burst, preventing, alert, monitoring, artificial intelligence. (key words)**

I. Introduction

In recent years the problems associated with 'cloudburst' events are usually reported in and around the Kerala hilly areas. Most of these cases are associated with unexpected heavy rainfalls. So we need something to prevent this. So we get an idea of an Intelligent system to predict cloud bursts and thus alert the people living in a vulnerable situation. Pressure, humidity, the intensity of rainfall, temperature, etc are monitored and analyzed with the help of data science and artificial intelligence. The changes in the environment are being adversely affecting human beings. Even though these are the effects of human activities there should be done something to secure the lives of people. The continuous dangerous effect of natural calamities are experiencing since the 2018 flood. Many people are losing their lives, properties, houses, pets, and dear ones. There may be a possibility to save at least their life if the cloud burst was predicted so they can move to a safer location.

So, we are designing an Intelligent system to predict cloud burst and thus alert the people living in vulnerable situation. The working will be simply by monitoring environmental factors like pressure, humidity, the intensity of rain fall, temperature, wind etc are and analyzing with the help of data science and artificial intelligence. The monitored data is sent to the cloud, the data is analysed by ai and if it is a condition to be warned, warning is sent to cloud and to respective receivers. So, people at vulnerable areas can make necessary actions to save their lives.

Predister will monitor the following environment parameters for analysis such as pressure, humidity, the intensity of rainfall, temperature, etc with help of data science and artificial intelligence. While monitoring these parameters, you need to get a stable set of results. Therefore, a series of anomalous measurements indicates a potential introduction of atmospheric variability, and users are warned about this activity using IoT technology. Short-term false positives are recorded but not treated as alerts. Therefore, success. By implementing this. Short-term false positives are recorded but not treated as alerts. Therefore, success. By implementing this monitoring approach, an early warning system for torrential rains can be achieved very accurately

II. Objectives

A. To Develop a self-powered automated Intelligent system to predict cloud bursts and thus alert the people living in a vulnerable situation
B. To monitor and analyze atmospheric parameters with the help of embedded systems and artificial intelligence
C. To predict cloud burst and high-intensity rainfall so people can move to safer locations before the occurrence of a landslide
D. To alert rescue forces, and authorities to quickly reach the disaster area as well as they can remotely monitor and feed alerts in the specified area

III. Data And Methodology

We got the data from recent years exactly from 2018 onwards. Over the last four years, Kerala has witnessed a series of natural disasters. Every year, the state seems to be experiencing disasters. In August 2018, the Flood, often referred to as the Flood of the Century, claimed the lives of 483 people. In August 2019, 48 people died after a part of the hill collapsed in Kabarapara near Nirumble in the Malapram district, and in August 2020, Petimdi in the Idukki district after a landslide wiped out the settlements of tea plantation workers. 74 people died in. In October 2021, two landslides in the Idukki and Kottayam districts claimed many lives. However, residents of the two affected settlements, Kootickal and Kokkayar, say this is the first time a tragedy has hit them..

Meteorological experts said torrential rains must have caused torrential rains in several parts of the Kottayam and Idukki districts. Torrential rain is a pattern of torrential rain in a localized area in a short time. He adds that long-term and short-term strategies are needed to deal with such tragedy, and in times of change everyone must anticipate the unexpected. By listening to early warnings and communicating them to target groups, you can reduce the severity of the disaster.. And also we also a sadness about Nitheesh our college mate who lost his life in the landslides that occurred at Pettimudi, Idukki 2020 and also the situation in kootticakal which is some bit kilometer away from our college which has witnessed a large loss to property and human. As we are analysing the situation koottickal had witnessed widespread damages to life and property in mid-October. A series of landslides in Koottickal panchayat due to cloudburst, tucked away in the Kottayam high ranges, claimed at least 12 lives recently. The disaster has once again brought to light the effects of rampant quarrying in ecologically sensitive areas. The patch of rocky land was surrounded by thick vegetation and shrubs or trees grew on the difficult terrain. So, as we analyzed this, we got an idea to prevent this situation so predister was born. A recent study by scientists at the National Remote Sensing Center (NRSC) in Hyderabad analyzed six major landslides in the state from 2018 to 20 and found that rainfall ranges from 200 to 600 mm. rice field. It played an important role in causing landslides in the Wayanad, Malappuram and Idukki districts. According to an analysis led by Nirmala Jain, the Puthumala landslide was caused by the 1st rainfall (244 mm) on 8th August 2019, and the Kavalappara was 3 days from 5th to 7th August 2019. Experienced rainfall (236.2 mm) Daily rainfall (229 mm) played an important role in causing Petimudi's landslides.

Fig 1. Shows the block diagram. Here we use microcontroller which is mega Wi-Fi R3 which is integrated with node mcu and we have mainly two outputs one is entirely wireless and one is connected with the buzzer through the driver circuit and then we have a dedicated power supply system that is integrated with me and their blogs that consists of solar panel with 200 watt per and we have a battery and that is capable charging with the aid of pwm controller and after that show the regulation surprisingly we use regulated multi output power supply because we required different power outputs for different voltage output for different sensor that are integrating with MCQ and the pressure sensor that capable of sense and that feed on pressure related values that connected with the with the aid of this mega Wi-Fi R3 and wind sensor gives feats of old win the related weather activities and temperature and humidity sensor feed as all temperature changes as well as humidity of the current section and GPS information gathering with the aid of GPS and rainfall sensor for analysing the rainfall we are normally using a surprise system already we have designed the dedicated for analysing rainfall for each and every movement and their system is situated in the area and soil moisture sensor that gives moisture content level of soil and LDR sensor that he does all light intensity related activities whether the light for is off for cloud or not everything all information we can easily gathered by LDR and all together we are sending to a cloud with the help of an integrated Wi-Fi router and that is initial set steps and initial system we are trying to develop here. The cloudburst concretization plans are based on a few simple principles. The main principle is to keep the water on the surface and control it rather than installing large, expensive pipes underground. Instead, cloudburst streets will collect and transport the water away from the vulnerable, low-lying areas. So by our project predister we cannot help the destruction caused by cloudburst but we can save peoples life by alerting and giving them a new life

The fig 2 shown is the form design of our project we give the basic idea for our product physical structure and the positions of our senses we designed this by help of SketchUp software by reducing the cost of making box and we select a boxer structure which is available in market. making cost of boxer structure is little bit high so we have an industrial areas in our college so we can purchase the box around 2000 rupees from the market with the aid of this box you design the basic structure. Also, it has the advantage of not getting any kind of lightning because have a lightning arrestor which is made by cooper and it will work effectively. And also this material is made of hard material and it will not be damaged easily. Also, we made this design with a special compartment for the power supply and other components. We were able to deliver a level of design depth that rough sketches or 2D designs couldn’t, such as enhanced detail control, thanks to this modelling. It also allows us to investigate the physical features of a design without succumbing to physical limits, and by doing so, we can correct problems that we couldn’t correct when building it.

Fig 3 shows the expected outcomes of our project. By analyzing specific geographical areas that supposed to be a chance of cloud-burst from that area we are gathering all that and feeding to it cloud and from the cloud the the aid of the algorithm initially we are collecting data with the AI and we analyses the data analyse kind of abnormality are found. If found then we will get alert the people and make them move to safer locations with their belongings and precious ones. And also, here in the geographical area while we specifying these the river near to our geographical area the system embedded in that area also will let through the system because if we have any chance of acquiring the cloud-burst then it automatically the water level may arise and that may lead to a bad things and we will let the information to the people before so that people can move to safer locations. The agencies also get help from our device because it can make their jobs easier and help so many people from the problems and damages caused by cloud burst and related issues. Cloud computing has the advantage of eliminating costs associated with on-site data centres, such as hardware and upkeep. With AI projects, those upfront expenses can be prohibitive, but in the cloud, businesses can quickly access these technologies for a monthly subscription, making R&D costs more reasonable. Furthermore, AI systems can extract insights from data and analyse it without the need for human participation.

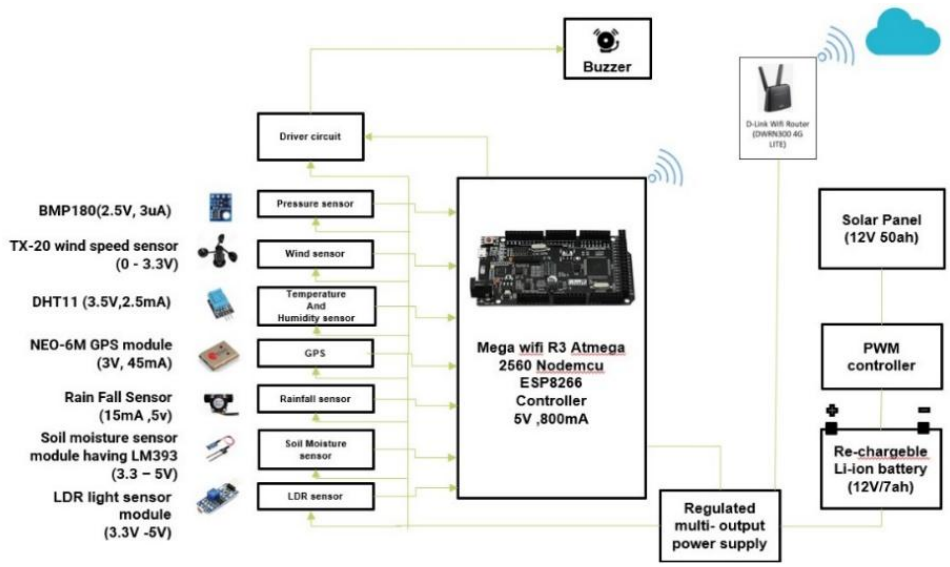

Fig 1. The proposed schematic block diagram of our project Predister

Fig 2. The proposed schematic form design of our project Predister showing a front, side, and back view

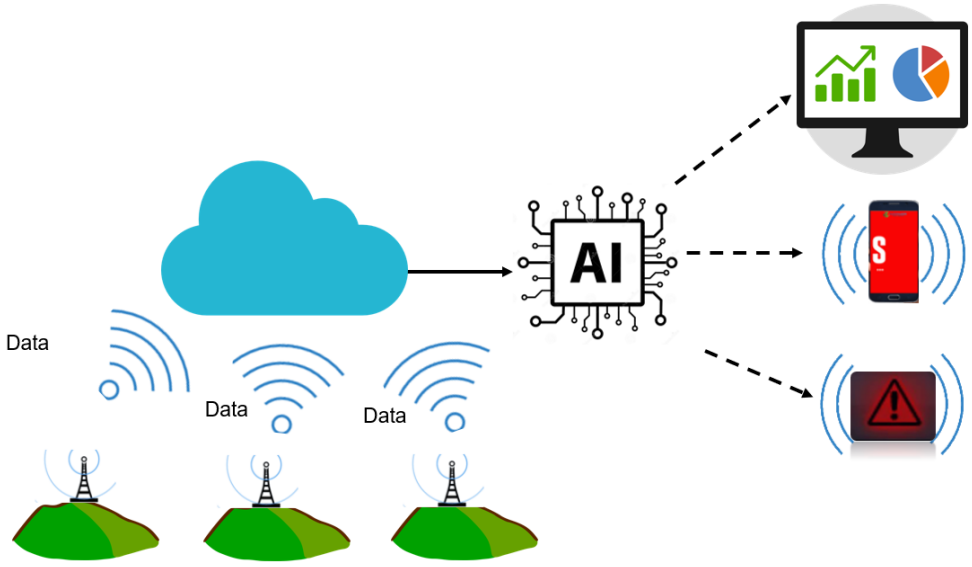

Fig 3. The proposed schematic expected outcomes of our project Predister

IV. PROTOTYPE

This is our prototype which we made by using a readymade case with a length of 31 cm and width 26cm and a height of 55cm. For reducing the cost we select a nearby available readymade case for our project. this case is made up of aluminum foil. Aluminum foil is extremely dimensionally stable even in soft state. Aluminum foil can be recycled several times without loss of quality. Aluminum foil does not absorb So it is durable and lightweight. we use primer paint for avoiding corrosion. This case also has a lock system which makes secure the components inside. Then In this case we addon the metal stand which is a portable type we can easily detach this metal stand. the case is fixed on a straight pipe which is carrying the weight to the stand. we also have a portable solar panel stand it can easily movable to any direction and also easily detachable and also these are rotatable so the stand and solar panel can be placed in any direction. In this case, we have a separation in the case power supply unit and controller unit. This separation is fixed with a rubber mat for avoiding the conduction between the metal box. Inside this case, our components are safely secured from theif, weather conditions, etc and in this case also sensors are placed perfectly in different locations. and also it is adaptable to every atmospheric condition and it will withstand any vulnerable conditions also. Its parts can be removed and can be removed into 4 pieces and can be integrated so that we don't want to take the whole weight. The main advantage is that we don't need any manpower to take and fix it. So the manpower cost is also reduced. If there is strong wind and other negative factors we can fix this structure in ground with the help of concrete

Fig 4. The Detailed front view, side view, and back view of our project Predister

V. FACTORS THAT AGGRAVATE CLOUD BURST

Torrential rains are mainly caused by clouds that lead to heavy rains. According to various studies, torrential rain is a small sign of intense combat, creating strong convection, lifting moist air at a sufficient speed and reducing the water load with great force and tremendous force. Create a cloud. Raindrops form a strong downdraft that looks like torrential rain, and larger drops fall at terminal velocities from about 12 km / h to over 80 km / h. The resulting precipitation is a stream of water falling at high speed over a small area. When the rate of water accumulation on the ground exceeds the surface capacity, local floods occur on flat terrain. There is no satisfactory technique for predicting heavy rains. Her size. This requires a very good radar network. This is prohibited to recognize the possibility of heavy torrential rains. At close range, you can only identify precipitation areas that are difficult to preserve. The weather conditions favorable to the appearance of clouds burst. Factors that exacerbate the devastation of heavy rains are indiscriminate and large-scale deforestation, indiscriminate unplanned urbanization, roads, dams, large-scale construction, expansion of mining projects, and the corresponding ease of human activity. Increases, rivers and nullers. Most of the invasion of artificial debris into the hills is accidentally abandoned slopes that eventually flow into rivers and streams of small rivers. When the water level in the bed rises, the waterways cannot withstand the sudden impact of heavy loads caused by torrential rain. Heavy floods have occurred along the slopes, causing widespread devastation.

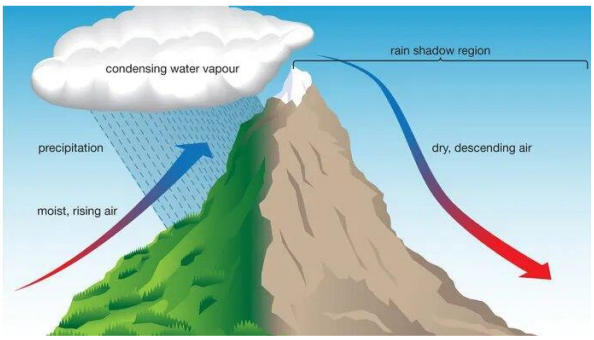

Fig 6. Fig that shows how cloud burst occurs [4]

VI. CONCLUSION AND FUTURE SCOPE

Despite the devastating effects on human life and socio-economics everywhere, little attention has been paid to meteorological studies of "heavy rain", these studies are primarily of damage and flooding. Limited to evaluation. Understanding the dynamics of torrential rain not only has a significant impact on predicting this phenomenon in order to save lives in the affected areas, but it also

has an impact on the scientific community regarding the unique dynamics of this phenomenon. increase phenomenon. The purpose of this study is twofold. The first is to answer the question of how downpour synoptic weather conditions differ from a normal monsoon synoptic meteorological system. Second, we will investigate what conditions are caused and how they are caused by torrential rains. Atmospheric factors are continuously monitored and analyzed to predict cloudburst.

A. This device can be used as an Air Quality Monitor.
B. Our devices operate in a specific range of regions and with the help of GPS, we can analyze and alert the locations which are connected to the affected area.
C. Enable Vision to help the rescue team and other forces to view the situation at hilltop.
D. We can analyze the data and save this for future references and to determine parameters
E. Atmospheric factors are continuously monitored and analyzed to predict cloudburst

VII. ACKNOWLEDGMENT

We were overwhelmed by the magnitude of the downpour and the nature of the storms we heard from the locals. We have always wondered what atmospheric conditions play a role in such a catastrophic meteorological system. Therefore, our vision was to develop a system to protect and support people from such disasters. We would also like to thank project guide Mr. Anto Manuel for his full support.

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