SPECIAL FEATURE

Real Time growth rate measurement of Biofloc using IoT

Silicon Tech

The Science & Technology Magazine

Digest

Vol. 28 • Jan - March 2023

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ChatGPT

ChatGPT is a powerful language model developed by OpenAI that can generate human-like text, and responses to a wide range of topics. The technology, debuted in November 2022, has received widespread attention for its potential applications in various industries such as customer service, marketing, and content creation. Additionally, ChatGPT has also garnered interest from researchers and developers for its cutting-edge AI technology and its ability to be fine-tuned for specific use cases.

The model is trained on a massive corpus of text, allowing it to generate responses to a wide range of questions. One of the key features of ChatGPT is its ability to generate contextually relevant text. This means that the model is able to understand the context of the question being asked and generate an appropriate response. For example, if someone asks a question about a specific historical event, ChatGPT will generate an answer based on its knowledge of that event.

Another key feature of ChatGPT is its ability to generate text that is consistent with a specific style or tone. This means that the model can generate text that is written in a formal style, a casual style, or any other style that is appropriate for the context of the question. This makes it an ideal tool for a wide range of applications, from generating news articles and reports, to generating marketing materials and customer service responses.

Despite its impressive abilities, there are some limitations to ChatGPT that are worth mentioning. Firstly, the model is not perfect, and it can generate responses that are sometimes inaccurate or even offensive. This is particularly true when the model is not given enough context to generate an appropriate response. For example, if someone asks a question about a sensitive subject, ChatGPT may generate a response that is inappropriate or insensitive.

Another limitation of ChatGPT is that it is only as good as the data it was trained on. This means that if the training data is biased or contains inaccuracies, these biases and inaccuracies will be reflected in the responses generated by the model. It is therefore important to be careful while using ChatGPT and to always verify the information it generates.

In conclusion, ChatGPT is a powerful and versatile language model that has the potential to revolutionize the way we interact with machines. Whether we are looking to generate content, respond to customer inquiries, or simply engage in conversation, ChatGPT is a tool that can help us in completing a job. However, as with any tool, it is important to use ChatGPT responsibly and to be aware of its limitations. By doing so, we can ensure that we get the most out of this amazing technology.

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Real-Time Growth Rate Measurements of Biofloc Fish Using IoT

Abstract : *Biofloc technology is a tool for water quality management in aquaculture. The fishing industry faces many difficulties like water pollution, temperature imbalance, feed, cost, etc, which affects the growth of fish. Different techniques can be used to make decisions for fish-farmers related to the growth of fish. Most of the research has focused on real-time data assets and storage. Biofloc technology (BFT) collects data using sensors, analyses them using a machine learning model, generate a decision with the help of artificial intelligence. The main objective of our research is to propose an IoT based solution to aquaculture that will help to increase the growth rate of fish. A real-time model will be designed for monitoring the activities of fish growth and suggestions can be automatically generated in due time for increasing the growth rate of fish.*

Keywords: Biofloc, Aquaculture, IoT, Machine learning model, Artificial intelligence.

I. INTRODUCTION

Aquaculture makes up 1.07 percent of GDP, making it one of the categories that is rising in developing nations like India. According to estimations, the country might need 1.6 crore tonnes of fish. Furthermore, it has been noted that regular fisheries have been decreased as a consequence of overfishing. This led to the adoption of commercial aquaculture. Aquaculture is the practise of organizing specific exercises, procedures, and knowledge for raising a variety of aquatic creatures and underwater plants. This action has produced amazing results in terms of monetary growth and food development. Maintaining a safe distance from natural harm and the loss of fish due to various diseases is made easier by routinely evaluating the physical and biological guidelines of pond or lake water. By keeping an eye on certain physical conditions, like as temperature, turbidity, oxygen levels, and pH, aquaculture failure can be prevented. Because it involves the breeding of aquatic animals like scavengers, fish, crabs, and other creatures, aquaculture is also known as aqua farming.

Utilizing the Internet of Things (IoT) makes it possible to monitor water waste remotely and maintain water, gas, and other environmental PH levels. IoT use has produced a successful model for practical production of natural and organic food. An optimum water quality state is created when fish, plants, and microscopic organisms all coexist in harmony within a controlled environment. This calls for the development of standardised techniques for evaluating the water quality, which rely on the secure transmission of accurate information. IoT is used to monitor, regulate, and maintain water quality parameters using sensors that provide remote, continuous, persistent data about water quality on a graphical user interface (GUI).

To measure the water parameter, there are numerous boards and circuits. An aquarium's PH, water temperature, turbidity, or gas levels are measured using a Raspberry Pi 3 and commercial sensor circuits. The data collected from the sensors is sent to ThingSpeak, an IoT investigation stage service that provides ongoing information. A healthy environment that is conducive to the growth of fish and plants can be maintained by regularly observing this information. It consumes 90% less water than traditional farming does. [Aqua Fishing Monitoring System using IoT devices].

This study focus on Indonesia where more water than land is present. Indonesia therefore offers a huge potential for fishing output. Growing aquatic organisms requires a variety of skills, knowledge, and practises known as aquaculture. For Indonesia's economic growth and food production, aquaculture is crucial. Farmers encounter

crop failure as a result of numerous dangers. This is caused by the growers' ignorance and the fact that they are still using outdated cultivation techniques. Using an autonomous self-feeding system, one can first observe the behaviour of fish before determining how environmental changes affect the physiological parameters of cultured fish. The increase of fish weight gain was much higher in males than in females in both sets of tests in several research that used technology in aquaculture, such as a self-feeding system, which were carried out using Nile tilapia. Technology started to advance using the Internet of Things (IoT) to make it simpler to monitor, collect, send, and access data via a network without the need of computers or humans as the age progressed. One of the aquaculture products in Indonesia that has the most risk in relation to other products is shrimp. In order to live, shrink commodity needs consistent water quality conditions because it is sensitive to changes in water quality. In order to keep the water in shrimp farming in good condition, water quality must be maintained. Water quality parameters that need to be considered in shrimp farming include the content of dissolved oxygen (DO), hydrogen potential (PH), turbidity, temperature and water level. In order for the shrimp to continue growing and avoiding sickness so that they will survive longer until harvest time, the water quality must be kept at the relevant standard values that have been established. This shrimp, which originates from the West Pacific Coast of Latin America, was first made available in Indonesia in 2001 after being brought there in 1978–1979 for the first time. [Application of IoT based Technology in Vaname Shrimp Cultivation].

Numerous characteristics, including pH, ammonia, dissolved oxygen, temperature, nitrates, salt, carbonates, bio carbonates, and others, are taken into consideration when monitoring an aquaculture system. These sensors are attached to collect data, and using IoT, the data is sent to the aqua farmer. The Raspberry Pi is special on the IoT platform since it comes with a built-in Wi-Fi module. Long-term environmental data collection for Internet of Things (IoT) representation is particularly suited for Wireless Sensor Networks (WSN). WSN solutions now span a wide range of applications, and as technology and research develop, their application space continues to grow. Additionally, due to their adaptable low-cost data gathering and actuation, this trend enhances their employment in IoT applications. [Design and Implementation of IoT Based Real Time Monitoring System for Aquaculture using Raspberry Pi].

In order to help shrimp and fish farmers save money on feed by recycling wastewater during production, biofloc technology was developed in the 1990s. The fundamental notion behind those producers is that they can benefit from the nitrogen cycle by promoting the growth of advantageous bacterial colonies in culture water. The IoT extends its wings across all industries and changes how people live their lives. Energy is conserved, while data connections and reliability are improved on a global scale. The hardware-controlled system and mobile app make up the prototype design. An account administration module, species profile, telemetry, and manual controls are all features of the Android mobile app. It functions as a user interface where users may see sensor readings (pH, temperature, and dissolved oxygen) and get remote alarm notifications on android mobiles. The administrator account is where alert level values are established. This user is in charge of running the programme. A user can specify a feeding schedule in the mobile app as well. The hardware, which includes an Arduino, Raspberry Pi, sensors, and relays, is interacted with by the mobile app. The Arduino is equipped with sensors for pH, temperature, and dissolved oxygen. A corresponding relay is automatically turned on once the Arduino determines that the sensors' reading levels are inappropriate. [Assessment of an automated ioT-biofloc water quality management system in the Litopenaeus vannamei's mortality and growth rate]

RELATED WORK

In this study there are many parameters used such as temperature, dissolved oxygen, pH, salinity, and Oxidation-reduction potential (ORP) which will help us to know about the condition and quality of the water. Here fish-farmers can access to the Thing-Speak cloud server using mobile applications to look after the condition of the water. This is based on IoT technology, named the E-Sensor AQUA system. It also proposed a simple and

effective method to Improve sensor reading's reliability and reduce maintenance costs by using an automatic sensor probe cleaning mechanism. This solution helps to make it more affordable for small-scale farmers in developing countries to apply hi-tech farming practices [1].

This study helps to provide a stable and comfortable environment for the fish, promoting their health and growth. The Arduino board processed a temperature sensor, which was used to estimate the water temperature. This automated system is able to maintain the tank temperature according to the species of fish cultured while providing a consistent and reliable way to monitor and adjust the tank temperature. The system was tested and monitored in the experimental setup, and it proved to be effective in maintaining the temperature of the tank according to the requirements of different types of fish. We will make the system accessible to fish farmers by using low-cost components in its development. The purpose of this project is to design and develop an automated fish tank temperature control system with cost-effectiveness in mind The results of the experiments revealed that the temperature can be accurately regulated by controlling the power supplied to the heater with an error of less than 0.3 °C as suggested by [2].

Biofloc technology helps to maintain the water quality in aquaculture systems by providing additional organic carbon and nitrogen sources that can be used as food by bacteria, which in turn provide food for the aquatic animals. This benefits aquaculture businesses by enhancing water quality, increasing fish yields, minimizing environmental impact, and lowering operational costs. Here, we employ Sustainable Tool, which is an innovative technique that relies on the biofloc system to achieve water quality management. To keep the nitrogen and carbon levels in an aquaculture system at their ideal levels, Sustainable Tool uses biofloc. Biofluid technology has a number of advantageous qualities. By enhancing feed, biofloc technology not only helps to improve water quality but also lowers feed costs [3].

This study examines how IoT technology can be applied to aquaculture, showing how it is beneficial for those involved in the industry. The IoT devices are beneficial as they can monitor various parameters of the water, such as temperature, pH levels, dissolved oxygen, salinity, and turbidity, which are needed for proper fish farming in the right water environment. The Android app helps these customers check various parameters of the water easily by connecting the IoT devices to their smartphones. This will provide detailed information about the water parameters, and if any parameter is outside of the ideal range, it will notify the customers accordingly Features [4].

This study presents a remote monitoring system using the concept of IOT for aquaculture water quality. Through the study includes there are many sensors used and also arduino is connected to it. Each and every sensor gets detected instantly, stores the information in cloud and checks for upper and lower limit range, if any deviation is found at once an alert message is sent. This technology in aquaculture will provide many benefits like; Improves the growth of aquatic products, lowering of damage caused by major disasters, improved environmental control, and also reduces the cost [5].

Monitoring of water quality in aquaculture was defined and implemented in this study using the Raspberry Pi, Arduino, various sensors, a smartphone camera, and an Android application. The water quality parameters used in this work are temperature, pH, electrical conductivity, and color. An Android phone is used as the terminal device. The results of this study have demonstrated that the proposed system is capable of monitoring water quality parameters accurately and reliably A user can monitor the water condition using an Android app through Wi-Fi within Wi-Fi range and through the Internet from anywhere in the world. The Android phone allows users to gain access to the data in a straightforward manner, making it easy to use and giving it an advantage over other systems. By using this system, anyone can monitor the water quality in their vicinity and be aware of any changes that might lead to health hazards. [6]

By incorporating technologies such as artificial intelligence (AI) and the internet of things (IoT), this study utilizes a mobile application to collect, analyse,

and interpret data All of these new technologies in the sector have enormous potential. The mobile application will enable those involved in the fishing industry to interact with each other and provide real-time data on their activities. The study recommends the capacity development of young fisheries professionals in emerging information technology areas like AI, blockchain, mobile apps, IoT, etc. This capacity development will enable young fisheries professionals to design, develop, and manage mobile apps that are suitable for the needs of various contributors. This mobile application will be beneficial for the fishing industry as it will allow fishermen to access timely data, enabling them to plan their fishing trips and make more informed decisions. [7]

In this study, experimental research was conducted to measure the effect of an indoor pond biofloc with a prototype developed on the growth and survival rate of Litopenaeus vannamei shrimp. The prototype was tested on a variety of parameters, including water temperature, dissolved oxygen, nitrite and ammonia concentrations, pH levels, and biofloc abundance. This study recommends that future researchers explore and conduct assessments on the addition of other water quality parameters such as salinity, nitrite, nitrate, and orthophosphate. The findings of this study suggested that the prototype performed well with regards to the growth and survival of Litopenaeus vannamei shrimp. [8]

By automating the monitoring and control of water quality, oxygen levels, temperature, feeding schedules, and fish health, the proposed intelligent IoT Biofloc system will improve efficiency and production. Here we developed a system that uses sensors to predict water quality and provide real-time monitoring through an Android app and also uses machine learning models such as decision regression trees. The system is designed to help farmers optimize the process of monitoring, controlling, and managing fish farms. The results of this experiment demonstrate that the proposed system has achieved good accuracy in predicting water conditions in fish farms and can be used as a reliable tool to help farmers monitor and manage their fisheries more efficiently. [9]

This system is aimed at providing real-time insights into the chemical environment with data captured from a wide range of sensors. It is made up of three main parts: a chemical sensor, a central server, and an alert system. The proposed model is capable of ensuring water quality as it monitors all the parameters like water temperature, water level, pH, and TDS, controls different pumps and motors automatically, and alerts the user if any parameter exceeds the ideal value. The combination of sensors, a cloud system, a mobile app, and controlling devices has the potential to improve fish farming by making it more efficient and allowing for real-time monitoring. [10]

This study presents a system in which collected data is analysed by a machine learning model and artificial intelligence (AI), allowing it to make decisions that are then sent in the form of notifications to the user via a mobile application. The water quality monitoring system, which uses IoT technology, is a step that monitors the water quality in real-time, reduces the cost of production, increases efficiency, reduces human dependency, and thus ensures sustainable development economically and socially. The data collected by the IoT-enabled device is sent to the cloud, where machine learning algorithms and artificial intelligence algorithms analyze the collected data and take decisions accordingly. The experiments performed on the proposed system showed promising results with an accuracy score of 0.773, which is a good enough measure to indicate that the system works reliably Additionally, this system is designed to detect water contamination quickly and accurately. [11]

This study aims to build technology for observing and validating waters acidity levels in tilapia biofloc ponds. In this paper by observing the quality of pool water acidity is executed automatically through a microcontroller. [12]

In this system, the combination of the pH sensor, Arduino, and additional equipment enabled us to quickly and accurately measure the pH level of water. With this combination, we have achieved accuracy and precision in our measurements that would be difficult to replicate using traditional tools. We also connected a temperature sensor and GSM to the system, which allowed us to

monitor the pH levels and temperature in real-time as well as feed our experimental fish from any location with cell phone service. Additionally, a liquid crystal display was connected to the system in order to display all the results in an easily accessible way. The system was designed in such a way that it could accurately measure and monitor the pH of water over a period of time.

This technology creates a dynamic website linked to the cloud server, which enables farmers to keep track of the system's progress remotely and update their operations accordingly. Also, it gives farmers access to information that would have been difficult to come by in manual testing. Furthermore, the KNN model helps to develop the system's predictive capabilities by learning from past data and extrapolating this information to make future predictions, and this model uses features such as depth, water temperature, and salinity to classify fish species accurately. Temperature, water level, and pH value estimates are also provided. All of these features make the KNN model an invaluable tool for aquaculture farmers, as they are able to monitor the water quality of their aquaculture systems in real time and with a high degree of accuracy.

In this work, we try to design a system for cultivating fish using IoT devices. Through the use of a combination of sensors, a microcontroller, and an embedded system, we will be able to create a real-time monitoring system that records data such as water temperature, pH, turbidity, CO3 gas, and water level. This system will be able to detect unusual changes in the environment and alert the users of any potential risks or disturbances, allowing them to take necessary action. With this system, fish farmers will be able to have a more accurate and reliable monitoring system for their fish tanks or ponds.

This method of water management allows for the optimal health of the fish by creating an environment where they can thrive and reproduce and also handling the pH, membrane, temperature, ammonia, etc. of the water in the tank. As a result, the parameters affecting water quality remain in balance. Culture is the foundation for the health and development of living organisms. It is recommended to monitor and evaluate water quality parameters. To guarantee a healthy environment for the fish, it is important to keep up with the maintenance of water quality in order to ensure that it remains balanced.

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In this model, we have used cloud computing, the Internet of Things, and artificial intelligence, where cloud computing and the Internet of Things have enabled more efficient and automated data collection and analysis, while artificial intelligence has increased efficiency by automating tasks. Here, CIA technologies were used, which enable greater flexibility, allowing for a more diverse range of species and production strategies. In this way, by using cloud computing, the Internet of Things, and artificial intelligence in the aquaculture value chain, the productivity of aquaculture has increased considerably. Here we found the current population growth and technological development needed to protect wild fish stocks, control fish prices, and increase productivity.

This aims to create a mobile application to control an automatically operated aquarium system, allowing us to easily monitor and control various factors such as feeding, air pumps, light, and the pH value of the water. This will efficiently control the fish aquarium and reduce spoiled water due to improper fish feeding. This system could alert users when the pH value of the water was lower than a determined value, allowing them to adjust their fish-feeding and aquarium maintenance to keep their tank in top condition. We demonstrated how to use an automatic aquarium, with the aquarium size adjusted and done on an automatic water changing system.

We will create the aquaculture monitoring and control system to determine the issues of medicine, agriculture, transportation, training, etc. Monitoring dissolved oxygen, carbonates, turbidity, ammonia, nitrates, salt, pH, and temperature parameters can help us determine when these issues arise, such as when the pH is too high or low or when there are too many nitrates present. This system decreases labour costs and energy consumption. Also, the methodology executed can facilitate the aquaculture farmers' precise and reliable observance of water parameters.

PROPOSED MODEL

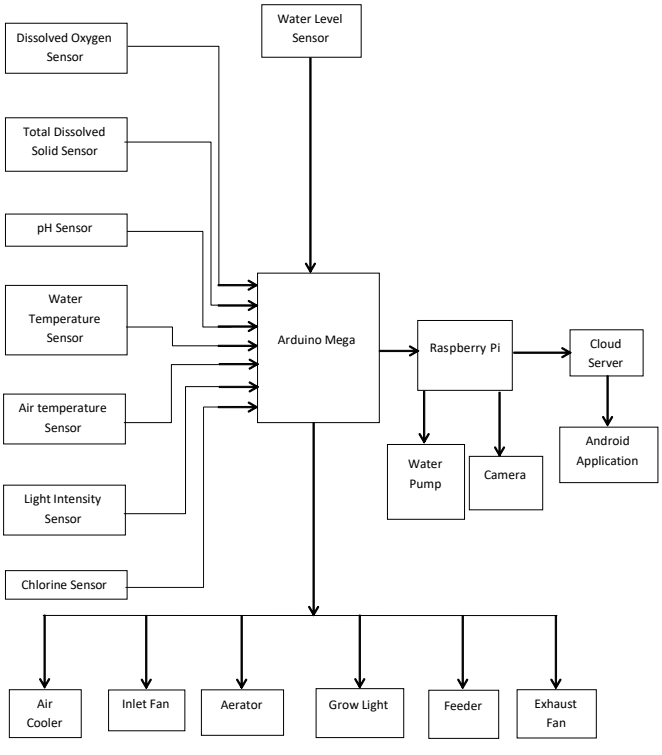

Fig: Purposed Block

Fig: System Architecture

Figure 1. Block diagram of the proposed system

In the above figure the Ubidots sensors are connected to a cloud that will provide easy access for receiving and analysing data. The cloud is also accessible to mobile users. The data that will be collected from sensors is then compared with the standard threshold that is recommended by WHO. If it exceeds the standard, an alert message will be sent to the users. With the help of Ubidots' cloud, users can easily access real-time data and analyse it. The use of cloud technology makes the data easily accessible to users in various places around the world.

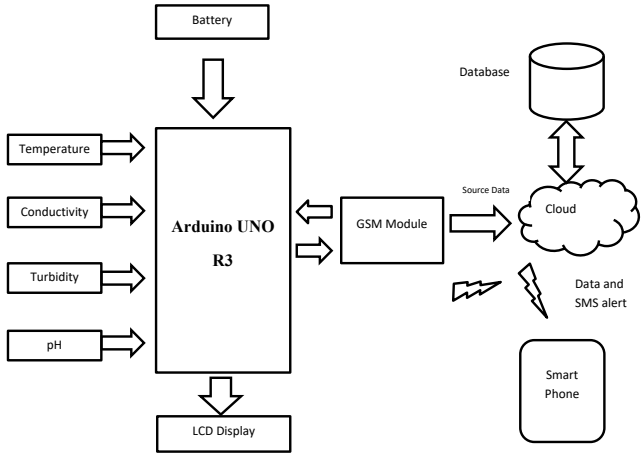

Figure 2. Block diagram of water monitoring system

We will use an Arduino Uno R3 as a core part of the Internet of Things-based water monitoring system. The controller will be directly connected to, or interfaced with, a variety of sensors. Sensor data, i.e., TDS, temperature, turbidity, and pH, are measured or estimated by using the sensor in different water bodies such as lakes, rivers, water tanks, etc. and then passed to the Arduino Uno R3, which processes and stores data. This measured data will be sent to the cloud with the help of the GSM module. The GSM module will enable the Arduino Uno R3 to securely send data to the cloud, making it accessible in real-time and allowing users to view and compare changes over time.

CONCLUSIONS

Aquaculture development includes a considerable number of commercial, biological, engineering, and precision measurement and calculation areas. Here we have discussed the parameters such as temperature, water level, pH values, and oxygen level using the IoT sensors and Arduino Uno. System control is installed in

fish farm terminal equipment to allow administrators to monitor the fish farm's status. These measurements and calculations are key to a successful aquaculture industry. The proposed model can be implemented in real-time to monitor the water level and its parameters. Through which the growth rate can also be predicted by the owner. Future work can be focused on the death rate reduction by using different collected parameters.

ACKNOWLEDGMENT

We would like to express our sinere gratitude to our supervisor, Dr. Samaleshwari Prasad Nayak for guiding us in this research work.

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Elon Musk

Elon Reeve Musk (born June 28,1971) is a South African-born American entrepreneur, business magnate, and investor. He is the founder, CEO, and chief engineer of SpaceX, CEO and product architect of Tesla, Inc.; owner and CEO of Twitter; founder of The Boring Company; co-founder of Neuralink and OpenAI; and president of the humanitarian Musk Foundation. Musk is the second wealthiest person in the world according to Forbes' real-time billionaire list and Bloomberg Billionaires Index.

Musk was born to a Canadian mother and a South-African father. He was an introvert and bullied in his teens. But his keen interest in the technology arena pushed him into developing a video game at the age of 12 and selling it to a computer magazine. Musk travelled to Canada at the age of 17 to attend Queen's University; in 1992 he moved to the United States to study business & physics at the University of Pennsylvania, then moved to Stanford University in California and dropped out after two days from the Ph.D. program.

The growing popularity of the internet pulled Musk and his brother Kimball to develop a company named Zip2. Elon subsequently went on developing his further online financial companies such as X.com, PayPal an online money transfer service, and eBay the online auction site. He also released an EDM track "Don't Doubt Your Vibe" featuring his own lyrics and vocals. His involvement in SpaceX & Tesla marked most part of his success story. Musk played a key role in Tesla Motors in the development of the world's first electric vehicle, the Tesla Roadster. Musk's SpaceX has signed many high-profile contracts with NASA and the US Air Force to manufacture rockets and execute military missions. He has desired to work on a collaborative mission to deploy an astronaut to Mars by 2025. Elon Musk has shown entrepreneurial inclinations since childhood; he has pursued his goals consistently which not only inspires people associated with him, but the entire world of entrepreneurs!

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Distribution Transformer Monitoring System

Abstract : *— It is very important to maintain transformer health in order to maintain smooth and reliable operation in grid operation. Real time transformer health monitoring systems help to warn the system operator before any fault occurred and to enhance the reliability of power supply to the consumers. In case the failure couldn't be avoided, immediate information of transformer failure with precise location details should be sent to the service operator so that necessary action can be taken without delay. In order to design a smart monitoring system, we need to understand the drawbacks of conventional monitoring system and the problems faced in electricity distribution grid. The transformer monitoring system will help the operator to define the performance of the unit. It will also provide valuable information about transformer health and this system will allow the utilities to optimally run the transformer and keep this equipment in operation for longer period.*

Keywords: Distribution Transformer, Arduino UNO, Current, Voltage

I. INTRODUCTION

In power systems, a distribution transformer is an electrical equipment which distributes power to the low power low voltage users directly, and its operating condition is an important component of the entire distribution network. Operation of distribution transformer under rated condition (as per specification in their nameplate) guarantees their long life. However their life is significantly reduced if they are subjected to overloading resulting in unexpected failure and loss of supply to a large number of customers thus affecting system reliability. Overloading and ineffective cooling of transformers are the major causes of failure in distribution transformer exist some problems and deficiencies. Few of them are mentioned below.

(1) Ordinary transformer measurement system generally detects a single transformer parameter such as power, voltage, current and phase. While some detect multi parameter, the time of acquisition and operation parameter is too long and testing speed is not fast enough.

(2) Detection system itself is not reliable. The main problem is the device's instability, poor anti jamming capability, low measurement accuracy of the data.

(3) Timely detection data will not be sent to monitoring centers in time, which cannot judge transformers three phase equilibrium.

4) A monitoring system can only monitor the operating state or guard against steal the power, and is not able to monitor all useful data of distribution transformers to reduce costs.

(5) Many monitoring systems use power carrier communication to send data. But the power carrier communication has some disadvantages like serious frequency interference, with the increase in distance signal attenuation, serious load changes brought about large electrical noise. So if we use the power carrier communication to send data in real time data transmission, reliability cannot be guaranteed [1].

It leads to monitoring of key operational parameters of distributing transformer which can provide useful information about the health of transformer and keep the asset in operation for a longer period. This will help to trip the transformer before any serious failure which leads to a significant cost saving and greater reliability.

II. HARDWARE IMPLEMENTATION

This project explains regarding the Hardware implementation. It tells about the design and working of the design with the help of circuit diagram and explanation of circuit diagram in detail.

III. COMPONENTS REQUIRED

A.distribution Transformer

A distribution transformer is also known as a typical kind of isolation transformer. The main function of this transformer is to alter the high voltage to the normal voltage like 240/120 V to use in electric power distribution. Generally, these transformers are available in different sizes with efficiencies along with insulating

oil. These transformers are available in various sizes and efficiencies [2]. The selection of this transformer mainly lies in the requirement and budget of the user.

B. Arduino uno

Arduino Uno as shown in Fig1 is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button.

C. Acs712 Current Sensor

Fig. 2 shows The ACS712 is a fully integrated, hall effect-based linear current sensor with 2.1kVRMS voltage isolation and a integrated low-resistance current conductor. Technical terms aside, it's simply put forth as a current sensor that uses its conductor to calculate and measure the amount of current applied.

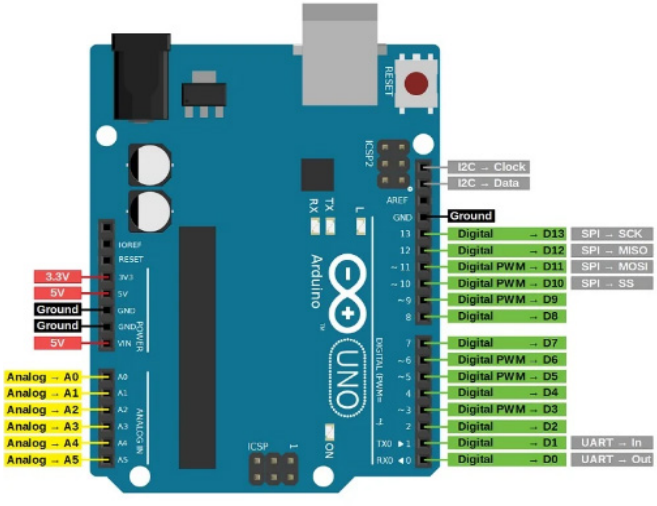

Fig 1. Arduino With Pin Description

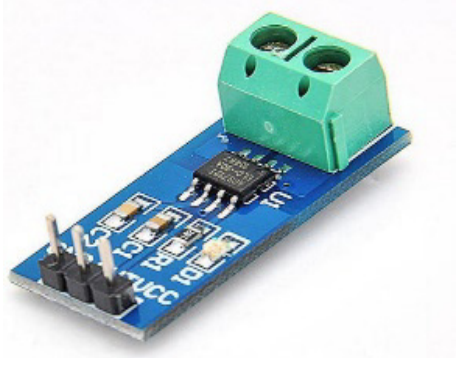

Fig 2. Acs712 Current Sensor

D. ZMPT101b Voltage Sensor

The Voltage Sensor is a simple module as shown in Fig. 3 that can used with Arduino to measure external voltages that are greater than its maximum acceptable value i.e. 5V in case of Arduino.

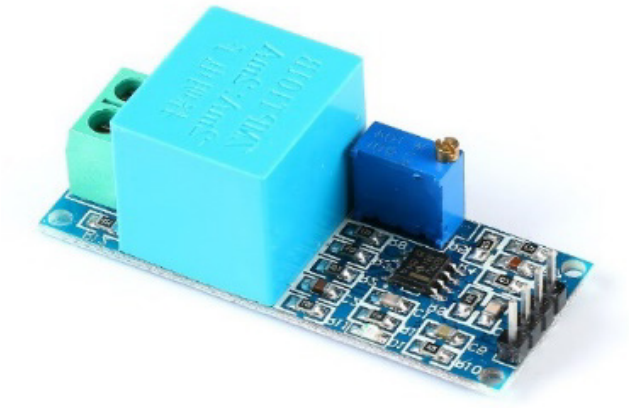

Fig 3. Zmpt101b Volatge Sensor

When there is no load on output (nothing is connected to input), the sensor has an initial voltage (Offset) of VCC/2. That is, if nothing is connected To the input and the supply voltage of the module is 5 volts, the output of the module will be 2.5 volts.

E. Relay module

Fig. 4 shows the relay module which is the device that open or closes the contacts to cause the operation of the other electric control [3]. It detects the undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area through ON or OFF.

Fig. 4 Single Pole Relay Module

IV. WORKING AND RESULTS

When current flows through the circuit, if the current value increases more than the threshold value. The Arduino UNO receives the data, and sends it to the relay module to trigger the circuit. Hence, protecting the transformer from overloading condition

Rating of the transformer used :

12-0-12V, 2Amps Centre-tapped step down transformer.

Under normal condition :

Voltage ranges between 11.25 to 12V
Current ranges between 0.30 to 0.35 Amps (when Single lamp is switched ON).

Faulty condition (Threshold value 0.54):
Voltage decreases to 9.9 to 10.2V

Current increases to 0.53 to 0.57 Amps (when all the lamps are Switched ON).

As the current crosses the threshold value i.e. 0.54 Amps, the relay circuit triggers and breaks the current flow to the transformer. Hence, protects the transformer from overloading condition.

V. CONCLUSION

This smart transformer monitoring system is quite useful as compared to manual monitoring and also it is reliable as it is not possible to monitor the load current manually. This system can detect the abnormality condition and trigger the relay to prevent any catastrophic failure of distribution transformer.

VI. FUTURE WORK

A server module and GSM module can be included to this system for receiving and storing transformer parameters information periodically about all the distribution transformers of a particular utility in a database application. A GSM module can easily figure out that which transformer is undergoing fault by sending message to mobile. Database will be a useful source of information on the utility transformers. Analysis of these stored data helps the utility in monitoring the operational behavior of their distribution transformers and identify faults before any catastrophic failures thus resulting in significant cost saving as well as improving system reliability.

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[3] Monika Agarwal, Akshaypandya,” GSM Based Condition Monitoring of Transformer,” IJSRD - International Journal for Scientific Research & Development, Vol. 1, Issue 12, 2014 , ISSN (online): 2321-0613.

Lipsa Prusty, Arun Rath,
Asneet Hura, Ayaskant Sammantray
Milirani Mallik, Ashutosh Nanda

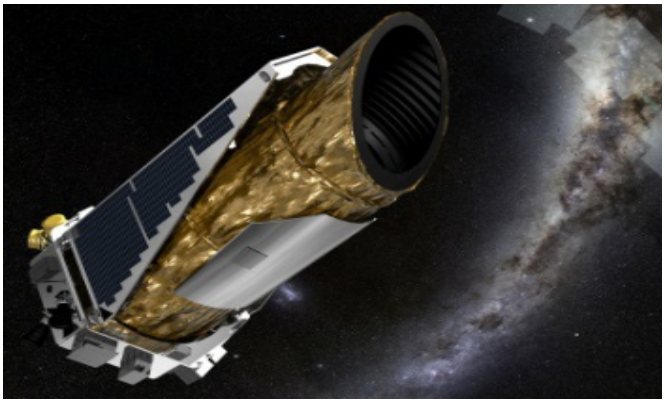
Department of EEE.

Scintillating Space Technology

Kepler Space Telescope

The Kepler Space Telescope was launched by NASA to look for planets similar to Earth that are orbiting other stars. More than 2,600 of these "exoplanets" were found, many of which show promise as potential habitats for life. The goal of NASA's Kepler, the tenth in a line of low-cost, quick-to-develop, and laser-focused science missions of the Discovery class, was to find planets like Earth circling other stars in our part of the Milky Way. The renowned German astronomer Johannes Kepler inspired the naming of the spacecraft (1571-1630).

Kepler was designed to search for terrestrial planets—planets that are half to twice the size of Earth—that are in the habitable zone of their stars and might potentially harbour liquid water on their surface.

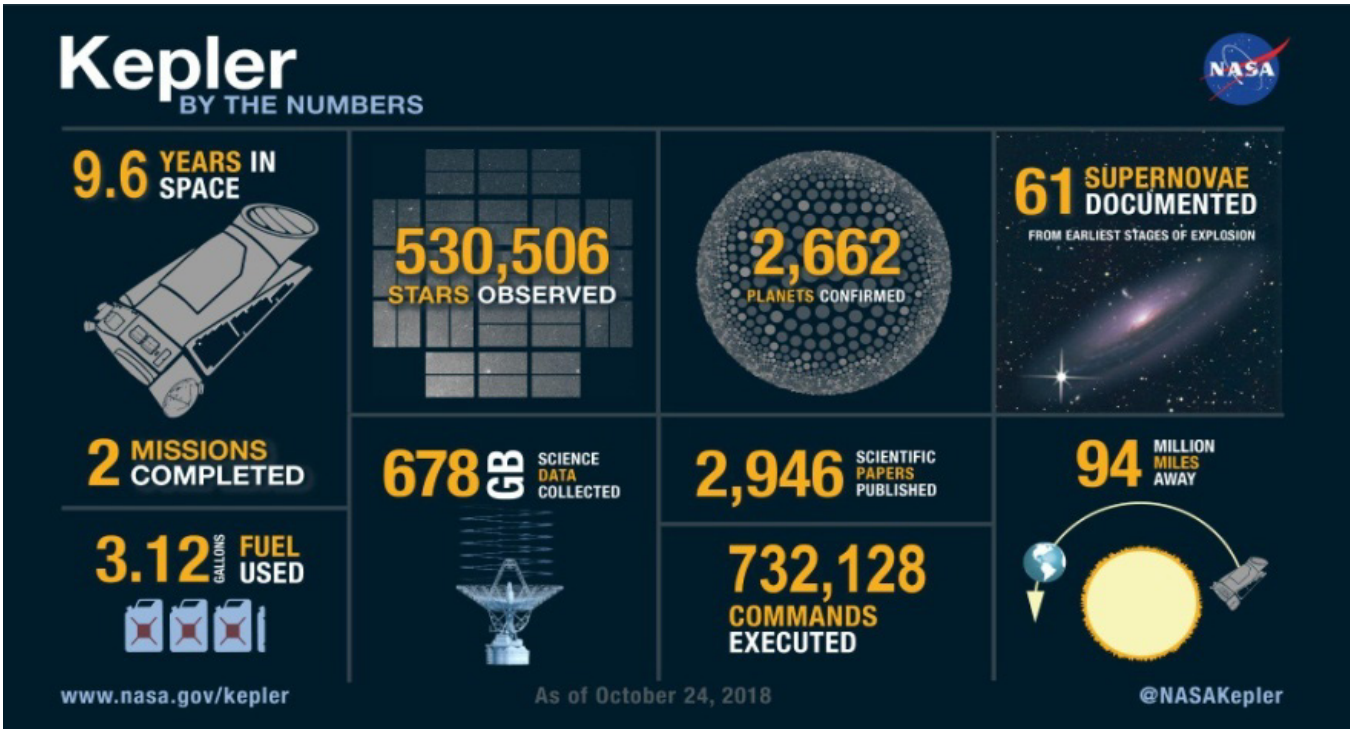


Its scientific objectives included estimating the number of planets in multiple-star systems, figuring out the characteristics of stars with planetary systems, and figuring out the abundance of these planets and the distribution of sizes and forms of their orbits.

The capacity of the Kepler space telescope to measure a star's brightness to a minute fraction of a percent is one of its superpowers. This exact photometry is required to detect the minute dimming brought on by a planet passing in front of its star. For instance, Earth blocks less than 0.01% of the light from the sun while Jupiter blocks roughly 1% when it passes in front of the sun.

Eliminating false positives was a crucial component of Kepler operations in the beginning. Each candidate planet was verified using other telescopes, typically by measuring the gravitational "wobble" displayed by a star in response to a rotating planet. This was done because apparent star dimming can occur through methods other than exoplanet transits (for example, due to a star's natural variability, stars pots, or another star or pair of stars somewhere in the same line of sight).

Kepler used transits, which are minute drops in a star's brightness that happen when a planet passes in front of



it, to find planets. The telescope and image sensor array were specially developed 3-foot (1-meter) diameter aperture telescopes, and the entire spaceship was engineered to support them. One of the largest mirrors outside of Earth's orbit, the telescope's mirror measured 4 feet, 7 inches (1.4 metres) in diameter. About 100,000 main-sequence stars will be observed by Kepler during the course of three and a half years.

Six planets made up the planetary system that orbited Kepler-11, a yellow dwarf star located around 2,000 light years from Earth. These planets are larger than Earth, with the largest ones being comparable in size to Uranus and Neptune, according to a NASA announcement from February 2011.

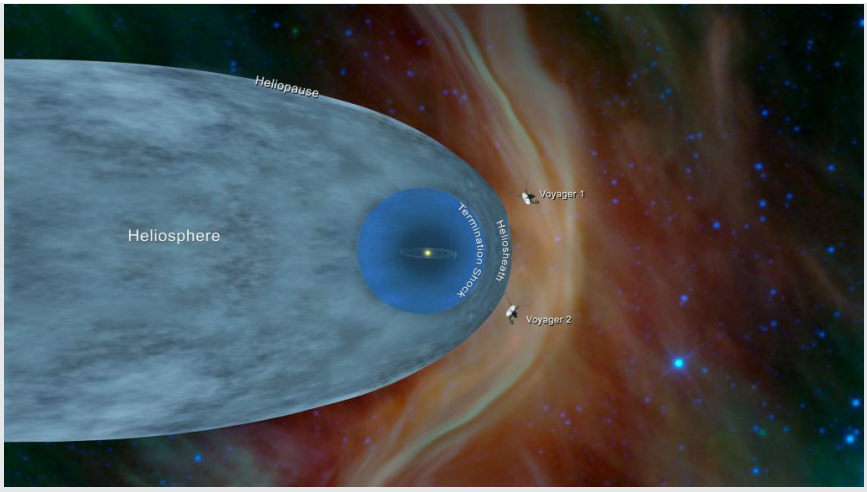
Kepler experienced at least two safe mode incidents in 2011. A potential issue led to the spacecraft's virtual shutdown of science operations. The Kepler project team was able to revive the vehicle within two to three days in both the February and March occurrences.

More than 2,600 planets outside of our solar system have been found thanks to Kepler, many of which may hold the promise of supporting life.

William Borucki, the original chief investigator of the Kepler mission, remarked, "When we started conceiving this mission 35 years ago, we didn't know of a single planet outside our solar system." "Kepler has launched us on a new trajectory that is full of promise for future generations to explore our galaxy now that we know planets are everywhere."

Even after initial warnings of limited fuel, astronomers pushed Kepler to its limits before retiring the spacecraft, successfully completing a number of observation programmes and downloading important scientific data.

Saujanya Paikray
8th Sem, CSE



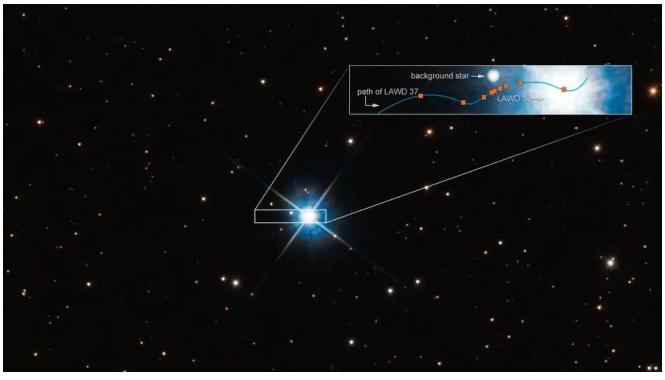
(Excerpted from UNIVERSE TODAY, Space and Astronomy News)

Researchers from UCLA and UC Berkeley are examining the likelihood of extraterrestrial intelligent civilizations intercepting outward transmissions from NASA's Deep Space Network (DSN). These signals are directed towards five deep space spacecrafts - Voyager 1, Voyager 2, Pioneer 10, Pioneer 11 and New Horizon; all five spacecraft are traveling through interstellar space, having completed their primary mission years ago.

Voyager 1 officially left our solar system in August 2012 followed by Voyager 2 in November 2018; the remaining three have yet to cross our solar system's heliopause, which is the boundary between the solar wind emitted by our Sun and interstellar wind.

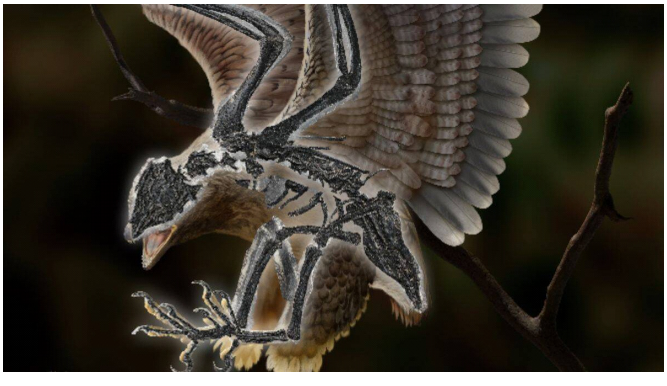
In the end, the researchers identified the number of stars each spacecraft transmission will encounter as the signals endlessly traverse the cosmos at the speed of light. The spacecraft transmissions will encounter 142 stars for New Horizons, 241 stars for Pioneer 10, 289 stars for Voyager 1, 325 stars for Voyager 2, and 411 stars for Pioneer 11.

Measuring mass of a dwarf star (Source: The Indian Express)



The Hubble Space Telescope of NASA is used by astronomers to directly measure the mass of a single, isolated white dwarf star. It is due to "gravitational lensing," that occurs when light from a background star is slightly deflected by the gravitational forces of a star in the foreground. White dwarf stars had previously been measured by viewing them in binary star systems. This measurements may be uncertain if the white dwarf's companion is in a long-period orbit lasting hundreds of thousands of years.

Bird or dinosaur? (Source: The Indian Express)



A strange fossil discovered in China appears to have a dinosaur-like head and a bird-like body, raising new questions about dinosaur evolution into birds. This 120-million-year-old fossil has added to the already contentious debate over whether birds are descended from dinosaurs. In order to study the fossil, researchers first used high-resolution CT scanning to examine it while it was still enclosed in its rocky resting place.They then digitally removed the bones and reconstructed the skull's original shape and function. It was discovered at this point that the fossil's skull is nearly identical to that of dinosaurs such as T.rex, rather than being bird-like.

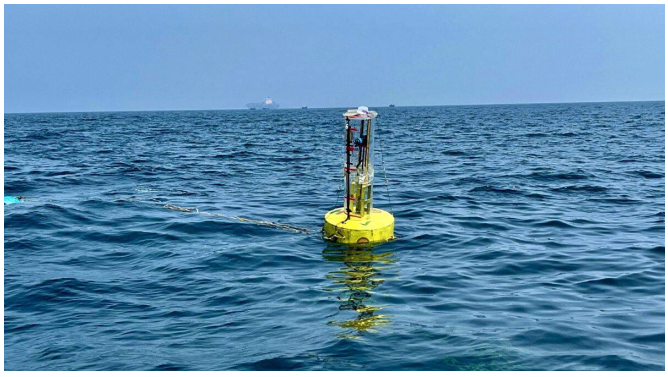
SSLV-D2 (Source: The Indian Express)

The Small Satellite Launch Vehicle (SSLV-D2) joined Isro's fleet of three rockets: the workhorse PSLV, the heavier cryogenic GSLV, and the heaviest launcher, LVM3, which is being human-rated for the Gaganyaan mission. Earlier this vehicle successfully placed three satellites in a 450 km circular orbit around the earth. This will put two start-up spacecraft, Janus-1 and AzaadiSat2, along with ISRO's earth observation satellite EOS-07, in a 450-km circular orbit around the Earth.

Cryomesh to preserve coral (Source: The Indian Express)

According to scientists, preserving coral larvae may someday aid in rewilding reefs that are threatened by climate change. Scientists are working overtime to safeguard coral reefs as the warming ocean threatens fragile ecosystems. A novel technique for freezing and storing coral larvae has been successfully tested by scientists working on Australia's Great Barrier. A new lightweight "cryomesh" that can be manufactured cheaply and better preserves coral. “If we can secure the biodiversity of coral … then we’ll have tools for the future to really help restore the reefs and this technology for coral reefs in the future is a real game-changer,” says Mary Hagedorn, Senior Research Scientist from the AIMS lab.

Electricity from Ocean Waves (Source: The Indian Express)

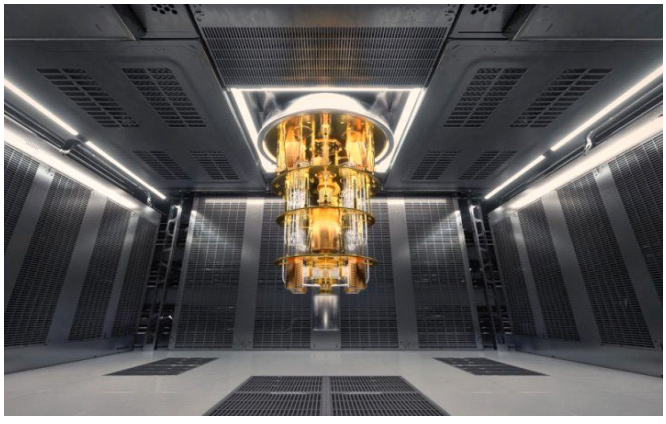


Researchers at IIT Madras have developed and tested a system for generating electricity from seawaves. This generates electricity from the oscillation of waves in the Sea. The system named "Sindhuja-I" was deployed about six kilometres off the coast of Tuticorin in Tamil Nadu, where the sea is about 20 metres deep. This system currently generates 100 watts of power. In the next three years, it will be scaled up to produce one megawatt of energy.

Eyes can tell about heart disease (Source: E & T News)

According to a team of scientists from St. George's, University of London, artificial intelligence (AI) has discovered that twisting of eye vessels can cause high blood pressure and heart disease. They use artificial intelligence tools to study blood vessels in the back of the eye and their relationship to heart disease. They discovered that routine eye examinations of the size and shape of these blood vessels can aid in the detection of health issues. The researchers found that an increase in 'twisting' of the arteries could be a key element in the development of High blood pressure and Heart disease conditions.

Quantum Computers (Source: Silicon Republic)



Researchers from the University of Sussex and Universal Quantum demonstrated that quantum bits (qubits) can be transferred directly between quantum computer microchips. TThey have built a more powerful quantum computers, that are far more powerful than even today's most advanced supercomputers by successfully transferring data between quantum microchips.

Photosynthesis to capture solar energy (Source: The Indian Express)

Photosynthesis is the process by which plants absorb sunlight and convert it into sugar. Researchers from IISER-Thiruvananthapuram and IIT-Indore have developed a new artificial light-harvesting system that can efficiently capture light for power conversion by mimicking photosynthesis. According to IISER-Thiruvananthapuram scientists, this fundamental investigation into highly efficient energy transfer systems will provide the basis for designing new light-harvesting materials that can enhance the efficiency of solar cells and reduce energy loss.

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Automatic Classification of Discrete Emotions in Various Dialects of Odia Speech

This thesis proposes the classification of emotions in three dialects of the Odia language – Cuttacki, Sambalpuri, and Berhampuri. Very little, if any, prior work on emotion classification in this language is available in the literature; the study aims to create a well-balanced database for conducting meaningful experiments. It is expected that the survey will provide helpful information about the nature and characteristics of emotion to the researchers in the field of speech emotion recognition in Odia dialects. Moreover, this study will help develop a generalized system that can recognize vocal emotion, increasing the accuracy rate of human-computer interaction.

A vocal portrayed emotion database of 7 discrete emotions (Happiness, Disgust, Anger, Fear, Surprise, Sadness, and Neutral) has been created with 70 utterances per speaker (10 per emotion), consisting of short sentences of three dialects of Odia. The total number of speakers in each dialect is 6 (3 Males and 3 Females). This dataset is authenticated by a Listening Test (i.e., Subjective test). Different types of feature sets are extracted from the utterances, which are based on Spectral and Prosodic features: Log Frequency Power Coefficients (LFPC), Mel Frequency Cepstral Coefficients (MFCC), delta MFCC, Double delta (DDMFCC), Linear Prediction Cepstral Coefficients (LPCC), Log power, log Mel-spectrograms and its first and second derivative (static, delta, and delta-delta) namely, three-channel log Mel-spectrograms. Initially, we took some traditional Machine algorithms such as Gaussian Mixture Model (GMM), Support Vector Machine (SVM), and Hidden Markov Model (HMM) used as classifiers. Then, deep convolutional recurrent neural network (DCRNN) using an ensemble classifier (Softmax and Support Vector Machine) is proposed. The comparative performances of all these feature sets are evaluated concerning the accuracy of classification in three cases: (i) speaker-independent and text-dependent vocal emotion recognition in each dialect, (ii) Speaker dependent and text-dependent vocal emotion recognition in each dialect, and (iii) Multidialectal database tested on certain feature combinations. This thesis also sets the stage for developing an application in android to detect the emotions in the Odia language.

In conclusion, it can be mentioned that through this work, an Odia speech emotion multidialectal database has been successfully created for the first time. The design and testing of the emotion recognition system from speech have been implemented using this database. This study will enable researchers to automatically identify emotions in the Odia language of subjects with similar cultural and social background.

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Crops Grown In Bangalore High On Toxic Heavy Metals

According to a study published in Current Science, Scientists in Bangalore, India has found toxic levels of four heavy metals, chromium, nickel, cadmium and lead, in crops and vegetables grown on soil irrigated with water from six lakes in the Bangalore city. The lakes are Margondanahalli, Yele Mallappa Shetty, Hoskote, Varthur, Byramangala and Jigani. They found that, the 17 lakes in and around Bangalore, have become part of the city's drainage system, into which flow untreated sewage and industrial effluents from garment factories, electroplating industries, distilleries and other small-scale but polluting units and many farmers are now using water from these lakes to irrigate and water vegetable crops.

(Yele Mallappa Shetty Lake in Bangalore, India)
Image credit: Naveen Nkadalaveni (CC BY-SA 4.0).

Soils irrigated by these lakes accumulate heavy metals to varying degrees depending on their concentration in the water and the frequency of irrigation. The heavy metals are absorbed by the crops along with other essential plant nutrients. The study found chromium content ranging from 7.93 to 56.15 milligrams per kilogram, exceeding the EU standard of FAO/WHO std. is 20 mg/kilogram, in all crops, but particularly high in coriander, spinach, radish, amaranth and kohlrab. Nickel exceeded permissible limits by 25 per cent in all the tested samples. Farmers using contaminated lake water for farming end up contaminating the soil as well. There should be strict rules about the discharge of wastewater from the residential areas and industries.

Source:
https://www.scidev.net/asia-pacific/news/crops-grown-in-bangalore-high-on-toxic-heavy-metals/

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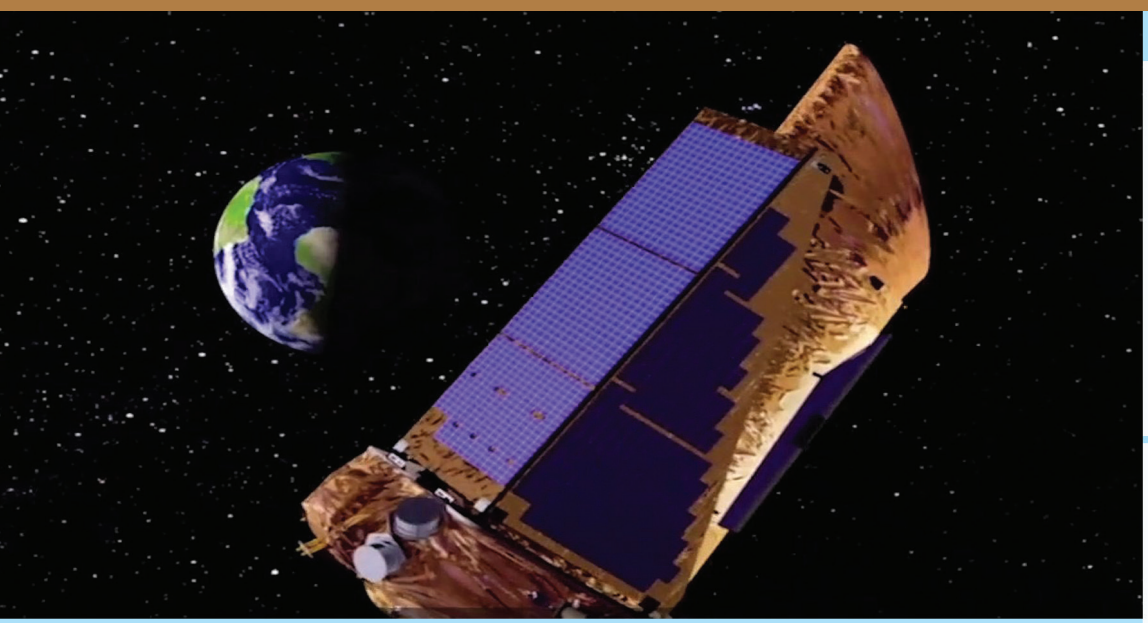

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