Research Article

Real Time Monitoring And Data Acquisition For Ship Using Adhoc Networks

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Abstract

In current situation the communication technology is used in various fields. Using current technologies the peoples are able to send, receive the data and transfer their ideas within a short period of time. Internet of things (IoT) is one of the important concepts used to make a communication with other devices. It means create a communication with all devices using internet connection. IoT is used to connect various objects or services. This concept is used to collect the real time data from various devices with the help of sensors. The sensors are connected with the objects. The collected data is used to do all operations in effective manner and take a proper decision depends on the situation. IoT plays an important part in ship monitoring also. In this paper proposed a new system to collect the data from ship using sensors. The sensors are fixed physically in various parts of the ship likes engine, important components, vessels etc. This data are used to track the ship and take preventive actions during an emergency situation.
Keywords- Internet of Things, Ship Ad-hoc Networks, High Frequency, Routing Schemes, Marine Cartography, Sensors, Internet of Things

I. INTRODUCTION

Various embedded technologies such as cloud computing, Internet of things, Big data are used in marine field also. The various communication techniques will control connection between ship and port. The traditional model ships are not able to communicate the sea shore port directly. IoT is the current growing technology. It is used to connect the various devices with the help of sensor. Different types of sensors are available in the market. The sensors are fixed in the physical devices. Sensors are used to provide real time data to the sea shore port or control room. These data are used for make a proper decision at the proper time. In ship monitoring also IoT is used. The sensors are stick on the ship parts. The sensors are connected with the main control room on the sea shore. The smart ships are not only used to collect the data from ports but it refers to make a proper communication with other ports and other ships. The following figure 1 show that how the ships are communicated with the controlling devices.

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Figure 1 Ship Communication to port

The following figure 2 shows the various applications of IoT in marine system
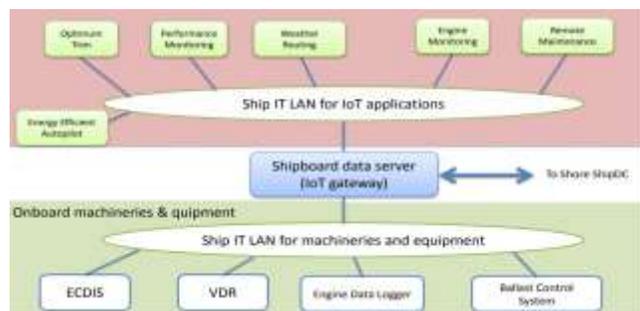

Figure 2 IoT applications in Marine Technology

After the introduction part of this paper in section I, the remaining part of the paper contains the following parts: part II is used to describe the literature review and also provide the data about smart ship and also the importance of current communication techniques in marine field. Section III describes about the proposed system, Section IV describes the result and discussion part. Finally Section V presents the conclusion part.

II LITERATURE SURVEY

Rabab Al-Zaid et al., explained about satellite communication used in marine communications. This satellite connection is very costly and difficult to implement on the small and medium sized vessels. Another drawback of the satellite communication in sea area is low network connectivity. To overcome these issues the authors proposed a new system for collect the data from vessels on the sea using IoT concept. Ships are constructed by using Very High Frequency (VHF) radios waves and various sensors like temperature sensor, wind speed sensor and direction sensor etc. Data are collected from various sensors and send to the clouds integrated with base station on the sea shore. The central cloud produces the location of the ships [1].

Guobao Xu et al., says that observing marine surrounding area has paying more attention due to the changes of climatic condition. From past two decades various systems are developed to observe the marine environment using latest technologies. In this paper the authors were reviewed the usage of IoT in marine environment observation [2].

Pooja Gundewar et al., share out an identification of ships movements, protect the ships from accidents, arising fuel form the ship tank and fire ignition. If any accidents are occur in the ships, the ship owners are facing heavy financial loss [3].

Sujun Yang et al., proposed a new system to monitor the structure of the ship. The outer layer of the ship was affected by various kinds of sea waves, air and sea water. In this paper the authors develop a new system for ship monitoring in real time using the concept of IoT. The stress level of the ship and quantity of vibration was measured by using various sensors in the ship. Using the value of this attributes avoid the critical state of the ship [4].

Hasib Zunair, et al, said that now various sensors are used in security and tracking applications. In this paper the authors designed and execute a new system using wireless communication network for observe various ships to avoid dangerous things in case of overweight. This system consists of four stages: Detection part, GPS tracking system, data transfer system and software part for implementing web contents [5].

Zhenhua Zhao et al., constructed a new system for ship monitoring. This consists of various hardware and software parts such as monitor device, user system, processor, GPS part, memory part, I/O devices with interfaces etc. [7].

M. S. Zaghloul et al., designed and executed a new system to control the ship using SCADA. In this system various sensors are connected on the ship. The sensors are connected with the control room to create an online management of the ship. The alarm is also fixed with the sensors and continuously observes it. The alarm sound will be activated depends upon sensed data [8].

Shadman Sakib et al., developed a new version of automobile tracking scheme for water vessels. The additional feature of this system is the ships and vessels on the water has been monitoring from remote locations. By using motion tracking concept immediately send the messages to the ship owner using GPS concept when the system can identify any dangerous activity [9].

Ahmadhon Kamolov et al., says that new concepts in communication technologies used in our day to day life. In marine technology, the advanced computing concepts like IoT, big data technique and cloud computing technology also used to gain more attributes and automatic various operations related to marine. Due to this advanced techniques the existing ships are replaced by smart vessels and ports. The main objective of this work was to present a novel system using IoT for creating a automatic link by finding suitable locations through sensors and ship notification message. This system was developed by using Raspberry Pi with combined an ultrasonic sensor. The output of the above mentioned system was to notice the vessels and change the unfilled berth for landing the ship or any kind of vessels [10].

III PROPOSED METHOD OF SHIP MONITORING

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The following figure 3 demonstrates the block diagram of proposed ship monitoring system using IoT concept.
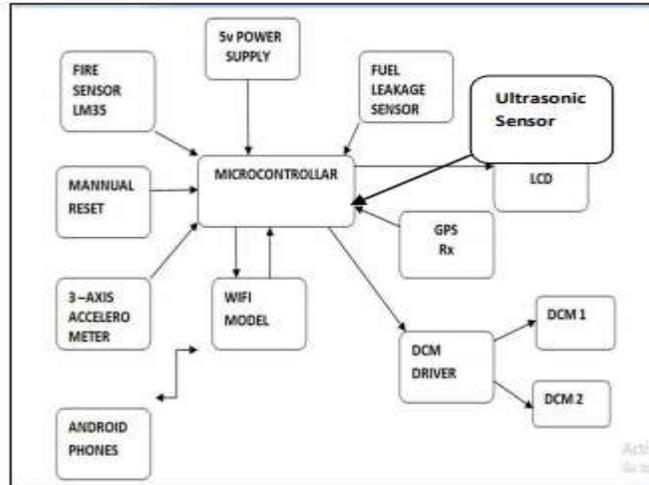

Figure 3 Block Diagram of Ship Monitoring System using IoT

This proposed system consists of various hardware devices. The 3-axis accelerometer is used to calculate the angle of tilt position and display the output on the screen. The fuel leakage sensor is used to identify the gas leakage. This sensor is fit for identifying H2, LPG gas, CH4, CO and Alcohol. Fire detecting sensor LM35 is used to identify the temperature level. Ultrasonic sensors are used to calculate the distance of target device. The ship or vessel location is tracked by using GPS concept. The tracked location sends to the centralized micro controller. The smart devices will connect with the server system by using TCP/IP protocol.

IV RESULTS AND DISCUSSIONS

This proposed ship monitoring system is designed by using the current communication technique IoT. IoT is used to connect the various devices and objects by using sensors. The sensors are placed in physical objects. All sensors are connected with the help of microcontroller. The sensed data is used for decision making and take immediate action. The following figure 4 shows the prototype of the proposed system.
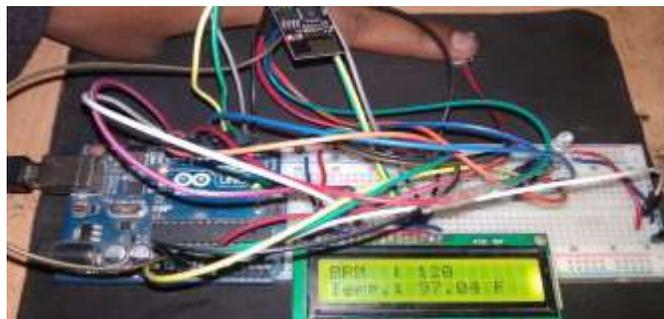

Figure 4 Model of Proposed Ship Monitoring System

V CONCLUSION

The proposed system is mainly used for ship holder by observing their vessels in actual time to find out problems and protect important failure condition. This system is also improves the safety value. This entire system is connected by using various sensors. These sensors measure the performance of the vessel by using different attributes. The collected sensed data is used to measure the performance of the ship, identify the operational conditions, measure the external conditions of the environment and compute the fuel level also. IoT is compared with wireless sensor technique; it has more data analyzing power and controls the objects in an intelligent manner.

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