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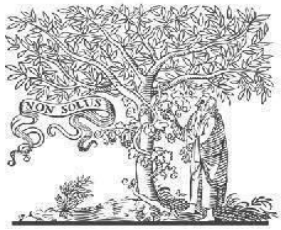

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AN ADVANCED IOT AND GPS-GSM BASED REAL-TIME AUTOMATED DATA MONITORING ROBOT WITH IMAGE PROCESSING AND LIVE STREAMING FOR HUMAN LIFE AND LAND MINE DETECTION SYSTEMS

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ABSTRACT

An era of automation is currently being experienced, where everything is becoming more automated day by day. Automation technology has been applied everywhere, from smaller to larger scales. Moreover, real-time communication between complicated human-machine interfaces is one of the difficulties of the fourth industrial revolution. That is why robots are essential in this field because they improve human lifestyles, lighten workloads, and carry out several dangerous tasks. This research presents a groundbreaking advancement in the form of an automated real-time IoT-based data monitoring robot in an era characterized by the proliferation of automation and the Internet of Things (IoT). This ground-breaking system combines GPSGSM functionality, human life detection, land mine detection, image processing, and live streaming in an efficient manner. The robot utilizes its IoT framework and a variety of embedded sensors and technology to gather, process, and transmit realtime data from its surroundings. Notably, it supports disaster response, military operations, and safety measures by performing the vital tasks of detecting human life and land mines. The ability to categorize and process visual data is improved by the image processing feature, and situational awareness is provided by live streaming

I.INTRODUCTION

The Internet of Things (IoT) and automation have played an undeniable part in the transformation of our world. These technologies, which enable previously unheard-of levels of productivity, safety, and efficiency, are rapidly changing both industries and societies [1]. In the realm of data monitoring, automation and IoT are converging to create new and innovative solutions. A particular aspect of it is pointed out by this research, which is capable of simultaneously solving multiple problems. The multifaceted potential of such a robot is explored by this research, with its adaptability and relevance in a range of fields, including data collection, data monitoring, search and rescue, military applications, and so on [2]. Bangladesh is a country that experiences numerous, powerful earthquakes almost every year. Besides earthquakes, many people also pass away each year as a result of other causes, such as gas explosions and gunfire. One of the examples is the collapse of Rana Plaza, in which 1200 people died in that accident [3]. However, not only Bangladesh but also other nations in the world are also facing a serious earthquake threat. This year, the earthquake that occurred in Turkey in March killed about 60 thousand people [4]. The horror of it can never be described. Keeping these events in mind, the idea of this robot was born. Our goal is to build a cost-effective robot that can be used for multiple purposes and has a high degree of

accuracy in each sector of its use, such as data collection, data monitoring, land mine detection, image classification, human detection, and so on. Moreover, this research represents a significant step toward improving efficiency, safety, and productivity by leveraging the power of IoT and automation, positioning itself at the forefront of technological innovation. The paper is structured as follows: Section II explains the background and literature review of the project. Section III introduces the materials and methodologies, and Section IV represents the experimental result analysis and important discussions about results. Finally, the conclusion is drawn in Section V.

II.LITERATURE REVIEW

A. Khanna and S. Kaur, "Internet of things (iot), applications and challenges: a comprehensive review," Wireless Personal Communications, vol. 114, pp. 1687–1762, 2020.

The idea behind the Internet of Things (IoT) is to connect various gadgets to the internet and one another to communicate several bits of information and data. The Internet of Things is revolutionizing many aspects of life, including how we drive, shop, and even acquire electricity for our houses. All around us, there are sophisticated electronics and sensors embedded. How we use these tools and how they exchange data and knowledge. An overview of various platforms, architectures, applications, and problems is provided in this study. The Internet of Things (IoT), a ground-breaking paradigm, has emerged, enabling common objects to be connected to the internet and collect and exchange data. This review article provides a thorough analysis of IoT and the many sectors it serves. By closely examining its fundamental components, like connected devices and communication protocols, we can fully comprehend the underlying structure of IoT systems. The Internet of Things (IoT) is a network of physically addressable devices with varying degrees of computing, sensing, and actuation capabilities that may collaborate and communicate with one another utilizing the Internet as their common platform [1]. The Internet is the name of the communication system that links people to information. The basic goal of the Internet of Things is to link things and people at any time or location via any network, method, or service. IoT will enable common gadgets to connect and access the internet in order to achieve a variety of goals. As of this writing, only 0.6% of potential IoT devices are thought to be connected [2]. But it's predicted that by 2020, there will be more than 50 billion internet-connected devices. Fig. 1 illustrates how the Internet of Things (IoT) "connected" various functions of devices and a network [3], whereas the Internet has evolved into a network of many devices rather than just a network of computers. The ability to transmit information online is now present in various gadgets, such as smartphones, cars, industrial systems, cameras, toys, structures, home appliances, and numerous other things. Regardless of their size, these devices can carry out intelligent reorganizations, tracking, placement, control, real-time monitoring, and process control and capacities. There have been a lot more devices in recent years that can connect to the Internet. Even if the popularity of wearable technology (watches, headsets, etc.) and the rise of smartphones have had the greatest commercial impacts on the consumer electronics industry, Only a small portion of a bigger trend toward the blending of the physical and digital worlds is linking individuals. In light of everything said above, it is projected that the Internet of

Things (IoT) will continue to expand in terms of the variety of devices and capabilities it can support. It is difficult to define the IoT's increasing bounds because of the vagueness of the word "Things" [4]. While commercial success is still a long way off, For corporations and academics, the Internet of Things (IoT) continues to present what seems like an inexhaustible supply of potential. The paper covers the many IoT domains in light of this applications that could be used as well as the corresponding research difficulties.

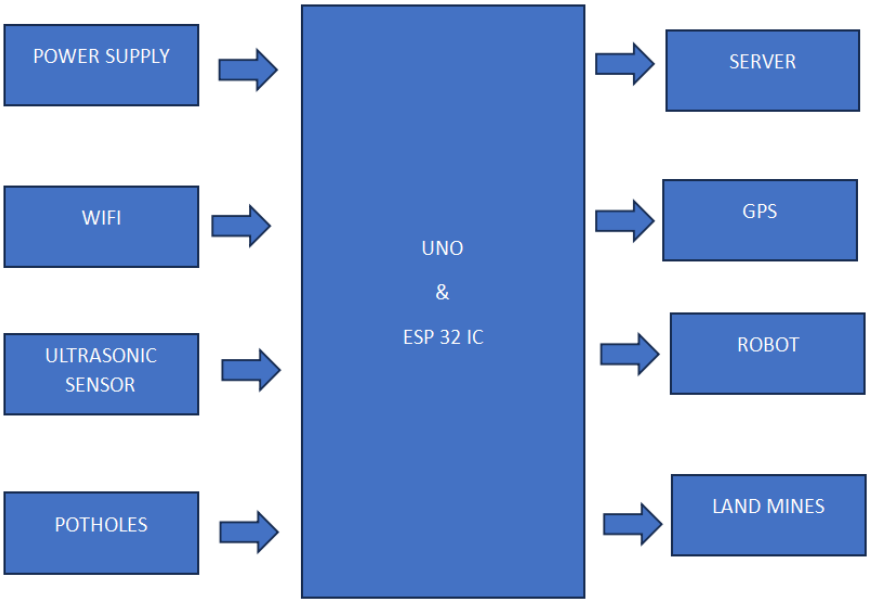
III.EXISTING SYSTEM

The development of novel solutions in a variety of fields, including automation, security, and disaster management, has been accelerated by the integration of the Internet of Things (IoT) and GPS-GSM technology. [5] With a focus on realtime data monitoring as well as land mine and human detection applications, this literature review explores the changing landscape of robotics and IoT-enabled systems, highlighting the importance and potential effects of the proposed project. Recent research has demonstrated the revolutionary potential of IoT-enabled robotics for emergency response and hazardous environment exploration [6]. Robots equipped with sensors, actuators, and communication modules can move autonomously through challenging terrain and gather vital information in real time. Examples of such applications are getting popular gradually, such as a mobile robot that emphasizes the value of integrated sensor data in effective decisionmaking for search and rescue missions

IV.PROPOSED SYSTEM

In the world of IoT, it is really hard to understand the whole mechanism without the system architecture of a project. It is the conceptual model that defines the structure, behavior, and more views of a system, which is really important to realize. The system architecture of this project is depicted in fig. 1. The total system architecture is categorized into three main segments in the following fig. 1. The first one is the robot control part, the second one is the detection and live streaming part, and the third one is the data monitoring part. The microcontroller in the first segment is an Arduino Nano, and it is connected with a Bluetooth module, a motor driver, and motors. The robot will be controlled manually by a user via a Bluetooth module and an android application. To ensure the operation and control are successful, a power supply is provided to the Arduino Nano, Bluetooth module, and motor driver. On the other hand, The micro-controller in the second segment is an Arduino Uno, and it is connected with a metal detector, an ESP-32 camera, a GPS module, a GSM module, and a buzzer. The metal detector is used here to detect land mines, and their location is found using the GPS-GSM module.

Block diagram



V.CONCLUSION

In conclusion, this research introduces a cutting-edge automated IoT-based data monitoring robot that stands at the forefront of technological innovation. Combining GPS-GSM functionality, human life and land mine detection systems, image processing, and live streaming, this robot offers a multifunctional solution to real-life practical problems in a rapidly evolving technological environment. However, the thoroughness with which our research approaches a variety of problems at a low cost makes it particularly noteworthy and different from others. It excels in disaster response, military operations, and safety measures, detecting human life and land mines efficiently. Moreover, the addition of image processing advances its capabilities for object recognition, while live streaming improves situational awareness. Although it has many limitations, such as limited power supply, lowresolution images, the robot's movement failure, etc., keeping that aspect aside, we can say in simple terms that this robot represents how automation and IoT have the power to reshape industries at a cheaper cost and promote innovation in our constantly evolving technological landscape. However, in the long run, we intend to add more features to the robot while maintaining consistent performance. Finally, the importance of this robot in solving real-life practical problems in various hostile environments cannot be expressed in words.

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