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Lora Based Controlled Surveillance Spy Robot

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Abstract:
Robotics has been the idea of superior production for more than 1/2 a century. As robots and their sidebars grow to be greater state-of-the-art, reliable, and miniaturized, these structures are an increasing number of getting used for army and criminal purposes. Robots play an essential position in military affairs, from surveillance to capability explosives. With appropriate sensors to carry out on unique missions, mobile robots are operated remotely to come
across popularity. With the development of generation inclusive of LoRa era goals to trade information wirelessly with radio waves that incorporate functions that make it less difficult, detectable and managed. The project offers a cutting edge way of looking at far flung and border regions the usage of a robotic multi-motive robot primarily based on LoRa.

Key Word*: Surveillance, Robot, Embedded C, Fritzing, Lora module, IoT.*

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I. Introduction

LoRa is found to be the best IoT solution because it operates in an unlicensed Industrial Scientific and Medical (ISM) band (sub-gigahertz) and provides long-distance connectivity to low-power devices. The spread spectrum modulation is an old modulation technique developed in 1940 which was originally used for military communication[6]. Monitor real-time data collection and timely data transmission to operator data. The employment of Defense applications plays an important role in keeping an eye on its citizens and LoRa modulation is an improved version of the traditional method as it is based on the chirp spread spectrum, which allows the use of low-end oscillators for storage, and makes synchronization faster and more reliable. Moreover, LoRa technology provides over 150 dB link budget, providing good coverage [14]. The idea of chirp to spread a spectrum modem converts one information into another bit series and spreads it across the spectrum. It thus makes it more powerful for channel sound because all the allocated bandwidth is used to broadcast the signal. LoRa aims to

eliminate duplicates, reduce device costs, increase battery life on devices, improve network capacity, and support a larger number of devices. It transmits information about 10 to 15 km in rural areas and 30km in water. The disadvantage of this remote connection is the low data rate, which usually ranges from a few hundred to a few thousand bits per second (0.3 to 37.5 kbps) due to which helps us to achieve longer battery life due to lower power consumption. In fact, the whole electronic system is powered by batteries. Even a large number of items are connected with technologies such as GSM, ZigBee, Wi-Fi, and Bluetooth with high power consumption. Considering the energy needs and the issue of battery life, it is worthwhile to use LoRa technology to use an IoT robot based cognitive statins in India. The natural environment is highly unstructured and often unknown, hence these robots must be able to process a large amount of information, and make planning and navigational decisions quickly [7]

II. PROPOSED SYSTEM

Many remotely operated Unmanned Ground Vehicle (UGV) have been proposed earlier to meet various requirements such as path tracking, mine detection, human-animal detection, visual surveillance, etc. The proposed idea of using cognitive robot is for covert surveillance. Cognitive robots have to undergo various processing requirements where they perceive the environment, collect the data and transmit it to the base for the user to act appropriately. In fact the cognitive robot has to filter the information and send respective data to the controller in order to handle the vast amount of data that is amassed by its sensors before performing tasks relevant to their specific missions can be performed. Multiple sensor are used to demonstrate environmental conditions such as harmful gas detection and also for human animal detection, metal detection, etc in this

proposed project. The robot consists of ESP32 microcontroller which acts as the core of the robot, as everything will be managed by it. The metal detector will be used for metal detection also which can be used for mine detection as well as gun or other equipment deployed nearby field or with the enemy. The PIR sensors will be used for human animal detection. Once any unusual behavior is detected it is communicated to the user with a notification on LCD. Hence monitoring of the planned route will be done at the surveillance end, making it capable of operating in real time.

III. Methodology

1. The robot side of the system uses ESP32 and the controller side of the system ESP32. ESP32 is a low-cost, low-power Microcontroller with an integrated Wi-Fi and Bluetooth.
2. Various sensors such as Metal Detector Sensor to detect any metal, land mines , guns varios metal obstacles,
2.1 IR Sensor (Human Detection) sensors use a pair of pyroelectric sensors to detect heat energy in the surrounding environment. These two sensors sit beside each other, and when the signal differential between the two sensors changes (if a person enters the room, for example), the sensor will engage. It can be used to detect any humans or animals in the vicinity.
2.2 Metal Sensor to detect any weapons or ammunitions in the vicinity.
2.3 Gas Sensor (Hazardous Gas Detection) is a device which detects the presence or concentration of gasses in the atmosphere. It is helpful to detect toxic or explosive gasses and measure gas concentration.

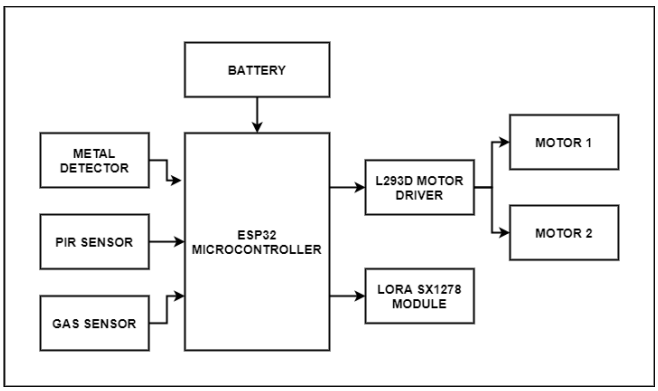

Fig -1: Block Diagram of Robot

3. The L293D Motor Driver is used to drive engines connected to a robot.
4. LoRa SX1278 modules are used to transfer data between the modules.
5. Data from the sensors connected to the robot is collected and transmitted by LoRa via the robot to the LoRa controller.
6. The joystick is used as a controller to control the movement of the robot.
7. Robot navigation is done via the Wi-Fi module.
8. The 2C LCD is used to display the current state of the sensors sent by the robot to the controller.

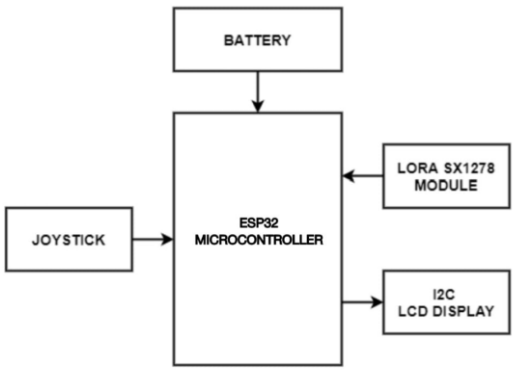

Fig -2: Block Diagram of Remote-control

IV. Circuit Diagram

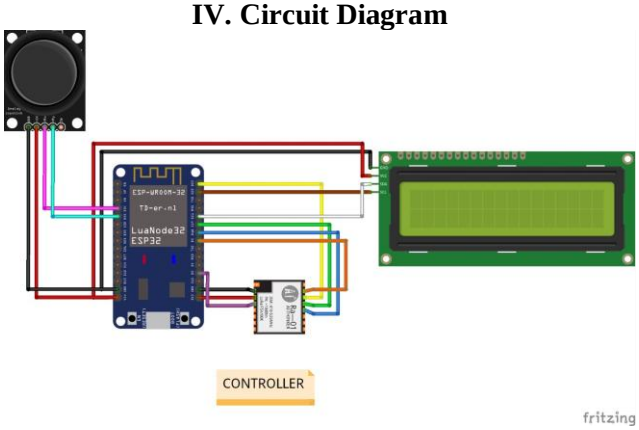

Fig -3: Descriptive Diagram of Remote Control

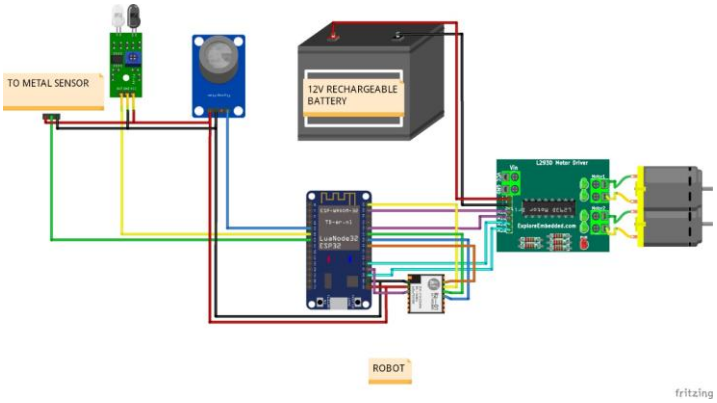

Fig -4: Descriptive Diagram of Robot

V. Result

With rapid development in IoT, devices that are able to communicate during a long-range for an extended time and consume less energy are a necessity. In this paper, the framework for making a Cognitive spy robot for the military surveillance purpose is proposed. It overcomes the matter of limited range surveillance by using LoRa communication techniques at no network area.

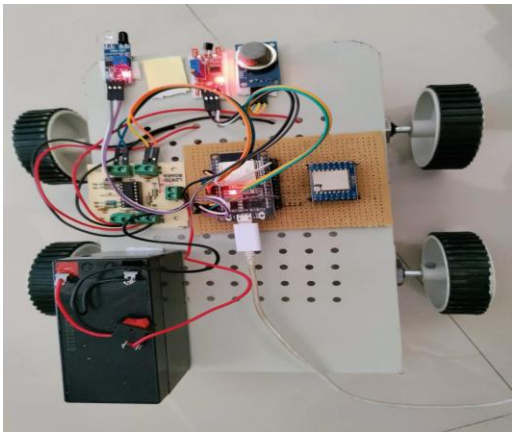

Fig -1: Surveillance Robot

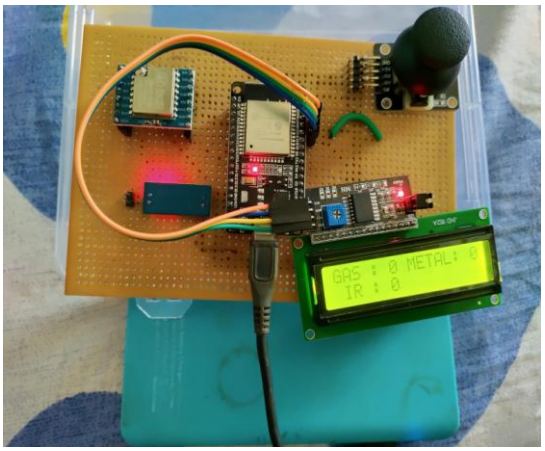

Fig -2: Controller

We can remotely operate the robot with the assistance of mobile manually too. With the help of programming automatic monitoring can also be done. Our proposed robot is miniature, thus maneuvering into area where human access is impossible.

VI. Conclusion

It is found that we are able to receive data from about 6 km in urban areas by using LoRa module. The result we have found to be effective alternative for military surveillance purpose because mostly naxalites or terrorists area is dense forest area where there are no local communication networks. In fact, employing LoRa communication technique and using Internet of Things, we expanded the coverage and a cognitive robot setup is successfully implemented.

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