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Smart Wearable Shoe for Tracking and Monitoring of Army Soldiers

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Abstract: ***Resource following alludes to the technique for following noticeable resources by examining scanner tag labels appended to products or utilizing GPS, BLE or RFID to send area labels.***
RFID labels can spread their area, however the transmission distance is restricted (a couple of meters). Resources can be followed by manual examining of scanner tags, (for example, QR codes).
You can check a QR code utilizing a cell phone with a camera and a committed program, just as a standardized identification reader. Yet, the entirety of this has its impediments.
In our system the user can be able to track the location of the asset once it has been moved in a long distance or stolen. This project utilizes long distance RF communication modules such as LoRa modules which provide long distance communication in terms of kilometres. The LoRa modules can be distributed across the city for tracking of the asset. As the asset moves around the city, the location of that asset is been transmitted to a nearby LoRa which is then transmitted to the mobile app developed independently for tracking the asset

I. INTRODUCTION

Correspondence and community dynamic between battle gear and military hardware is one of the signs of the Internet of Things (IoBT) [1]. The idea of IoBT was proposed by the US Army Research Laboratory (ARL) to acquire keen order control and estimating examination of military administrations. The up and coming age of military organizations will have all the more generally dispersed army installations, including weapons, vehicles, robots, and what can be worn by people. The order, control, correspondence and knowledge (C3I) framework will speed up reconciliation with IoBT, consequently impacting military choices in future conflicts [2]. As a vital piece of IoBT, the military is the most adaptable data base on the combat zone. The roundabout sensors associated with the military hardware furnish the war room with subtleties of a complex conflict. Simultaneously, as a co-usable and subsidiary business bunch, troopers use IoBT hardware to constantly convey, facilitate and work together and perform errands. The wearable sensors are the essential parts of shrewd military gadgets. Tactile modules with adaptable data gathering data on the war zone under the strength of strong assets, Sensors 2019, 19, 2651; doi: 10.3390/s19122651www.mdpi.com/diary/Sensors 2019, 19, 2651 pass Cooperate with different modules coordinated in the gadget for information move and examination. While the emphasis is on improving consciousness of the circumstance, metal organizations worn by officers expand the body organization (BSN). As one of the highlights of the Internet of Things, BSN can distinguish the trading of data among individuals and items, to screen, assess and control the human body and the climate [3]. As a specific BSN unit, Soldier-BSN (S-BSN) has solid natural issues and huge security pressures.

A. Objective

1) The objective of the project is to track the location of the utilized asset.
2) To wirelessly track the location stolen assets using mobile app.
3) To develop a mobile application for cheap and effective tracking.
4) To save the valuable properties.

B. Problem Statement

1) Tracking of GPS location of stolen assets and other things becomes difficult due to signal loss in existing tracking solutions leading to loss of valuables.
2) There is no asset tracking without the use of internet connection.

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II. LITERATURE SURVEY

A. *Muhammad Sadiq Rohei, Member, UN Youth, Dr Nordiana Binti Ahmad, Dr Ely Salwana, Abdul Sattar Kakar,"Design and Testing of an Epidermal RFID Mechanism in A Smart Indoor Human TrackingSystem"*

With expanding consideration regarding public security issues around the world, an ever increasing number of advances are expected to improve public wellbeing. The fast advancement of RFID innovation gives a superior future to individuals with solid area following different inside applications, in this way guaranteeing safe versatility and better observing. It tends to be utilized to diminish the pace of abducting, particularly in agricultural nations where clinical experts are compromised by tax assessment. Accordingly, different RFID arrangements have been tried in numerous human global positioning frameworks. Notwithstanding, these arrangements are viewed as vanishing, with confined clients or harmed and utilized for bombed contact methodology, inability, security or protection issues. Hence, an exhaustive strategy is proposed in this investigation to assess the pertinence of epidermal RFID labels (installed under the skin) in successful human global positioning frameworks. An approved model was built up that plans to build public security by empowering the general population to utilize 868 M Hz-controlled RFID UHF labels in non-industrial nations to acquire public personalities. This examination appends incredible significance to key chip and radio wire capacities, for example, power acquire, polarization yield and distance learning, to test the viability of RFID labels for the appropriateness of skin applications to human security. The outcomes show that the created tag has a higher transmission rate, the relating esteem ento = 0.6, the force is about 1.57 dBi, and the perusing distance is around 4 m, demonstrating that the tag is reasonable for human global positioning frameworks. The technique depends on a locally situated global positioning framework with simple to-utilize middleware that is productive and can guarantee the wellbeing of individuals in the house.

1) *Pros:* As far as cost-viability and energy effectiveness, the activities depicted here might be vital to the green business.
2) *Cons:* The expense of the venture is high, so it can't work ordinarily.

B. *Luca Leonardi, Filippo Battaglia, Lucia Lo Bello, Senior Member, IEEE," RT-LoRa: A Medium Access Strategy to support Real-time flows over LoRa-based networks for Industrial IoT applications",[2019]*

Luca Leonardi, Filippo Battaglia, Lucia Lo Bello, IEEE Senior Member, "RT-LoRa: Media Access Strategy to Support Real-time Streaming of LoRa-based Industrial Internet of Things Application Network", [2019]

Low-power wide region organization (LPWAN) networks are ideal for some applications that require low force utilization, countless hub support, and wide dissemination. LoRa (Remote) is perhaps the best LPWAN innovations since it accomplishes a solid organization association and is demonstrated to be utilized for IoT applications like natural checking and shrewd equilibrium. LoRa likewise vows to give modern Internet of Things (IoT) conditions, yet its reception is upset by the MAC law LoRaWAN, which doesn't give ongoing information stream support. Accordingly, this article proposes RT-LoRa, which is a focal LoRa access methodology that can give ongoing traffic support, so LoRa-based LPWAN can be carried out in mechanical IoT applications. This article presents RT-LoRa, conducts equal testing in the genuine climate of the Internet of Things industry, and gives explicit rules to setting up a RT-LoRa organization.

1) *Pros:* This article presents RT-LoRa, conducts equal testing in the genuine climate of the Internet of Things industry, and gives explicit rules to building up a RT-LoRa organization.
2) *Cons:* This technique may not be reasonable for applications that require more inclusion.

C. *Fengji Luo, Member, IEEE, Gianluca Ranzi, Member, IEEE, Xibin Wang, and Zhao Yang Dong, Fellow, IEEE," Social Information Filtering Based Electricity Retail Plan Recommender System for Smart Grid End Users",[2019]*

The fast development of information in the keen matrix gives an enormous chance to get data for looking for and planning suitable interest side administration (DSM) techniques to augment network execution. Over-burden information additionally presents difficulties to information investigation and dynamic. This article acquaints the PC helped measure with the shrewd matrix and proposes a program to suggest a power deals framework intended for private clients. The proposed customized advancement plan (PRS) depends on a community oriented screening measure (CF). First gather client power utilization information from savvy meters, and afterward store the vital attributes of client power utilization and point by point data about the chose power plan in the client data set (UKD). For the objective client, the suggestion framework breaks down their force example and discovers clients with designs

1) *Pros:* Tests are performed dependent on genuine brilliant meter subtleties and deals framework subtleties to guarantee the adequacy of the proposed PRS.
2) *Cons:* This method produces an overload of data that may hinder data analytics and decision making.

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III. EXISTING SYSTEM

With expanding thoughtfulness regarding public wellbeing issues around the world, an ever increasing number of innovations are expected to improve public security.

The quick improvement of RFID innovation gives a superior future to individuals with dependable area following different inside applications, accordingly guaranteeing safe portability and better checking. It tends to be utilized to diminish the pace of hijacking, particularly in agricultural nations where clinical experts are undermined by tax collection. Along these lines, different RFID arrangements have been tried in numerous human global positioning frameworks.

Nonetheless, these arrangements are viewed as vanishing, with limited clients or harmed and utilized for bombed contact techniques, incapacity, security or protection issues. Consequently, a far-reaching strategy is proposed in this examination to assess the pertinence of epidermal RFID labels (installed under the skin) in compelling human global positioning frameworks. An approved model was built up that plans to build public security by empowering people in general to utilize 868 M Hz-controlled RFID UHF labels in agricultural nations to get public personalities.

This examination appends extraordinary significance to key chip and radio wire capacities, for example, power acquire, polarization yield and distance learning, to test the adequacy of RFID labels for the pertinence of skin applications to human security. The outcomes show that the created tag has a higher transmission rate, the comparing esteem ento = 0.6, the force is about 1.57 dBi, and the perusing distance is around 4 m, demonstrating that the tag is reasonable for human global positioning frameworks. The technique depends on a locally established global positioning framework with simple to-utilize middleware that is productive and can guarantee the security of individuals in the house.

A. Disadvantages Of Existing System

1) Only indoor human tracking is done
2) RFID tags are used which are less distance transmissible
3) Not real time applicable as it should be integrated under the skin
4) Only a distance of 4 meters is achieved

B. Proposed System

Today, military security has become an issue of concern. Presently in India, all pieces of the safeguard framework, specifically the military, naval force and aeronautics areas are dealing with the issue of following arrangements and their status. At present, subsequent to knowing the status and area of each trooper, they will be told by radio. Nonetheless, these techniques have demonstrated not to be compelling following strategies. During the conflict, we always hear the problem of missing of soldiers in the newspaper. On focusing this problem, we have decided to develop a system that will automatically trace the location of each and every soldier. This project utilizes long distance RF communication modules such as LoRa modules which provide long distance communication in terms of kilometres. The hardware component includes micro-controller, GPS, LoRa modules, etc. The LoRa modules can be distributed across the city for tracking of the asset. As the asset moves around the city, the location of that asset is been transmitted to a nearby LoRa which is then transmitted to the mobile app developed independently for tracking the asset. By this the user can have a track of their valuable asset. Thus, this project will help us in tracking the lost asset in an easy and effective manner.

C. Advantages

1) Cheap and effective solution for tracking the military personnel.
2) An independent mobile app for tracking the personnel without any signal loss
3) Protects the military personnel from getting lost.

D. Applications

1) Can be used extensively by the defense agencies
2) Asset tracking

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IV. ARCHITECTURE DIAGRAM

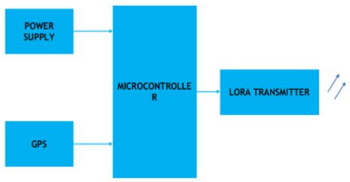

Figure 4.1 Transmitter module

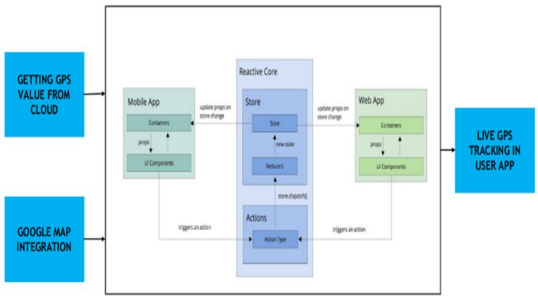

Figure 4.2: System Architecture

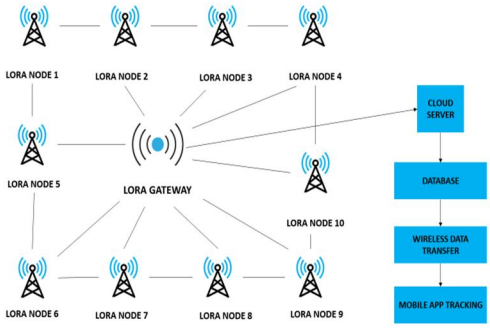

Figure 4.3: Internal mobile application development architecture

A. Working

In this project,we have decided to develop a system that will automatically trace the location of each and every soldier. This project utilizes long distance RF communication modules such as LoRa modules which provide long distance communication in terms of kilometres. The hardware component includes micro-controller, GPS, LoRa modules, etc. The LoRa modules can be distributed across the city for tracking of the asset. As the asset moves around the city, the location of that asset is been transmitted to a nearby LoRa which is then transmitted to the mobile app developed independently for tracking the asset. By this the user can have a track of their valuable asset. Thus, this project will help us in tracking the lost asset in an easy and effective manner.

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V. MODULE DESCRIPTION

1) Power supply Module
2) Processing module
3) Lora module
4) Gateway module
5) Mobile application development

A. *Power Supply Module*

The force supply circuit comprises of a low voltage transformer that drops from 230v to 12v. In this circuit, 4 diodes are utilized to build the extension connector.The connect controller gives hot DC power, which is then introduced in the capacitor channel. adjustment. Parts.

The sifted DC power is provided to the regulator to create a stable 12v DC voltage. 230V AC power is changed over to 12V AC (12V RMS esteem, where the most extreme worth is practically 17V), however the necessary voltage is 5V DC; for this situation, the 17V AC power supply should initially be changed over to DC, and afterward the voltage diminished to 5V DC. An electronic force converter called a rectifier can be utilized to change the current switch over to coordinate current. There are different kinds of fixes, like half-wave rectifiers, wave-filled rectifiers and scaffold fixers. In view of the advantages of extension over a large portion of a wave and full waves, normally utilized rectifiers are utilized to change over AC into DC.

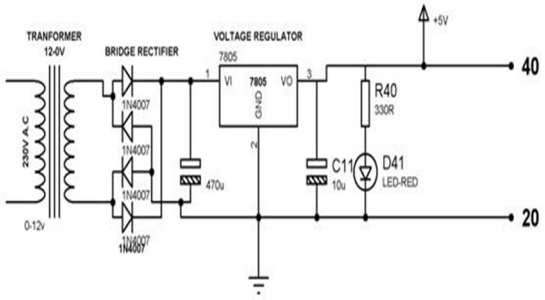

Figure: 4.4 Power supply

B. *Processing Module*

The ATmega-328 is really an exceptionally progressed RISC (AVR) regulator. It upholds up to eight (8) pieces of information. The ATmega-328 has an inherent memory of 32KB. This microcontroller has numerous different highlights. You ought to likewise survey the presentation of PIC16F877a (PIC microcontroller) and look at the highlights of these two microcontrollers. The ATmega 328 has 1KB intelligible electronic configuration (EEPROM). This trait shows that the force supply to the microcontroller is removable, anyway it can store information and give results subsequent to controlling it. Also, the ATmega-328 has 2KB static irregular memory (SRAM). Different highlights will be clarified later. The ATmega 328 has a wide range of capacities, making it the most famous gadget available today. These highlights incorporate progressed RISC setup, productivity, low force utilization, ongoing adding machine with autonomous oscillator, 6 PWM pins, USART arranged sequential, programming security framework lock, up to 20 MIPSputput, and so forth . ATmega-328 is fundamentally utilized in Arduino.

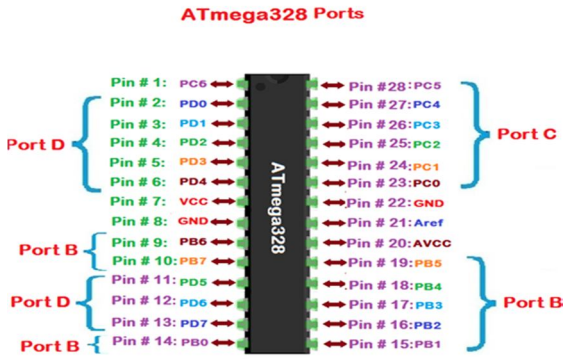

Figure: 4.5 Atmega 328

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C. LoRa Module

LoRa remote innovation that can give far off information move, low force and security for M2M and IoT applications. LoRa depends on peep spread range exchanging and has low force highlights, (for example, FSK mode vacillations), however can be utilized for far off correspondence. LoRa can be utilized to interface sensors without wires, entryways, hardware, apparatuses, creatures, individuals, and so forth to the cloud.

LoRa Technologies deals with various recurrence groups in various areas: in the United States, it works on a 915 MHz band; in Europe, it works on the 868 MHz recurrence band; in Asia, it works from 865 to 867 MHz and 920 on 923 MHz groups. Snap here to become familiar with LoRa's recurrence band.

LoRaWAN is a low-power organization (LPWA) convention created by LoRa Alliance, which can interface remotely "battery" gadgets to the Internet to provincial, public or worldwide organizations to meet Internet of Things (IoT) prerequisites, like direct correspondence, start to finish security. endpoints, travel and limited administrations.

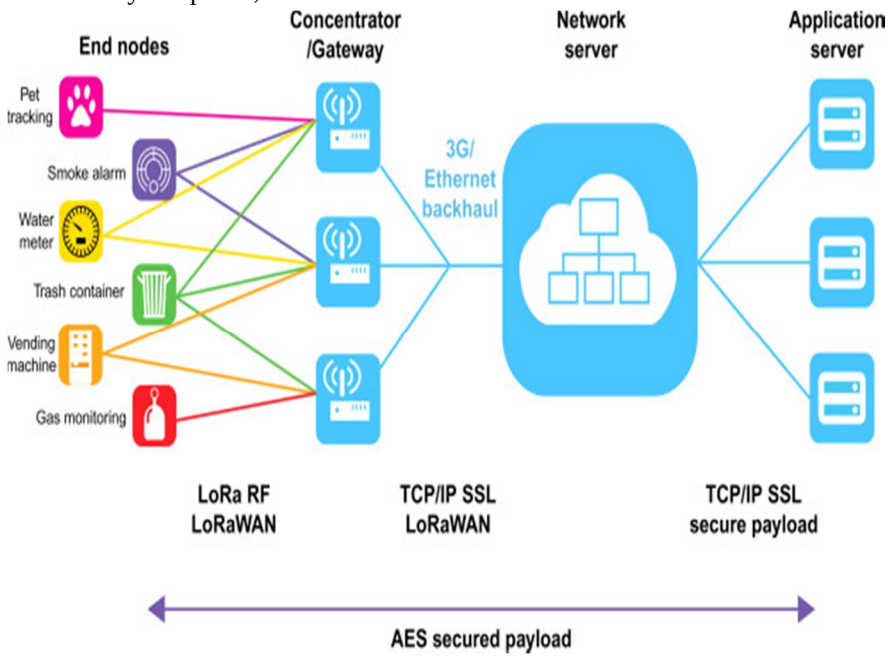

Figure 4.6 LORA module architecture

LoRaWAN utilizes an unlicensed range in the ISM band to depict the cycle of correspondence and organization plan, while the LoRa body layer frames a distant correspondence interface between the far off sensor and the organization associated door. This convention serves to immediately set up open or private IoT networks utilizing Hardware and programming anyplace.

D. Gateway Module

The ESP8266 is an ease Wi-Fi chip with a full pile of TCP/IP and MCU capacities (produced by Chinese maker Espresso in Shanghai). In August 2014, the chip utilized an ESP-01 module created by outsider producer AI-Thinker to pull in Western makers. This little module permits the microcontroller to interface with a Wi-Fi organization and make simple TCP/IP correspondence utilizing Hayes style orders. Nonetheless, no English messages and orders were acknowledged on the chip around then. The low cost and the way that there are a couple of outside highlights in the module demonstrate that it can wind up being modest, pulling in numerous programmers to check the module, chip and programming in it, and afterward interpret it. Chinese writings. The ESP8285 is an ESP8266 with 1 MiB worked in streak memory, permitting single-chip gadgets to associate with Wi-Fi.

The following microcontroller chip will be ESP32. ESP8266 (presently ESP8266EX) is a maker of remote microcontroller modules. In particular, ESP8266 is a framework on chip (SoC) (I²C) with 2.4 GHz Wi-Fi work (802.11 b/g/n, support WPA/WPA2), broadly useful information/yield (16 GPIO), inside coordinated circuit (I²C), and simple Digital transformation (10-bit ADC), sequential fringe interface (SPI), I²S correspondence with DMA (GPIO shared pins), UART (for committed anchor and UART for conveyance just) can be empowered in GPIO2), With heartbeat width tweak (PWM).

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The center of the processor is classified "L106" by Espressif. It depends on Tensilica's Diamond standard 106Micro 32-bit processor and runs at 80 MHz (or in excess of 160 MHz). It has 64 KB of boot ROM, 64 KB of RAM and 96 KB of RAM. The outer glimmer memory can be gotten to through SPI.

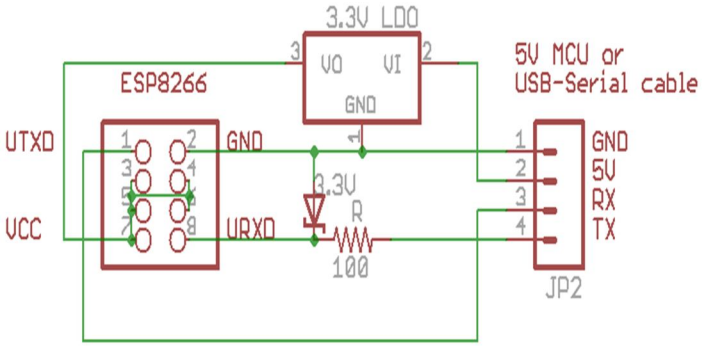

Figure 4.7 Circuit diagram of ESP8266

E. Mobile App Development

Respond Native is a system that makes a class of UI objects to make JavaScript code. It has an assortment of iOS and Android stages for building versatile applications with a customary look. The improvement of cell phones has seen extraordinary development. As per measurements, by 2020, versatile applications will create around US$188 billion in income through in-application stores, publicizing and in-application buys. People and business clients need great applications. These applications ought to have amazing usefulness, various screens, simple route and great plan. Then again, contrasted and shortcuts, more effective local applications invest a ton of energy on advancement, alternate ways give quicker improvement speed, yet there are bargains in execution and backing. Respond Native is by all accounts a viable answer for building excellent applications with a similar degree of execution and client experience given by customary applications in a brief timeframe.

Local applications have been coordinated into conventional code, which permits React Native not exclusively to run on two working frameworks, yet in addition to have similar usefulness on both non-deferred stages. Respond Native will likewise grow your ability pool: engineers can utilize Javascript to fabricate versatile applications. Javascript is extremely regular among start to finish engineers, and it is not difficult to dominate for back-end designers. Thusly, numerous previous specialists have the chance to attempt to create cell phones interestingly.

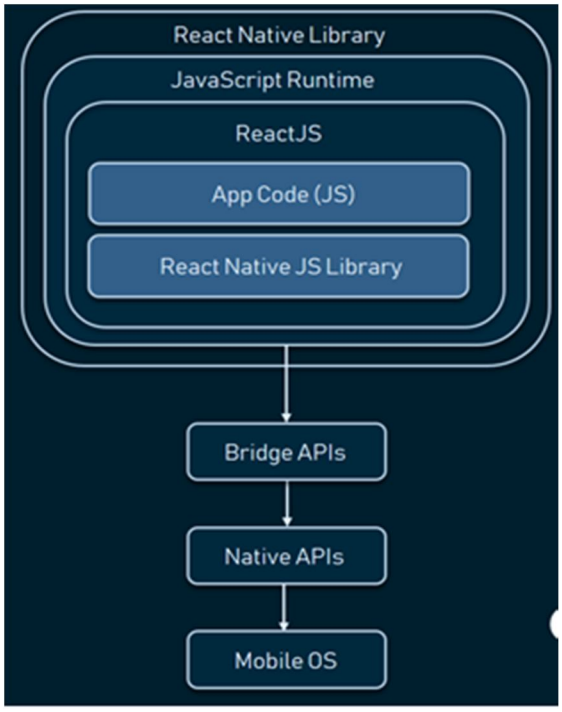

Figure 4.8 Mobile App Development

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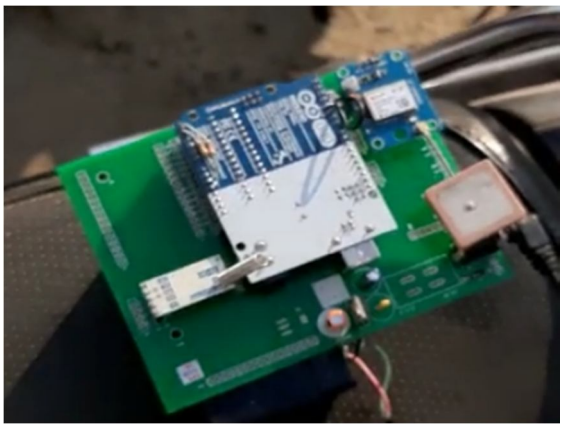
VI. RESULTS AND DISCUSSION

The accompanying figure shows the total transmitter equipment arrangement for this undertaking:



VII. CONCLUSION

This project is used for safeguarding the private property of individuals for example in places that require luggage carrying. This also help a person to view the current location of the property through a mobile application developed using react native.So, this project reduces the number of cases of loss in property, thus saving a lot of money.

VIII. FUTURE WORK

Within a reasonable time-frame, we are looking into the utilization of Lora's security innovation and may advance the improvement of the travel industry with higher precision. In this field, they have numerous chances to create or change the venture in an assortment of ways. In this way, the undertaking will have a useful scale later on, and the thought can be changed over into a PC item in a modest manner.

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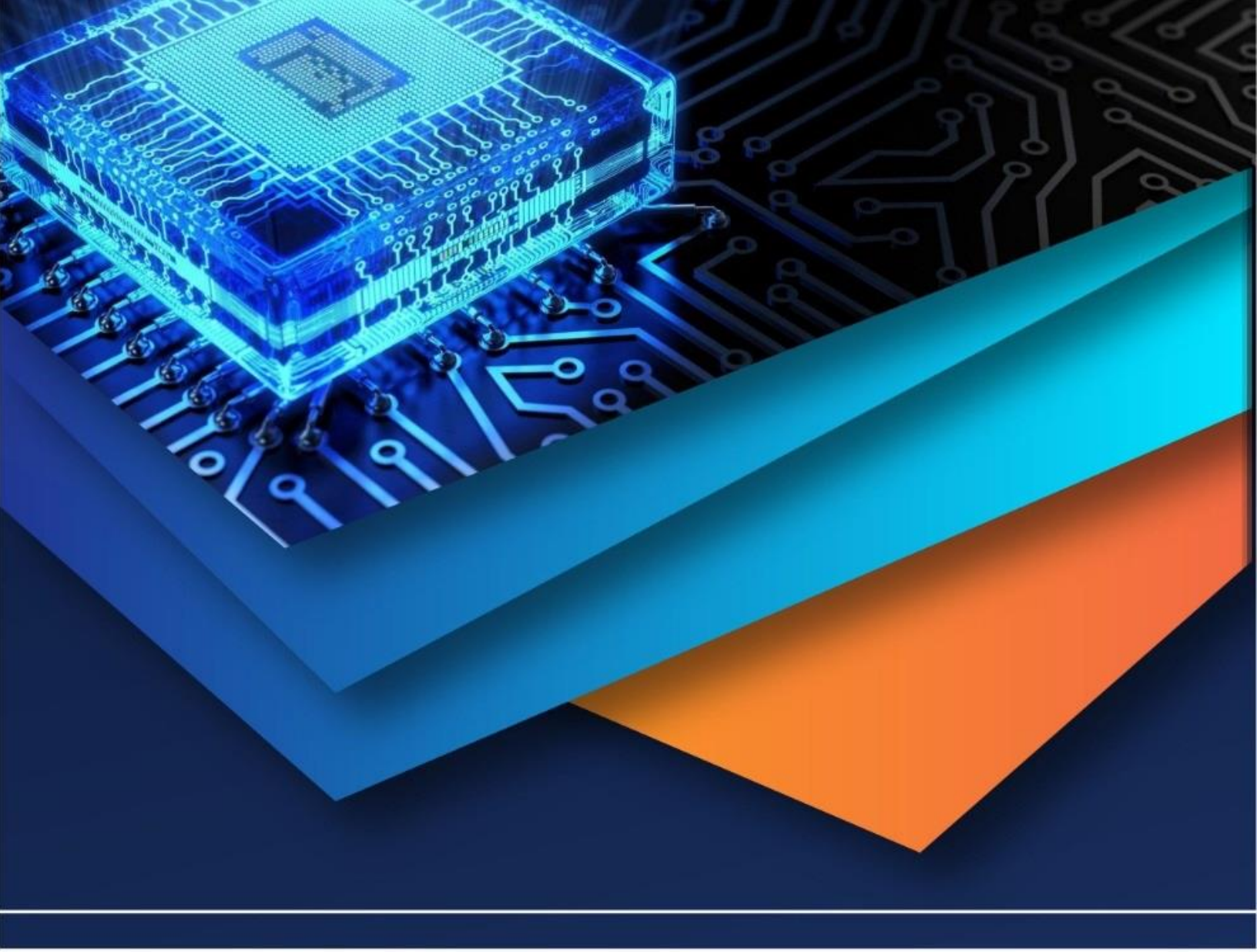

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