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Automatic Accident Insurance Claim

Divya N [1] , Dhamini J [2] , Bhavitha B [3] , Jampula Chaithanya Krishna [4] , Rekha.N [5]
Students, ECE, KSIT, Bengaluru, India[1-4]
Professor Dept of ECE, KSIT, Bengaluru, India[5]

ABSTRACT: In today's fast-paced world, the process of filing insurance claims after anaccident can be time-consuming and cumbersome, often involving significant paperwork and manual documentation. To streamline this process and provide more efficient and timely assistance to policyholders, this project proposes an Automated Accident Insurance Claim System utilizing GSM (Global System for Mobile Communications) technology.The system aims to revolutionize the traditional insurance claim process by incorporating advanced technologies to automatically detect and report accidents, thereby reducing response times and improving customer satisfaction. The key components of the proposed system include sensors, micro controllers, GSM modules, and a centralized database. Upon detecting an accident, the system's sensors installed in vehicles will immediately trigger the transmission of relevant data to a central server via GSM modules. This data may include information such as the location of the accident, impact severity, and vehicle identification details. The central server will then process this information and automatically initiate the insurance claim process. The proposed Automated Accident Insurance Claim System offers numerous benefits, including reduced claim processing times, enhanced accuracy in claim assessment, and improved overall customer experience. By leveraging GSM technology and automation, this system has the potential to revolutionize the insurance industry's approach to handling accident claims, ultimately leading to greater efficiency and customer satisfaction.

I. INTRODUCTION

The process of filing insurance claims following an accident is often fraught with challenges, ranging from delays in reporting to paperwork and documentation. In today's dynamic world, where efficiency and timely assistance are paramount, traditional methods of handling insurance claims can be inadequate. To address these shortcomings, this project introduces an Automated Accident Insurance Claim System leveraging GSM (Global System for Mobile Communications) technology. The aim of this system is to revolutionize the way insurance claims are handled by automating the detection and reporting of accidents. By integrating advanced sensors, microcontrollers, GSM modules, and a centralized database, the system enables swift and seamless processing of insurance claims. This introduction provides an overview of the proposed system's key components and functionalities, highlighting its potential to enhance the overall efficiency and customer experience in the insurance industry. The remainder of this document will delve into the details of the Automated Accident Insurance Claim System, including its architecture, operation, benefits, and implementation considerations. Through this exploration, we aim to demonstrate how this innovative approach can streamline the insurance claim process, reduce response times, and ultimately improve customer satisfaction.

II. LITERATURE SURVEY

The estimation of car damage costs by using image data has been a research challenge in the insurance industry. The efforts prove that there is a lot of potential for using images to estimate the damage severity of a vehicle which could revolutionise the insurance user experience.The method could help by shortening the length of time needed for the insurance company to resolve a claim. Thus saving time and money for both parties, while increasing customer satisfaction. The proposed system can reduce the number of false positives, which has the potential to save significant amounts of money for a large insurance company. The current improvements in deep learning and the adequate use of proprietary and public data can help an insurance organisation develop a full pipeline to improve its services. One of the main remaining challenges is to further refine the pipeline to give a more granular prediction about the damage to vehicle parts in order to improve prediction accuracy.[1]

Image analysis methods extract information from an image by using semi-automatic or automatic techniques termed: image understanding, image description, scene analysis, pattern recognition, computer/machine vision etc. Image analysis is different from the various other types of image processing methods, such as the restoration or enhancement in that the end result of image analysis procedures is a numerical output rather than an image or some pictorial output. By analyzing different techniques in literature review we conclude different technologies used to provide solutions for insurance companies. 3D model of car and other latest papers uses CNN model and categories different types of damages which provide efficient machine learning concepts to predict cost evaluation for damage[2].

Automatic Car Insurance using Image Analysis presents a solution to automate insurance claim processing which addresses the drawbacks identified such that it offers near real-time claims processing in minutes enabling users to process their claims quicker with fewer frauds in the process. The solution will identify whether the accident-met vehicle is the same as the insured vehicle and then automatically fill the initial claims form using speech recognition. The automated form-filling component in this research can convert voice input which contains details related to the accident into text paragraphs. The system will identify 9 custom fields in the voice input such as details of the claimant, accident and damage then categorize and arranged them into the form format using NER model. The research also proposes a method for external damage detection and claims cost calculation based on damage component, type and severity[3].

Modern technologies are moving extremely fast making their ways into various fields of the business. In this aspects, the insurance industry does not lack behind the others. The application of statistics in the insurance has a long history. Thus, the fact that insurance companies are actively using data science analytics is not amazing. In essence, the aim of applying data science analytics in the insurance is the same as in the other industries—to optimize marketing strategies, to improve the business, to enhance the income, and to reduce costs. In the paper, they presented several machine learning techniques to analysis the insurance claims efficiently and compare their performances using metrices [4].

The end-to-end unified framework to robustly perform driver drowsiness detection, remote monitoring, and evaluation. The system consists of four key building blocks, including an embedded platform, edge computing, cloud computing, and an interactive user interface for both driver and admin to perform a set of functionalities. This work relied on the use of computer vision techniques to detect the drowsiness of drivers, aimed primarily for a use case in which a driver is driving a public or logistic transport for longer routes. Unlike existing works, the proposed system offers a more holistic and effective end-to-end framework, covering drowsiness detection.[5]

The designed security system for vehicle based on driver's license and fingerprint technology. This system prevents vehicle theft and driving without proper driving license. It achieved through select authorized driver's license his/her holder allows running the car, also to provide extra security the system contains biometrics in form of fingerprint recognition to grant access to vehicle. To prevent all possible ways to vehicle theft, GSM module is used to send SMS alter to the owner of car tell him unauthorized driver's license entered. Also used GSM module to send SMS to holder of driver's license for remember him to renewal his license before expiry.[6]

The IoT-based Smart Accident Detection and Insurance Claiming System (ISADICS) presented in this paper aims to address critical issues associated with post-accident response and management. By leveraging the capabilities of sensor-equipped vehicles,the system not only monitors the real-time status of the vehicle and its surroundings but also takes proactive measures to minimize the aftermath of accidents.The implementation of ISADICS ensures swift communication with emergency services such as nearby hospitals and law enforcement agencies, enabling a rapid response to accidents. This timely intervention is crucial in reducing fatality rates and providing immediate medical attention to those injured in accidents. Furthermore, the system streamlines the insurance claiming process, alleviating the burden on individuals and ensuring a more efficient and transparent procedure.[7]

Vehicle Insurance Fraud Detection System Using Robotic Process Automation and Machine Learning presented in this paper aims to highlights the significant role that Robotic Process Automation (RPA) can play in the insurance sector, specifically in addressing the challenges associated with vehicle insurance and fraud detection. The conventional insurance processes, which involve repetitive tasks and manual interventions, can be streamlined and automated using RPA. This not only leads to improved business efficiency but also contributes to enhanced productivity, data security, reduced cycle time, and increased accuracy.[8]

The traditional approach to fraud detection, centered around developing heuristics based on fraud indicators, has limitations in effectively addressing the evolving landscape of fraudulent activities. The paper focuses on a more advanced and proactive solution by employing machine learning techniques for the detection of auto/vehicle insurance fraud, particularly in the context of fake accident claims.The emphasis on machine learning brings a data-driven and intelligent approach to fraud detection, allowing for a more dynamic and adaptive system. The performance evaluation, conducted through the calculation of a confusion matrix, provides valuable insights into the effectiveness of the proposed approach.[9]

Introduces an application designed for the automatic detection and classification of vehicle damages, offering practical utility for insurance companies in claims processing and the police department in accident record-keeping. The manual identification of damage types and severity after accidents can be a cumbersome task, making automated solutions crucial for streamlining the insurance claim process.The study explores the application of Convolutional Neural Networks (CNN), leveraging pre-trained models such as MobileNet and VGG19. Notably, the focus is on adapting these models for the multiclass classification of vehicle damages, a domain where CNNs have not been extensively explored. To enhance the model's performance, transfer learning is applied to a large constructed dataset. The investigation also addresses overfitting concerns and aims to train the model to capture more general features. The significance of this work lies in its contribution to improving the efficiency of damage assessment in the aftermath of accidents, which is vital for both insurance companies and law enforcement agencies.[10]

Developed SISBAR, a novel fraud detection system for insurance firms based on permissioned blockchain and machine learning algorithms. Selected two learning strategies for detection and classification of fraudulent claims submissions out of a pool of learning techniques based on experimental performance on a real insurance firm's data. Investigated the use of XGBoost and VFDT algorithms for batch and incremental learning strategies to detect and classify different types of fraudulent auto insurance claims and measure risk level of customers.[11]

Vehicle Damage Analysis Using Computer Vision presented in this paper addresses a significant challenge in the transportation industry – the manual inspection of vehicle damage, which is time-consuming. Recognizing the potential for automation in the vehicle insurance sector, the paper introduces a segmentation method based on machine learning for detecting vehicle damage. Utilizing photos taken at the scene of accidents for insurance claims can streamline the process, saving time, reducing costs, and enhancing driver convenience. [12]

The estimation of changes in the main insurance premium driver, a company's insured revenue, through the application of a random forest classification model. The focus was primarily on general liability insurance, which offers coverage for damages resulting from a business's operations.customer's motor vehicle insurance policy can effectively classify businesses into categories of shrinking, stable, and growing. This classification system provides valuable insights for insurance companies seeking to assess and adjust their premiums in a more targeted and efficient manner.The potential integration of this model into an insurance Customer Relationship Management (CRM) system offers a practical and economically viable solution.[13]

Extreme gradient boosting machine learning algorithm for safe auto insurance operations presented in this paper aims to investigate the use of XGBoost machine learning algorithm to detect and classify different types of fraudulent auto insurance claims. The performances of the proposed algorithms are compared to those of other state-of-the-art solutions: naive bayes, nearest neighbor, and decision tree algorithms.After applying data analysis and exploration techniques to select the most relevant features of the auto insurance dataset, evaluate the algorithms for different metrics. The experimental results show that the boosted classifier ensures not only the best accuracy in detecting fraudulent claims but also can classify different types of fraud in insurance unlike the existing solutions. [14]

With the increasing significance of insurance in society, the need to effectively detect and prevent fraudulent cases has become paramount. While customers seek security for their properties and vehicles, insurance companies face the challenge of rising fraudulent activities.One of the prominent techniques highlighted is the Naive Bayesian model, which has proven to be a powerful tool for fraud detection in the automobile insurance domain. The Bayesian visualization approach was employed to analyze and interpret the predictions made by the classifier. However, it was noted that this visualization technique may face limitations when dealing with abundant data containing relatively few instances of fraud. To address this limitation, survey proposes the adoption of Fuzzy Logic, where in fuzzy rules are formulated to enhance fraud detection. Fuzzy Logic provides a more adaptable framework for handling diverse datasets and variables, promising improved accuracy in fraud detection. The proposed technique is set to be implemented on a larger scale, involving a greater number of datasets and variables.[15]

III. BLOCK DIAGRAM

Primarily , arduinoUNO is used as a microcontroller[8bit].RFID which has tags and readers to transmit signals .Alcohol sensors to sense intake of alcohol. DC motor used for vehicle movement, vibration sensors for detection of accident by sensing large amount of vibration. Nodemcu and esp32 it is wi-fi module used for wireless communication.

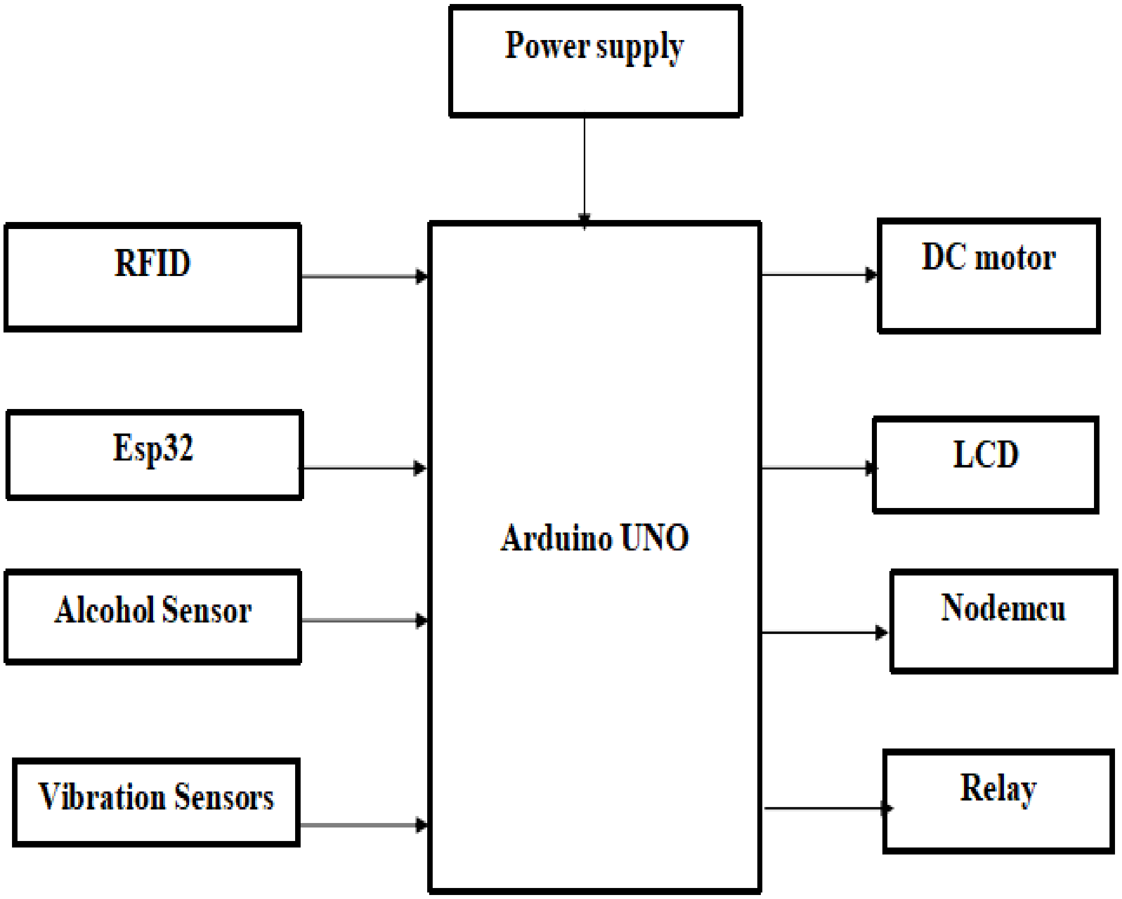
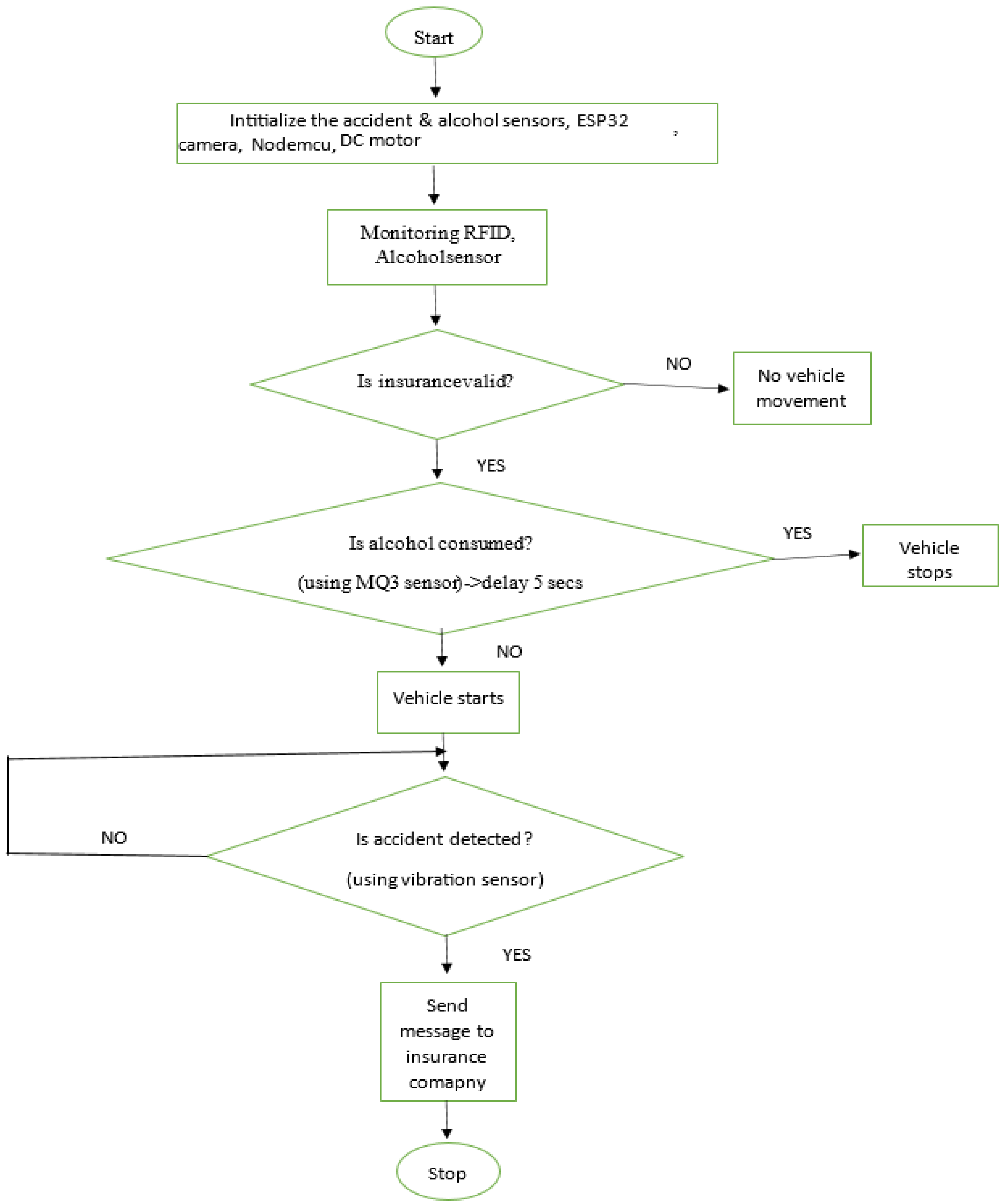


Fig: Block Diagram for checking insurance validation ,alcohol levels ,accident detection and intimating message to authorities.

IV. FLOW CHART



V.METHODOLOGY

Automating the insurance claim makes the verification easier by verifying the insurance using RFID card ,two conditions :valid and invalid. If the insurance is invalid the vehicle does not start, in other case if it is valid, delay is given to check alcohol consumption using MQ3 sensors,incase alcohol is detected vehicle stops or does not move. Incase alcohol not detected vehicle moves and if accident is occurred message is sent to the specified authorities ,intimating the exact location with photo.The accident is detected using vibration sensors ,when the vehicle vibrates in larger range the sensors detects the range value ,and identifying the accident has occurred.So that all these evidences helps in claiming insurance and can avoid mishandling of data.The message includes the causes of accident ,the exact location and timing where the accident takes place and the photo for the spot data.

VI .CONCLUSION

The adoption of Automatic Accident Insurance Claim systems marks a pivotal advancement in the insurance industry. The integration of automation, data connectivity, and real-time communication, brings about a paradigm shift in how insurance claims are reported, processed, and settled. The primary advantage lies in the expeditious nature of these systems. Automation significantly reduces the time between the occurrence of an accident and the initiation of the claims process. Swift notification through these systems facilitates prompt response from insurance companies, leading to quicker assessment, validation, and subsequent settlement of claims. This speed not only benefits policyholders by reducing the waiting period but also enhances the overall efficiency of the insurance ecosystem. Moreover, the accuracy and reliability of information in automatic accident insurance claims contribute to fair and precise evaluations.

VII. FUTURE SCOPE

It is poised to revolutionize the insurance industry. By integrating advanced machine learning and data science solutions, insurers can achieve several benefits. First, the rapid growth in data volumes, driven by consumer electronics and IoT devices, allows insurers to more precisely analyze customer profiles. Second, faster and better risk detection enables underwriters to focus on valuable customers, predict insurance types, and anticipate fraudulent claims. Third, significant automation capabilities streamline processes, from digital first notice of loss (FNOL) to claims payment and subrogation. Additionally, crash detection facilitates real-time FNOL, automating accident management, roadside services, repair scheduling, and parts ordering. As the industry embraces these innovations, costs decrease, efficiency improves, and customer experiences are enhanced, ushering in a new era of precision and effectiveness in insurance.

VIII. RESULTS

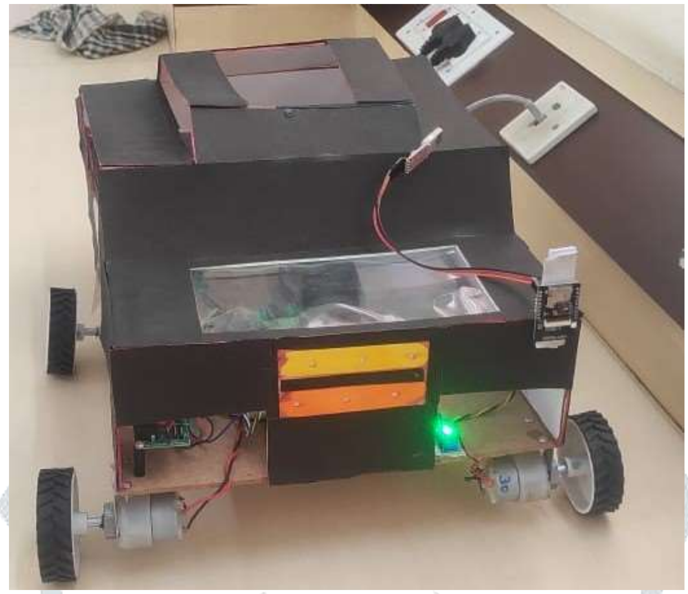


Figure2:implementing of sensors and motors

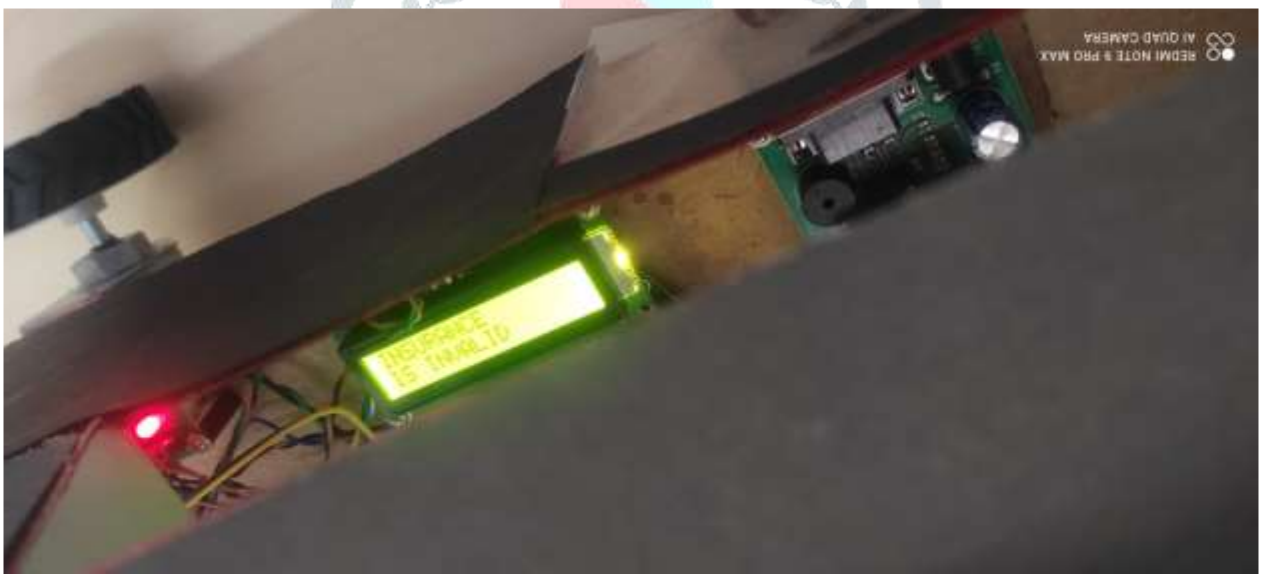


Figure3:using RIFD card checking invalid status

Figure3:using RIFD card checking valid status Figure4:Accident occurred

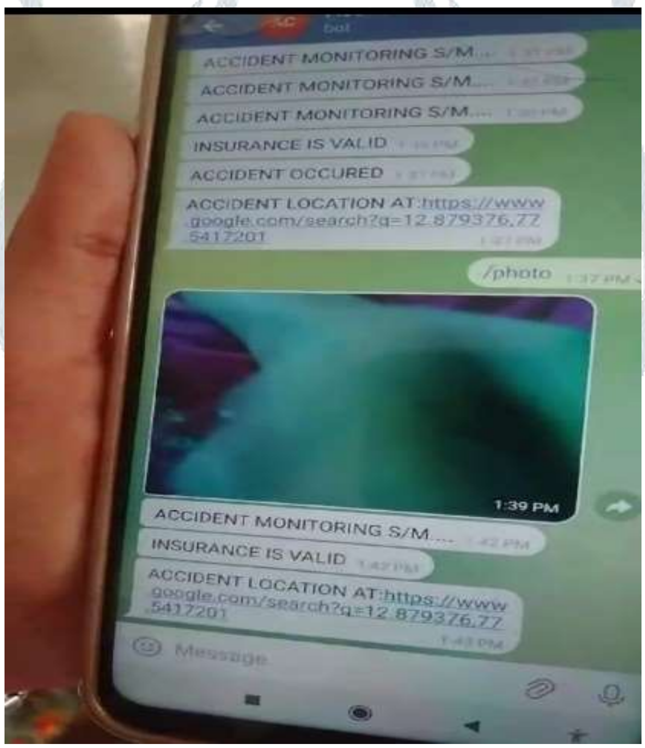


Figure5:Sending message to the authorities

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