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Page 1 screenshot

KERALA INDUSTRIAL INFRASTRUCTURE DEVELOPMENT

CORPORATION

(A STATUTORY BODY OF GOVERNMENT OF KERALA)

TRIVANDRUM

KINFRA HOUSE

Sasthamangalam

Kerala

Fax : 91 – 471 –2724773

E-mail : mail@Kintra.org

website : www.kintra.org

## APPLICATION FOR REGISTRATION- LAND

"FORM A"

Park Name:UNIVERSITY PARK

1

### A. DETAILS OF THE APPLICANT

01.a. Name of the Applicant::Sayand K K

Designation:Software Engineer

c. Name of Firm:ults

Communication Address:madhavam, 1234, Edappal,

Malappuram, Central, KERALA

Permanent Address:madhavam, 1234, Edappal,

Malappuram, KERALA, 679874

Mobile No.:8138950624

e-mail:sayandkk67@gmail.com

Aadhaar No

(Copy to be attached)

:848464116810

Details of the Shareholder/ partners (if any) with permanent address  
and % of share capital

(attach additional copy of this page if required)

No partner details provided

#### DETAILS OF EXISTING ORGANISATION (if any)

01. Name of Organization:A

Address of the Organization:A, A, KERALA, Malappuram, hbjnk,  
878987

Phone No.:8786561728

Name of the Product(s)

manufactured

:A

#### C. BRIEF DETAILS OF THE PROPOSED PROJECT

Name of the Product(s):Mobile App

(\*\*\*) Raw material used:

1.vghjk

2.

3.

4.

5.

(\*\*\*) Finished Products:

1.gvhnjk

2.

3.

4.

5.

2

Category of Industry as per

Pollution

Control Board standards :

\*details of effluent discharge to be

shared separately (Not applicable for

IT/ITES Units)

RedOrangeGreenWhite

Production flow chart

submitted : (Not applicable for IT/

ITES Units)

YesNo

Area required (Land in cents):7500

Proposed factory building area in

Sq Ft

:

Proposed Investment in first 3 years (excluding land cost)

Built-up space:Rs. 2666.6666667 (in lakhs)

Plant and Machinery:Rs. 2666.6666667 (in lakhs)

Auxiliary Services:Rs. 2666.6666667 (in lakhs)

Total:Rs. 8000 (in lakhs)

Name of the Industrial Park

where land to

be allotted

:UNIVERSITY PARK

Utilities required:

Amount of Power (in KW):1234

Quantity of Water in Litre per

day

:345

Manpower to be employed:43

Proposed form of constitution

Proprietary

Partnership

L.L.P.

Private Ltd.

Public Ltd.

Proposed date for

commencement of commercial

production

:

Preferred scheme(Please tick):

100% Down Payment

In Installments with

interest

Special provision for units with :

3

investment above 50 crore, if

applicable

Bank/Financial institution details:

Bank Name:SBI

Branch & IFSC Code:SBIN0123456

Registration fee payment details (Please tick):

(For Online transfer / NEFT, please refer annexure- 3 )

Demand Draft

Online Transfer

Signature: \_\_\_\_\_

Designation: \_\_\_\_\_

Seal: \_\_\_\_\_

Place: NY

Date: 2025-09-25

4

## TERMS AND CONDITIONS OF APPLICATION FOR REGISTRATION (FORM A)

This is an "Application for Registration" only.1.

The "Application for Registration" duly filled in may be sent to the  
Managing director, Kerala, 2.

Industrial Infrastructure Development Corporation, KINFRA House,  
TC 31 / 2312,  
Sasthamangalam, Trivandrum – 10."

The submission of "Application for Registration" shall not be  
construed as any commitment 3.

or obligation on the part of the Corporation that any plot shall be  
allotted to the applicant.

Your application for registration shall be accompanied with a

registration fee of Rs. 4.

10,000/- (Rupees Ten thousand only) plus GST @18% by way of

Demand Draft drawn in

favour of Managing Director, Kerala Industrial Infrastructure

Development Corporation,

payable at Trivandrum or by online transfer of fund via RTGS /NEFT.

Detailed profile of the proposed project is to be submitted along with

the Application for 5.

Registration.

The Registration fee Rs.10,000/- is refundable if firm allotment is not

made.6.

The selection of allottees among the registered applicants will be

made by a committee 7.

duly constituted for this purpose.

I / We agree to the above terms and conditions of the Application for

Registration.

Place: NY

Date: 2025-09-25

Signature: \_\_\_\_\_

5

Check list for submission of Form A

SI.No Particulars Compiled / Not

Compiled

1 DPR

Not Compiled

Signed copy of Project report (2 copies)

Product flow chart

Details of Raw materials & Finished Materials

Plant layout plan

Proposed Land utilization pattern (component wise)

Proposed factory building area in Sq Ft

Details on Pollution control measures to be taken, if any

Details of Effluent Generations, Power & Water Requirement

Details of scope & Market availability for product – (Product Feasibility)

Financial Evaluation Report – Certified by Chartered Accountant for allotment in Special provision

Details of technology used

Details of Employment Generation

2General

iApplicants Credentials

Name & Permanent Address (with Pin code)

Contact No. & mail id

Copy of ID cards- Aadhaar Card/ Driving License/ Voters ID,

PAN Card/Company PAN card/ Partnership firm's PAN Card

Mode of payment (100% payment/ in Installments)

Bank/Financial institution details

ii Photographs of Applicant / all partners/Directors / Share holders

iiiType of Organization - Documents to be submitted in Hard Copy

Partnership Firm :-(a) Partnership deed (b) Firm registration certificate, true extracts of Firm(Form A) issued by Registrar of firm

N/A

Private Ltd Co./ Public Ltd Co :-(a) MOA&AOA of company

(b)Certificate of Incorporation (c ) Board resolution

Limited Liability Partnership :-(a) Partnership deed (b) Firm registration certificate (c ) Board resolution

N/A

Signature of Applicant Verified by Park Manager

(Signature)

6

For Office Use Only

Normal payment

100%Installment

Recommended scheme in Special provisions if applicable

a.

Investments above 100 crore & with land area above 10 acres

b.

Investments 50 crore to 100 crores (Non MSME)

c.

On rental basis for area not less than 50 acres with investment above 100 crore.

(Signature)

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Annexure -1

Mode of payment of Lease Premium

(i) Full Down Payment

10% of the lease premium shall be remitted within 30 days and the balance 90% as

down payment within 90 days from the date of the “Letter of Intimation”.

(ii) Instalment scheme

a) Allottee is required to pay 20% of the total lease premium within 30 days from the

date of “letter of intimation”. 10% of the amount will be treated as

EMD.

b)The remaining 80% of the Lease Premium will be paid in 5 equal yearly

instalments, with the prevailing interest rate fixed by the agency from time to time.

c)In case the allottee commits default in paying the instalments along with interest

on the respective due date, the Government Agency may impose a penalty of 2%

on the defaulted amount in addition to interest for delayed payment, without

prejudice to the right of the Government Agency to cancel the allotment and

resume possession of the land after forfeiting EMD.

#### Other Terms

(a)EMD shall be forfeited for any resumption or cancellation of the plot after 90 days from

the date of the “Allotment Letter”. In the event of forfeiture or

cancellation, before 90 days, a proportionate lease premium calculated for the actual period (rounded off to month) plus one month shall be recovered as a penalty from the EMD.

(b)The payment terms can be varied from Park to Park as decided by the respective Government Agency from time to time.

(c)In case the allottee commits default in payment of common facility charges/ rental charges, lease premium, utility charges and other charges, the defaulted amount will carry interest as may be fixed by the respective Government Agency from time to time.

(d)For the delayed payments, amounts paid by allottee shall be adjusted first towards penalty then towards interest and only thereafter towards principal.

## Annexure -2

### Special provision for allotment

#### A.Investment between 50 Cr- 100 Cr (Non- MSME)

The land shall be allotted on a priority basis to Investors considering the economic

development and employment generation that the investor offers to the state. The

allotment shall be subject to the following conditions:

(i) Investor shall bring not less than 50- 100 Crore investment within a period of 3 years

and the project should generate employment opportunities

commensurate with the

investment.

### Payment Terms

Allottee is required to pay 20% of the total Lease Premium out of

which 10% will be

considered as EMD, within 90 days from the date of Letter of

Intimation

Allottees who bring in 50-100 Crore investment can opt for a moratorium of 24 months from the date of remittance of 20% payment. Interest will be applicable during this moratorium period. The remaining 80% of the Lease Premium will be paid in 5 equal yearly instalments, at the prevailing interest rate fixed by the agency from time to time.

In case the allottee commits default in paying the instalments along with interest on the respective due date, the Government Agency may impose a penalty of 2% on the defaulted amount in addition to interest for delayed payment, without prejudice to the right of the Government Agency to cancel the allotment and resume possession of the land after forfeiting EMD.

EMD shall be forfeited for any resumption or cancellation of the plot after 180 days from the

date of the remittance of EMD. In the event of forfeiture or cancellation, before 180 days, a proportionate lease premium calculated for the actual period (rounded off to month) plus one month shall be recovered as a penalty from the EMD.

The payment terms can be varied from Park to Park as decided by the respective

Government Agency from time to time.

In case the allottee commits default in payment of common facility charges/ rental charges,

lease premium, utility charges and other charges, the defaulted amount will carry interest as

may be fixed by the respective Government Agency from time to time.

For the delayed payments, amounts paid by the allottee shall be adjusted first towards

penalty then towards interest and only thereafter towards the principal.

## B.Investment above 100 Cr

The land shall be allotted on a priority basis to Large Investors,

considering the

economic development and employment generation that the

investor offers to the

State. The allotment shall be subject to the following conditions:

(i)Allotment is limited to 25% of the total extent of allottable land in  
the industrial park or  
a minimum of 10 acres of land.

(ii)Investor shall bring in not less than 100 Crore investment within a  
period of 3 years and

the project should generate employment opportunities

commensurate with the

investment. Such allotments shall be subject to the approval of  
SILAC.

(iii)In addition to the above Agency/Government shall consider  
providing a package of

incentives for those mega projects with an investment of not less than 300 Cr through a high-power committee headed by the Chief Secretary which will be in line with the industrial policy of the State Government.

### Payment Terms

Allottee is required to pay 10% of the total Lease Premium as EMD, within 90 days from the date of Letter of Intimation.

Allotees can opt for a moratorium of 24 months from the date of remittance of 10% EMD.

Interest will be applicable during this moratorium period. The remaining 90% of the Lease

Premium will be paid in 9 equal yearly instalments, at the prevailing interest rate fixed by the agency from time to time.

In case the allottee commits default in paying the instalments along with interest on the

respective due date, the Government Agency may impose a penalty of 2% on the defaulted amount in addition to interest for delayed payment, without prejudice to the right of the Government Agency to cancel the allotment and resume possession of the land after forfeiting EMD.

EMD shall be forfeited for any resumption or cancellation of the plot after 180 days from the date of the remittance of EMD. In the event of forfeiture or cancellation, before 180 days, a proportionate lease premium calculated for the actual period (rounded off to month) plus one month shall be recovered as a penalty from the EMD.

The payment terms can be varied from Park to Park as decided by the respective Government Agency from time to time.

In case the allottee commits default in payment of common facility

charges/ rental charges,

lease premium, utility charges and other charges, the defaulted amount will carry interest as

10

may be fixed by the respective Government Agency from time to time.

For the delayed payments, amounts paid by the allottee shall be adjusted first towards penalty then towards interest and only thereafter towards the principal.

C.On rental basis

Entrepreneurs willing to bring in huge investments in renewable/green energy for a

short period of time can be allotted on an annual rental basis based on the decision

taken by the respective Government Agency on case-to-case basis subject to the

following conditions:

Entrepreneur should bring a minimum investment of 100 Cr.

The Minimum land allotted will be 50 acres of land.

There will be a Lock-in period of 20 years for running the unit

### Payment Terms

Rent along with GST will be fixed on cost-recovery basis as decided by the respective

Government Agency.

Entrepreneur is required to furnish a security deposit equal to one year rent which shall not

carry any interest and shall be refunded back on the expiry of the lease period after adjusting

any outstanding dues to KINFRA or KSIDC, as the case may be.

In addition to the above the entrepreneur is required to furnish a Bank Guarantee equivalent

to one year's rent

11

### Annexure -3

Virtual Account No. of respective industrial park (IFSC

Code SBIN0004266) for  
transferring Registration fee

SI.

N

O

Name of ParkVirtual Account No.

1KINFRA - ADOORKINFRA1019999

2KINFRA - APPAREL PARKKINFRA1029999

3KINFRA - DEFENCE PARKKINFRA1039999

4KINFRA Electronic Manufacturing Cluster

(EMC)

KINFRA1049999

5KINFRA - EPIPKINFRA1059999

6KINFRA - HITECH PARK,KALAMASSERY KINFRA1069999

7KINFRA - ITP PALAKKADKINFRA1079999

8KINFRA - KAKKENCHERI KINFRA1089999

9KINFRA - KASARAGODKINFRA1099999

10KINFRA - KORATTYKINFRA1109999

11KINFRA - KTC (NADUKANI) KINFRA1119999

12KINFRA - KUNNAMTHANAM KINFRA1129999

13KINFRA - KUTTIPURAMKINFRA1139999

14INFRA - Mega Food ParkKINFRA1149999

15KINFRA - Mundakkal Park, KollamKINFRA1159999

16KINFRA - NELLAD KINFRA1169999

17KINFRA - NONSEZ(KFVP) KINFRA1179999

18KINFRA - OTTAPPALAMKINFRA1189999

19KINFRA - PETROCHEMICAL PARK) KINFRA1199999

20KINFRA - PUNALURKINFRA1209999

21KINFRA - RAJAKUMARI KINFRA1219999

22KINFRA - SEZ HITECHKINFRA1229999

23KINFRA - SEZ(KTIP) KINFRA1239999

24KINFRA - THALASSERYKINFRA1249999

25KINFRA - WAYANAD KINFRA1259999

26KINFRA - RAMANATTUKARAKINFRA1269999

27KINFRA - SEZ(KFVP) KINFRA1279999

28KINFRA - MATTANNURKINFRA1289999



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Emergency Response Network Using Motion  
Sensors & Adaptive Location-Based Power  
Management

The Main Project Phase 2 report

Submitted to the APJ Abdul Kalam Technological University  
in partial fulfillment of requirements for the award of degree  
Bachelor of Technology

in

Computer Science & Engineering

Ajay Krishna (SPT21CS005)

Mohammed Badusha (SPT21CS027)

Salman Faris A.V (SPT21CS035)

Vipin (SPT21CS049)

Eighth Semester 2021 Admission

Sreepathy Institute of Management & Technology

Vavanoor, Palakkad-679533

Affiliated to

APJ Abdul Kalam Technological University

April, 2025

SREEPATHY INSTITUTE OF MANAGEMENT AND

TECHNOLOGY,VAVANOO

KOOTTANAD 679533

DEPARTMENT OF COMPUTER SCINENCE &

ENGINEERING

Vision of Department

To create professionals in the domain of Computer Science and Engineering

through quality education, innovation and entrepreneurial skills to foster

sustainable development of the nation.

Mission of Department

•To impart quality education in the Computer Science discipline in order to

transform the students as computer and IT professionals fulfilling the needs

of industry, government and academia.

•To develop qualities of technology incubation, entrepreneurship and research orientation among students.

•To support the sustainable development of society through continuous student centric activities and functioning of professional bodies.

2

Sreepathy Institute of Management And Technology

Vavanoor, Palakkad-679533

Department of Computer Science and Engineering

## CERTIFICATE

This is to certify that the project report entitled Emergency Response Net-

work Using Motion Sensors & Adaptive Location-Based Power Manage-

ment submitted by Ajay Krishna (SPT21CS005), Mohammed Badusha

(SPT21CS027), Salman Faris A.V (SPT21CS035), Vipin (SPT21CS049)

to the A P J Abdul Kalam Technological University in partial fulfillment for the

award of Degree of Bachelor of Technology in Computer Science

and Engineering is

a bonafide record of the mini project work carried out under our supervision during

the year 2024-2025.

Mr./ Ms./ Dr. Guide Name

Asst. Professor/ Assoc. Professor/ Professor Dean(RD)

Department of CSE

SIMAT, Vavanoor

Palakkad

Ms. Sreeshma K.

Head of the Dept

Department of CSE

SIMAT, Vavanoor

Palakkad

Submitted for Evaluation held on:

Coordinator Sister Dept. Faculty External Examiner

#### ACKNOWLEDGEMENT

We are extremely thankful to our Principal Dr. S.P. Subramanian for giving us his consent for this Literature Survey. We are

thankful to

Ms. Sreeshma K., Head of the Department and Dr. Hema P Menon,

Dean(R&D), Department of Computer Science & Engineering, for their valuable

suggestions and support. We are indebted to our Project Coordinator Ms. Deepa

M., Assoc. Professor and our guide Mr./ Ms./ Dr. Guide Name, Asst. Profes-

sor/ Assoc. Professor/ Professor, Dept.of Computer Science & Engineering, for their

constant help and support throughout the presentation of the survey by providing

timely advices and guidance. We thank God almighty for all the blessing received

during this endeavor. Last , but not least we thank all our friends for the support

and encouragement they have given us during the course of our work.

Ajay Krishna (SPT21CS005)

Mohammed Badusha (SPT21CS027)

Salman Faris A.V. (SPT21CS035)

Vipin (SPT21CS049)

Eighth Semester 2021 Admission

Dept. of Computer Science & Engineering

SIMAT, Vavanoor, Palakkad

## ABSTRACT

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem

Ipsum has been the industry's standard dummy text ever since the 1500s, when

an unknown printer took a galley of type and scrambled it to make a type speci-

men book. It has survived not only five centuries, but also the leap into electronic

typesetting, remaining essentially unchanged. It was popularised in the 1960s with

the release of Letraset sheets containing Lorem Ipsum passages, and more recently

with desktop publishing software like Aldus PageMaker including versions of Lorem

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## Chapter 1

### INTRODUCTION

Lorem Ipsum is simply dummy text of the printing and typesetting industry.

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since the 1500s,

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1

## Emergency Response Network Using Motion Sensors

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1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more

recently with desktop publishing software like Aldus PageMaker including versions

of Lorem Ipsum.

## 1.1 MOTIVATION

The motivation driving the creation of Lorem Ipsum is simply dummy text of

the printing and typesetting industry. Lorem Ipsum has been the industry's standard

dummy text ever since the 1500s, when an unknown printer took a galley of type and

scrambled it to make a type specimen book. It has survived not only five centuries,

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including versions of Lorem Ipsum.

## 1.2 OBJECTIVES

Lorem Ipsum is simply dummy text of the printing and typesetting industry.

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1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more

recently with desktop publishing software like Aldus PageMaker including versions

of Lorem Ipsum. Key Objectives:

- 1. It was popularised in the 1960s with the release of Letraset sheets containing

Lorem Ipsum passages, and more recently with desktop publishing software

like Aldus PageMaker including versions of Lorem Ipsum.

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Emergency Response Network Using Motion Sensors

- 2. It was popularised in the 1960s with the release of Letraset

sheets containing

Lorem Ipsum passages, and more recently with desktop publishing software

like Aldus PageMaker including versions of Lorem Ipsum.

- 3. It was popularised in the 1960s with the release of Letraset sheets containing

• Lorem Ipsum passages, and more recently with desktop publishing software

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- 4. It was popularised in the 1960s with the release of Letraset sheets containing

lorem ipsum passages, and more recently with desktop publishing software

like Aldus PageMaker including versions of Lorem Ipsum.

- 5. It was popularised in the 1960s with the release of Letraset sheets containing

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like Aldus PageMaker including versions of Lorem Ipsum.

- 6. It was popularised in the 1960s with the release of Letraset sheets containing

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like Aldus PageMaker including versions of Lorem Ipsum.

These objectives collectively aim to transform the landscape of emergency response,

empowering individuals and communities to effectively mitigate the impact of acci-

dents and emergencies through swift and coordinated action facilitated by the ERN

application.

### 1.3 PROJECT OUTLINE

The rest of the project report is organized as follows. In chapter 2, literature

survey done for this project work is given. Chapter 3 presents the overall design of

the proposed system. Chapter 4 describes the dataset used for the analysis. Chapter

5 deals with the experimental results associated with this project and Chapter 6

brings out the conclusion and future work.

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Chapter 2

LITERATURE SURVEY

In their collaborative endeavor, Hajar Izzati Mohd Ghazalli, Muhammad Izaid-

din Hassan, Zuhri Arafah Zulkifli, and Siti Nuramalina Johari have ingeniously

developed MotoSOS [1], a groundbreaking mobile application aimed at revolution-

izing motorcycle safety through advanced technology. By harnessing the capabil-

ties of smartphone sensors, particularly accelerometers and gyroscopes, MotoSOS

autonomously detects motorcycle accidents with remarkable precision. In the devel-

opment of MotoSOS, the team employed cutting-edge technology centered around

smartphone sensors, specifically accelerometers and gyroscopes. These sensors are

ubiquitous in modern smartphones and are capable of measuring various aspects of

motion and orientation. Accelerometers, utilized extensively in MotoSOS, detect

changes in linear acceleration along different axes, including x, y, and z. This capa-

bility allows MotoSOS to detect sudden changes in motion indicative of a motorcycle

accident. Through rigorous experimentation, the team established threshold values

for acceleration that trigger accident detection, ensuring the reliability of the sys-

tem. Gyroscopes, another essential component of MotoSOS, measure the rate of

rotation or angular velocity of the smartphone along its axes. By analyzing gy-

roscope data, MotoSOS can detect changes in the orientation of the smartphone,

which correlates with the movement of the rider during an accident. Similar to

accelerometers, threshold values were established for gyroscope data to accurately

detect accident scenarios. The integration of these sensors into MotoSOS enables

the application to autonomously detect motorcycle accidents without requiring user

intervention. Upon detecting a potential accident based on sensor data exceeding

predefined thresholds, MotoSOS initiates emergency protocols, such as sending SMS

alerts to designated emergency contacts. The utilization of smartphone sensors un-

derscores the versatility and accessibility of MotoSOS, as it leverages existing hardware found in most smartphones without the need for additional external devices.

This approach ensures widespread applicability and ease of adoption among motorcycle riders, contributing to its potential impact on enhancing motorcycle safety.

Overall, by harnessing the capabilities of accelerometers and gyroscopes, MotoSOS

represents a technologically advanced solution to address the critical issue of motorcycle accidents, with the potential to significantly improve emergency response and

ultimately save lives.

The Accident Detection System Application [2], proposed by Akshay Agrawal et al.

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## Emergency Response Network Using Motion Sensors

al. from the Department of Computer Science at Vishwakarma Institute of Information Technology in Pune, India, addresses the critical need for timely emergency

response following accidents. With accidents being a leading cause of fatalities

worldwide, the proposed system aims to bridge the gap between accident occurrence

and emergency medical personnel dispatch. Leveraging the ubiquitous presence of

smartphones, particularly Android devices, the system utilizes built-in sensors such

as accelerometers and rotational sensors for accident detection. Upon detecting an

accident, the system captures images from the front and rear cameras of the smart-

phone and records the GPS location. This data is then encapsulated into SMS and

MMS notifications and promptly sent to pre-stored emergency contacts, thereby

alerting authorities and facilitating swift response. What sets this system apart

is its adaptive algorithm, which tailors accident detection thresholds based on the

characteristics of individual cars. By analyzing inputs from the vehicle during nor-

mal operation, the system can dynamically adjust its sensitivity to accurately detect

accidents, enhancing its effectiveness across different car models. The proposed sys-

tem offers a cost-effective and accessible solution, given the widespread adoption of

smartphones and the Android platform. Moreover, the report highlights the feasibil-

ity of the proposed idea by referencing related works and successful implementations

in similar projects. Ultimately, the accident detection system application has the

potential to significantly improve emergency response efforts, ultimately saving lives

on the road.

In the exploration of time-frequency analysis methods [3], Tatsuro Baba's review

delves into the enduring relevance of the Short Time Fourier Transform (STFT)

technique. Baba elucidates the critical role of time-frequency representation across

various domains, emphasizing the trade-off between time and frequency resolutions

dictated by the uncertainty principle. Through a meticulous examination of STFT

and other analyzing methods, he underscores its suitability for

non-stationary sig-

nal analysis, particularly in ultrasound blood-flow imaging. Baba's review extends

to proposing innovative control mechanisms for manipulating time-frequency reso-

lution while preserving the aspect ratio of the Point Spread Function (PSF). This

report provides a comprehensive insight into the practical utility and technologi-

cal foundations of STFT, offering valuable insights for researchers and practitioners

aiming to advance time-frequency analysis techniques across diverse applications.

The work by Filipe Felisberto, Florentino Fdez.-Riverola, and António Pereira [4]

presents a solution aimed at addressing the challenges of monitoring the elderly

population in a non-restrictive manner while maintaining their quality of life. With

the increasing aging population and economic constraints, there is a pressing need

for efficient methods of ensuring the well-being of the elderly without resorting to

premature nursing home admissions. Their proposed system

utilizes sensor fusion

technology, leveraging data from a network of wireless sensors placed around the

user's periphery. Designed with cost-effectiveness in mind, the system aims to reach

a broad target demographic. The system's capability to accurately detect and dis-

tinguish body postures and movements facilitates effective monitoring and rehabil-

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### Emergency Response Network Using Motion Sensors

itation of users, particularly in identifying long-term issues. While demonstrating

near-perfect precision in detecting normal falls, further research is required to ad-

dress the detection of complex falls, such as hampered falls, to enhance the system's

overall effectiveness in accident detection and response.

The research by Abdul Mateen, Muhammad Zahid Hanif, Narayan Khatri, Sihyung

Lee, and Seung Yeob Nam [5] introduces an innovative approach to address the

escalating risk of accidents on roads, particularly exacerbated by

adverse weather

conditions. In response to the heightened danger posed by reduced visibility and

hazardous road conditions during inclement weather, the study proposes an Acci-

dent Alert Light and Sound (AALS) system for autonomous accident detection and

alerts across all vehicle types. By installing the system on roadside infrastructure,

non-equipped vehicles (nEVs) and electric vehicles (EVs) can seamlessly benefit

from the AALS system without necessitating modifications to their onboard sys-

tems. This approach aims to transform conventional roads into smart roads (SRs),

streamlining accident detection and alert mechanisms. Leveraging a combination of

sensors embedded in SRs, the system autonomously detects accidents and promptly

alerts approaching vehicles via wireless communication. Furthermore, the incorpora-

tion of pre-saved locations reduces the time required to pinpoint accident locations,

enhancing response efficiency without reliance on GPS technology.

The proposed

AALS framework not only facilitates timely accident alerts but also mitigates the

risk of multiple-vehicle collisions (MVCs), thereby contributing to the overall safety

and efficiency of road transportation systems.

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Emergency Response Network Using Motion Sensors

## 2.1 LITERATURE REVIEW

SI NoAuthorTitleObjective

1HajarIzzatiMohd

Ghazalli, Muhammad

IzaiddinHassan,

Zuhri Arafah Zulkifli,

Siti Nuramalina Jo-

hari

MOTOSOS [1]A groundbreaking mobile

app leveraging smartphone

sensors for precise motorcy-

cle accident detection, triggering emergency protocols to enhance safety and potentially save lives.

2Akshay AgarwalACCIDENT

DETECTION

SYSTEM [2]

Utilizing smartphones' sensors for timely accident detection to bridge the gap between occurrence and emergency medical dispatch, enhancing road safety and saving lives.

3Tatsuro BabaTIME-

FREQUENCY

ANALY-

SISUSING

SHORTTIME

FOURIER

TRANSFORM

[3]

Investigating control methods for optimizing time-frequency resolution in STFT analysis while evaluating image quality using PSF for non-stationary signals. Proposing a method to maintain constant PSF aspect ratio during image expansion and contraction.

4AbdulMateen,

MuhammadZahid

Hanif, Narayan Kha-

tri,SihyungLee,

Seung Yeob Nam

SMART

ROADS

FORAU-

TONOMOUS

ACCIDENT

DETECTION

ANDWARN-

INGS [4]

Implement an accident de-

tection and warning system

on smart roads to reduce

human fatalities in traffic

accidents.

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Emergency Response Network Using Motion Sensors

5FilipeFelisberto,

FlorentinoFdez..-

Riverola, Antonio

Pereira

IMPLEMENT

AN ACCIDENT

DETECTION

ANDWARN-

INGSYSTEM

ONSMART

ROADSTO

REDUCE

HUMANFA-

TALITIESIN

TRAFFIC AC-

CIDENTS. [5]

Develop a cost-effective so-

lution for monitoring the

elderly and detecting acci-

dents using sensor fusion

technology.

Table 2.1: Literature Sources

## 2.2 BACKGROUND STUDY

The development of the Emergency Response Network (ERN) application

is grounded in a comprehensive background study encompassing various facets of

emergency response systems, technological advancements, and societal challenges.

Key areas of focus include the current landscape of emergency response mechanisms,

prevalent issues in timely accident detection and first aid provision, and the role of

smartphone technology in addressing these challenges.

Research indicates that existing emergency response systems often struggle to

provide timely assistance, particularly in remote or underserved areas where access

to emergency services may be limited. Moreover, delays in receiving critical first

aid following accidents contribute significantly to preventable loss of lives. This

underscores the urgency of developing innovative solutions that

leverage modern

technology to bridge the gap between accident occurrence and professional medical

assistance.

The proliferation of smartphones with built-in sensors, such as accelerometers,

gyroscopes, and GPS, presents a unique opportunity to revolutionize emergency re-

sponse systems. Previous studies, such as "MotoSOS [1]: Accident Detection for

Motorcycle Riders Using Motion Sensors" and "ACCIDENT DETECTION SYS-

TEM APPLICATION [2]," have demonstrated the feasibility of using smartphone

sensors for automated accident detection and distress signal dispatch. These findings

provide valuable insights into the potential efficacy of smartphone-based solutions

in enhancing emergency response capabilities.

Additionally, advancements in signal processing algorithms, as explored in papers

like "Time-Frequency Analysis Using Short Time Fourier Transform," offer further

avenues for improving the accuracy and reliability of accident detection systems. By

leveraging insights from these studies and building upon existing research, the ERN

project aims to develop a robust and effective mobile application that empowers

bystanders and certified first aid responders to mitigate the impact of accidents and

emergencies, potentially saving lives in critical situations.

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Chapter 3

## PROPOSED SYSTEM

### 3.1 PROBLEM STATEMENT

It was popularised in the 1960s with the release of Letraset sheets containing

Lorem Ipsum passages, and more recently with desktop publishing software like AI-

dus PageMaker including versions of Lorem Ipsum. It was popularised in the 1960s

with the release of Letraset sheets containing Lorem Ipsum passages, and more re-

cently with desktop publishing software like Aldus PageMaker including versions of

Lorem Ipsum.

### 3.2 PROPOSED SYSTEM OUTLINE

The system comprises two main components: It was popularised in the 1960s

with the release of Letraset sheets containing Lorem Ipsum passages, and more re-

cently with desktop publishing software like Aldus PageMaker including versions of

Lorem Ipsum. It was popularised in the 1960s with the release of Letraset sheets con-

taining Lorem Ipsum passages, and more recently with desktop publishing software

like Aldus PageMaker including versions of Lorem Ipsum.

### 3.3 SYSTEM ARCHITECTURE

The system architecture is depicted in the figure 2.1. The data flow diagram

illustrates the flow of data and interactions between users, first aid responders, the

database, and various system components.

At the core of the architecture, EXPLANATION

EXPLANATION: It was popularised in the 1960s with the release of Letraset

sheets containing Lorem Ipsum passages, and more recently with desktop publishing

software like Aldus PageMaker including versions of Lorem Ipsum. It was popularised

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and more recently with desktop publishing software like Aldus PageMaker including

versions of Lorem Ipsum. It was popularised in the 1960s with the release of Letraset

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## Emergency Response Network Using Motion Sensors

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software like Aldus PageMaker including versions of Lorem Ipsum.

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software like Aldus PageMaker including versions of Lorem Ipsum.

Figure 3.1: Data Flow Diagram

### 3.4 TECHNICAL DETAILS

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Lorem Ipsum passages, and more recently with desktop publishing software like AI-

dus PageMaker including versions of Lorem Ipsum. It was popularised in the 1960s

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cently with desktop publishing software like Aldus PageMaker including versions of

Lorem Ipsum. It was popularised in the 1960s with the release of

Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### 3.4.1 Smartphones

The primary hardware component utilized in the ERN is smartphones, which serve

as the platform for running the mobile application. Smartphones provide the neces-

sary computational power and connectivity to enable real-time accident detection,

distress signal transmission, and communication with first aid responders. Addi-

tionally, smartphones feature built-in sensors such as accelerometers and gyroscopes,

essential for detecting motion and orientation changes indicative of accidents or falls.

### 3.4.2 Motion Sensors

Accelerometers and gyroscopes are integral components of smartphones that detect

motion, acceleration, and orientation changes. These sensors play a crucial role in

the ERN's accident detection mechanism, where threshold-based

algorithms analyze

sensor data to identify potential accidents or falls. By continuously monitoring

motion sensor data, the ERN can trigger distress signals in the event of emergencies,

facilitating swift response from nearby first aid responders.

### 3.4.3 GPS Receivers

Global Positioning System (GPS) receivers integrated into smartphones provide ac-

curate location data, enabling precise positioning of users in real-time. This location

information is crucial for accident detection and distress signal dispatch within the

ERN. By leveraging GPS data, the ERN can determine the user's exact coordi-

nates and transmit this information to nearby first aid responders, ensuring timely

assistance in emergencies.

### 3.4.4 Internet Connectivity

Seamless internet connectivity is essential for the ERN to transmit distress sig-

nals, exchange data with Firebase's backend services, and facilitate communication

between users and first aid responders. Whether through Wi-Fi or mobile data

networks, reliable internet connectivity enables the ERN to function effectively in

various environments and conditions.

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### 3.5 METHODOLOGY

The development of the application follows a systematic methodology en-

compassing several key stages, including planning, development, testing, and de-

ployment.

#### 3.5.1 SUB HEADING 1

•TITILE 1Lorem Ipsum is simply dummy text of the printing and typesetting

industry. Lorem Ipsum has been the industry's standard dummy text ever

since the 1500s, when an unknown printer took a galley of type and scrambled

it to make a type specimen book. It has survived not only five centuries, but

also the leap into electronic typesetting, remaining essentially unchanged. It

was popularised in the 1960s with the release of Letraset sheets containing

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like Aldus PageMaker including versions of Lorem Ipsum.

•**TITLE 2:** Lorem Ipsum is simply dummy text of the printing and typesetting

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### 3.5.2 SUB HEADING 2

- TITILE 1: Lorem Ipsum is simply dummy text of the printing and typesetting

industry. Lorem Ipsum has been the industry's standard dummy text ever

since the 1500s, when an unknown printer took a galley of type and scrambled

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like Aldus PageMaker including versions of Lorem Ipsum.

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## Chapter 4

### DATASET

To obtain values indicative of an accident occurrence, we conducted a series of

experiments using our custom-built application to record data from the accelerom-

eter and gyroscope sensors. This application allows for real-time data collection

and analysis, providing both live values and maximum values for further examina-

tion(fig 4.1 & fig 4.2). For the accelerometer data, experiments were conducted in

various scenarios, including normal riding conditions, simulated accidents, throwing

the phone to the ground, and dropping the phone from a desk

height. The results

of these experiments, as shown in Table 4.1, indicate that the maximum value for

triggering accident detection is determined to be above  $70 \text{ m/s}^2$ . It's important to

note that these values serve as preliminary thresholds, subject to further testing

and calibration across different smartphone models to ensure accuracy and reli-

bility. Additionally, gyroscope data was analyzed, focusing solely on the x-axis to

represent the tilting of the smartphone corresponding to the rider's body movement.

The values exceeding 2 or falling below -2 on the gyroscope axis are indicative of ab-

normal tilting and thus trigger the accident detection module within the application.

Table 4.1: Accelerometer Experiment Results

Experiment Situation	Maximum MA Value ( $\text{m/s}^2$ )
----------------------	-------------------------------------

Normal ride	36.92
-------------	-------

Simulated	72.69
-----------	-------

Throw	65.52
-------	-------

Desk drop38.79

Figure 4.1:Motion

sensor values at rest

Figure 4.2:Motion

sensor values after

simulation

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Chapter 5

## EXPERIMENTAL RESULTS

To evaluate the performance and reliability of our system, extensive exper-

imentation was conducted utilizing real-world scenarios and simulated accidents.

This section presents the experimental results and analyses the effectiveness of the

Emergency Response Network (ERN) application in detecting and responding to

emergencies.

### 5.1 User Login and Signup

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when an unknown printer took a galley of type and scrambled it to make a type spec-

imen book. It has survived not only five centuries, but also the leap into electronic

typesetting, remaining essentially unchanged. The figure 5.1 shows the Signup page

of the application and figure 5.2 shows the Firebase authentication database.

Figure 5.1: Login Page

Figure 5.2: Authentication Database

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## Emergency Response Network Using Motion Sensors

### 5.1.1 Profile Setup

Upon signup, users can complete their profile setup by providing essential

details, including a profile picture, gender, blood group, description of any medical

conditions, and phone number (fig 5.3). These data are securely stored in Fire-

base Firestore (fig 5.4), ensuring accessibility and privacy. When a

distress signal

is sent, the user's profile information is automatically attached, enabling responders

to quickly access relevant details about the victim, such as medical conditions or

emergency contact information. This comprehensive profile setup enhances the effi-

ciency of rescue operations and facilitates prompt assistance in critical situations.

Figure 5.3: Profile Page

Figure 5.4: Firestore User Database

## 5.2 Registration and Verification Process

In the application, users have the option to register as first aid responders

by submitting required documents (fig 5.5). Upon submission, the documents are

stored in the database for review by the admin (fig 5.6). The admin has the author-

ity to verify the documents and designate the user as a responder (fig 5.7). Once

verified, the corresponding responder status is updated in the database (fig 5.8), en-

abling access to responder-specific features. This streamlined

process ensures that

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only qualified individuals are granted responder status, enhancing the effectiveness

and reliability of emergency response efforts within the ERN application.

Figure 5.5: Registr-

ation Page

Figure 5.6:After

Submission

Figure 5.7: Verifica-

tion Page(Admin)

Figure 5.8:After

Verification

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Emergency Response Network Using Motion Sensors

### 5.3Live Location Monitoring

The application continuously monitors the live location of users upon login,

updating their coordinates (latitude and longitude) and timestamp in Firebase Realtime Database in real-time (fig 5.9). This dynamic tracking ensures that the latest

location data is readily available for use in various application features, facilitating

timely assistance and accurate positioning of users during emergencies. By leveraging live location monitoring, the ERN enhances the effectiveness of emergency

response efforts, enabling swift coordination and intervention when needed.

#### Figure 5.9: Real Time Database

#### 5.4 Location-Based Power Management

The application incorporates a location-based power management feature to

optimize energy consumption while ensuring efficient accident detection using motion sensor data. Users have the option to enable or disable power-saving mode,

which dynamically controls the activation of the motion sensor. When power-saving mode is disabled, the motion sensor remains enabled at all times,

providing continuous accident detection capability. However, when power-saving mode is enabled, the application utilizes location services to determine whether the user is traveling. If the user is stationary, the motion sensor is disabled to conserve power. Conversely, if the user is in transit, the motion sensor is activated to enable accident detection functionality. This intelligent power management strategy balances energy efficiency with the need for real-time accident detection, enhancing the overall usability and effectiveness of the ERN application.

Figure 5.10 illustrates the scenario where power-saving mode is off, enabling the motion sensor for continuous accident detection. In Figure 5.11, with power-saving mode activated and the user stationary, the motion sensor is disabled to conserve power. Conversely, Figure 5.12 depicts power-saving mode

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Emergency Response Network Using Motion Sensors

activated while the

user is traveling, resulting in the motion sensor being enabled for accident detection.

Figure 5.10: Power Saving Mode Disabled

Figure 5.11: Power Saving Mode Enabled and  
Stationary

Figure 5.12: Power Saving Mode Enabled and  
Transit

## 5.5 Finding Nearest Responder

In the event of an accident, the application employs a mechanism to locate

the nearest responder for prompt assistance. By retrieving the current location of

the user and the locations of available responders from the real-time database, the

ERN calculates the distance between the two points. If the distance is within a pre-

defined radius, typically 5 km, the details of the nearest responder

are retrieved for distress signal dispatch (fig 5.14). This efficient process ensures that users receive timely aid from nearby responders, optimizing emergency response efforts within the ERN application.

Figure 5.13: No Responder Nearby

Figure 5.14: Responder Nearby

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Emergency Response Network Using Motion Sensors

5.6 Accident Detection and Distress Signal Sending

The application employs automatic accident detection utilizing motion sensor

data. When the sensor detects values surpassing a predefined threshold, indicating a

potential accident, a pop-up window with a warning sound is triggered. This window

provides a slide button to cancel the distress signal if it's a false

alarm, allowing the user to respond within a 20-second timeframe. Failure to cancel the signal within this duration prompts the ERN to dispatch a distress signal to nearby responders via push notification or SMS. The distress signal includes detailed user information and coordinates, facilitating swift assistance and ensuring effective emergency response.

Figure 5.15 illustrates the accident detection popup message with a cancel

button, allowing users to respond to potential false alarms. In Figure 5.16, the

signal send popup appears after the 20-second timeframe, indicating distress signal

dispatch to the nearest responder. Figure 5.17 showcases the incoming alert received

by the responder, containing detailed victim information and location coordinates.

Lastly, Figure 5.18 displays the Google Map view of the accident location retrieved

from the alert message, aiding responders in navigating to the scene promptly.

Figure 5.15:Accident De-

tected Pop-up

Figure 5.16: Signal Send Pop-up

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Figure 5.17: Responder View of Alert

Figure 5.18: Location of the Accident

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Chapter 6

## CONCLUSION & FUTURE SCOPE

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imen book. It has survived not only five centuries, but also the leap into electronic

typesetting, remaining essentially unchanged.

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