# **CHAPTER 1: GENERAL INTRODUCTION**

## Introduction

This chapter focuses on the following key concepts: Background of the study, Problem statement, research objectives, Methodology, Research question, research hypothesis, Choice of the study, Study delimitation, Significance of the study, and organization of the study.

## Background study

In times of disaster, together with terrorist threats, natural disasters, or army conflicts, governments often put into effect curfews and mobility guidelines to safeguard public protection (Conrad E 2000). The enforcement of such measures, but, offers a complex venture: balancing safety concerns with the need of permitting crucial actions. Traditionally, movement allows were issued via manual or semi-digital strategies, which aren't first-rate time-ingesting however furthermore liable to forgery, inefficiencies, and lack of actual-time tracking.

Over the years, several global locations have confronted issues in handling motion regulations successfully, particularly finally of fitness crises similar to the COVID-19 pandemic (*J Hum Rights.*2020). The reliance on physical lets in caused administrative bottlenecks, unauthorized tour, and, in some times, corruption. In Rwanda, wherein protection operations and emergency responses were a focal point of governance, the want for a greater green and steady gadget is obvious.

A virtual Curfew and Security E-Pass System offer an opportunity to beautify the effectiveness of mobility control measures. By leveraging technological improvements, the type of device can streamline the approach of issuing and verifying passes, ensuring that great authorized individuals are legal to adventure through restrained intervals. This could not super enhance safety however additionally decorate coordination between authority organizations, and general public.

Moreover, as virtual transformation continues to shape numerous sectors, integrating generation into emergency response mechanisms is both necessary and inevitable. A nicely structured e-pass device may want to serve as a model for different international locations going through similar challenges, demonstrating how innovation can be harnessed to control mobility through crises effectively.

Unlike current virtual governance structures that focus on public services, this E-Pass device can be an isolated emergency cell utility, strictly dedicated to catastrophe situations. It will function independently from unique e-governance structures and could be activated best in the course of emergencies to ensure unique use for catastrophe control. This separation enhances safety, prevents misuse, and ensures that it remains a dependable device for emergency response with out interfering with ordinary government capabilities.

The introduction of an automated system also minimizes human mistakes, reduces operational charges, and guarantees responsibility. Unlike guide verification techniques, a virtual platform can instantly authenticate an individual's credentials, reducing the possibility of fraud or unauthorized get entry to. Additionally, real-time records monitoring can provide insights into motion patterns, supporting government in strategic selection-making at some stage in emergencies.

## Problem Statement

Rwanda presently lacks a centralized, digital technique to streamline, trouble, confirm, and tune movement permissions at some point of crises. This absence consequences in coordination demanding situations amongst security agencies, constrained oversight of mobility throughout emergencies, and issue in making sure that simplest authorized individuals are granted movement privileges. The reliance on manual verification techniques increases the chance of unauthorized get admission to, decreasing usual protection effectiveness.

Moreover, emergency conditions require rapid response mechanisms, but with out a green, automated machine, selection-making and enforcement turn out to be slow, main to capability safety breaches and failure to provide vital motion clearance for important services. There is likewise the problem of record-preserving inefficiencies, making it tough for government to audit or music motion trends effectively.

To address those challenges, this observe seeks to layout and suggest a secure, efficient, and scalable E-Pass gadget so that it will automate the technique of issuing, verifying, and monitoring movement passes during emergencies (Alanzi, T. (2021). The device will integrate actual-time authentication, eliminate reliance on paper allows, and provide a dependent technique to dealing with mobility restrictions, making sure more advantageous protection, duty, and operational performance in Rwanda’s emergency response framework. During emergencies, making sure controlled yet bendy motion of vital personnel is vital. Traditional paper-primarily based motion passes are at risk of forgery, loss, and delays. Rwanda lacks a centralized, virtual method to problem, confirm, and track motion permissions effectively. The absence of this sort of gadget increases response time, creates administrative burdens, and reduces security effectiveness.

## Research objectives

This research includes two kinds of objectives such as general objectives and specific objectives

### 1.4.1 General objectives:

To design a Curfew and Security E-Pass System to facilitate managed motion all through emergencies in Rwanda.

### **1.4.2 Specific objective:**

The proposed study aims to achieve the following objectives:

* **Data Collection:**
* To acquire relevant records on the current mobility restrictions for the duration of emergencies in Rwanda.
* To perceive challenges faced through protection companies and the public in acquiring motion authorization.
* To analyse existing systems (if any) and determine their limitations thru surveys, interviews, and record critiques.
* **Analysis:**
* To observe the collected statistics and assess the effectiveness of contemporary movement manage mechanisms**.**
* To identify key requirements for a virtual emergency E-Pass system.
* To evaluate safety risks and capacity threats associated with unauthorized motion during crises.
* **Design:**
* To conceptualize a secure and efficient E-Pass machine that automates emergency motion authorization**.**
* To define the machine structure, together with user authentication, request processing, and approval workflows.
* To create system fashions, such as use case diagrams, entity-courting diagrams (ERD), and gadget flowcharts.
* **Development:**
* To put in force the centre functionalities of the E-Pass system, including request submission, approval, and verification.
* To combine security functions consisting of verification, and real-time monitoring.
* To make sure the gadget is optimized for cellular use, providing accessibility in disaster conditions.
* **Testing:**
* To conduct unit testing out on individual system additives to make sure each function works as predicted.
* To carry out integration checking out to validate seamless interactions among special modules.
* To simulate emergency scenarios and compare device overall performance under special situations.
* **Validation:**
* To deploy a pilot model of the device and acquire remarks from key stakeholders, which include protection organizations and emergency response teams.
* To verify user experience, safety effectiveness, and system reliability.

## Research Questions

* How will the facts be collected?
* How can the gathered statistics be analysed to perceive key challenges in motion control at some point of emergencies?
* What is the main goal or cause of this design project?
* What machine structure and security features may be blanketed in the E-Pass gadget design?
* What era stack or development equipment can be used for this task?
* What types of checking out will be executed to make sure system reliability and protection?
* What validation strategies or techniques can be used to evaluate the effectiveness of the gadget before deployment?

## Research Hypotheses

First, we assume that the way movement authorization is controlled in the course of emergencies might be prompted by way of factors such as the efficiency of the approval manner and the security measures in place.

We believe that if we layout a digital E-Pass gadget with actual-time verification and stable authentication, it will improve the process of granting movement permits all through crises.

We want to make sure that the system stays purposeful and reliable, even when dealing with a high quantity of requests at some stage in emergencies.

Finally, we need to check if the system gives correct and stable authorization to only folks who meet the desired criteria. These guesses are our research hypotheses, and we can look at them to see in the event that they’re true or not.

## Choice of the study

The preference of this study is based totally at the increasing want for an efficient, secure, and automatic system to manipulate motion authorization during emergencies. Rwanda, like many different nations, has confronted demanding situations in controlling motion for the duration of crises which includes natural disasters, security threats, and public fitness emergencies. The conventional methods of issuing motion permits, which frequently rely on guide tactics or centralized systems with constrained accessibility, can be sluggish, inefficient, and at risk of misuse.

This study focuses on designing a mobile-based, isolated emergency E-Pass system in order to feature independently during crises, making sure that authorized employees and civilians can flow securely and efficaciously. The cellular technique is selected because of its accessibility, flexibility, and capacity to provide real-time approvals and verification, even in excessive-stress situations.

Furthermore, the observe is giant for security companies, authority institutions, and emergency response groups, because it pursuits to enhance coordination and decrease unauthorized motion for the duration of emergencies. By leveraging virtual technology, the proposed system will contribute to enhancing country wide protection, optimizing emergency reaction, and ensuring public protection in Rwanda.

## Significance of the study

### 1.8.1 Personal interest

* This venture affords a possibility to use software program engineering ideas in growing a real-world emergency management solution.
* The project enhances my abilities in mobile application improvement, system protection, and data control, which are vital in today’s digital technology.
* By running in this undertaking, I benefit enjoy in system layout, testing, and validation, with a view to be useful for my future career in generation.

### 1.8.2 Ines-Ruhengeri Interests

* This project serves as an opportunity for INES RUHENGERI to demonstrate its role in fostering technological answers that cope with vital security and emergency challenges.
* The review may inspire future software program engineering and cybersecurity tasks in the group, promoting innovation in disaster management technologies.

### 1.8.3 Government interest

* The system enhances the performance of emergency motion control, reducing delays due to traditional paper-primarily based or centralized authorization methods.
* It provides a steady and automatic platform for issuing and verifying motion passes, minimizing fraud and unauthorized access to limited regions.

### 1.8.4 Community interest

* The platform guarantees that in emergencies, individuals with essential desires (e.g. clinical employees, first responders, vital employees) can pass speedy with out needless delays.
* The system enables lessen congestion and confusion during crises through making sure only legal individuals can move through restrained areas.

## Delimitation of the study

This study focused on mobile based, isolated E-Pass system in particular designed for use all through crises. The system is supposed to alter movement in confined areas and ensure that best authorized individuals can journey in the course of emergencies. Unlike Irembo, which integrates multiple government offerings, this gadget will characteristic independently and may be activated only throughout emergencies, making it a dedicated answer for crisis control.

The research is constrained to Rwanda and aligns with the country’s protection framework and emergency response protocols. It will more often serve government organizations, protection forces, emergency responders, clinical personnel, and individuals requiring pressing movement authorization. The examine does no longer enlarge to worldwide programs or the combination of hardware solutions which includes IoT-primarily based monitoring. Instead, it focuses completely on software program development, incorporating cell technologies, and actual-time verification for steady and efficient movement manipulate.

Since the gadget is designed for disaster situations, it'll no longer function beneath ordinary conditions but could be activated most effective whilst an emergency arises. Additionally, the examine prioritizes statistics security through enforcing encryption, consumer authentication, and access manage measures to prevent unauthorized get admission to. However, it does not cover physical security features past virtual verification.

## Research methodology

This looks at follows a dependent method to developing a mobile-based, remoted emergency E-Pass system using Python programming language. Data series will contain reviewing current emergency movement systems, authority rules, and security protocols through literature critiques and, if possible, expert consultations. System evaluation will perceive demanding situations in present day movement authorization methods and outline vital improvement.

The layout phase will awareness on system architecture, user-friendly interfaces, and safety functions. The improvement segment put into effect the gadget as a Python-based totally mobile software, ensuring it functions independently from structures like Irembo and activates only in emergencies.

Testing will include unit, integration, and safety checking out to make sure capability and safety in opposition to unauthorized get admission to. Finally, validation will involve professional evaluations and simulated crisis situations to assess the gadget’s performance in real-global emergencies.

## Organization of the study

The project is organized into five chapters as follows:

Chapter 1. General Introduction, this chapter is focusing on the Objectives of the project, Problem statement, Hypothesis, Research objectives and Methodology of the project.

Chapter 2. Literature review, this chapter offers theoretical concepts, fundamental tools, and languages that support this project during the development process.

Chapter 3. Research Methodology, this chapter focuses on the software development methodology used in this project and the data-gathering techniques.

Chapter 4. Design and Implementation, this chapter focuses on and describes the design and implementation project.

Chapter 5. Conclusion and Recommendations, the last chapter is made up of the conclusion and recommendation for further improvements of the software.