# Mobile App for Object Tracking and Location-Based Data for Time Series Analysis

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## Abstract

This project endeavors to design and develop a mobile application to capture and organize location-based data, including associated images and notes, in a date-wise manner display with the robustness of SQLite database management. The app's primary goal is to facilitate time series analysis of heterogeneous data, empowering users to uncover patterns, trends, and insights. With an emphasis on data security, user experience, scalability, and adaptability, this project aims to provide a valuable tool that enhances users' ability to make informed decisions and optimize their experiences based on historical location and current location information. This can be beneficial for urban planning, disaster management, and other applications that require a spatial-temporal perspective.


Figure 1. Home page of the app, showing main modules

Figure 2. Display all data in scroll list view

## Introduction

In today's fast-paced world, capturing, organizing, and preserving memories is essential. This mobile application is a powerful solution designed to revolutionize the way we capture, manage and visualize the Geospatial Analysis over the time. Developed using Unity and programmed in C#, this app is more than just a photo repository; it is a comprehensive memory management system. It combines the capabilities of image capture, note-taking, GPS tracking, and date-wise data organization, all underpinned by the reliability and efficiency of SQLite database integration. It offers users the ability to effortlessly capture moments, add context through descriptive notes, automatically record location details, and display this data in a chronological order.

## Objectives

Developing more advanced data visualization tools to allow users to explore the data in new and exciting ways. Providing options for cloud storage and synchronization, allowing users to access their memories from multiple devices and ensuring data continuity.

## Methodology

User-friendly interface within the mobile app allows users to capture location data along with associated notes and stages or events picture. The application includes the following:

- **Coding:** The app was developed using C# within the Unity editor environment, ensuring efficient functionality.
- **Database Integration:** The SQLite database was integrated to securely store images, notes, and location data.
- **GPS Integration:** GPS tracking features were implemented to record latitude and longitude coordinates.

## 1. Data Collection Module


Figure 3. Descriptive note taking system

Figure 4. Image capture interface

## 2. Data Visualization Module

**Data Organization:** Implement a robust system for organizing the collected data in a latitude and longitude, and date-wise manner. This system should facilitate easy retrieval and analysis of historical location and stage information.
**Time Series Analysis:** Enable users to perform time series analysis on the collected data. This includes date wise identifying the data in location.


Figure 5. Data visualization menus of the application

## Conclusions

In the ever-accelerating flow of our modern lives, the need to capture and store our most meaningful memories and state of the particular location has never been more apparent.

- Our innovative mobile app, meticulously crafted with Unity 2D, C#, and an SQLite database, has provided a compelling solution to this challenge.
- Through the seamless integration of image capture, note-taking, GPS tracking, and date-wise data organization, we have created a platform that not only captures moments but elevates them to lasting treasures.
- As we look to the future, we remain committed to continuous improvement, guided by user feedback and the evolving landscape of mobile technology.


Figure 6. Date wise data display in list view

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## Publications

1. Sharma, S, "Mobile Augmented Reality System for Emergency Response", Proceedings of the 21st IEEE/ACIS International Conference on Software Engineering, Management and Applications (SERA 2023), Orlando, USA, May 23-25, 2023.
2. Sharma, S., Engel, D., "Mobile augmented reality system for object detection, alert, and safety", Proceedings of the IS&T International Symposium on Electronic Imaging (EI 2023) in the Engineering Reality of Virtual Reality Conference, January 15-19, 2023.
3. Mannuru, N. R., Kanumuru, M., and Sharma, S., "Mobile AR application for navigation and emergency response", Proceedings of the IEEE International Conference on Computational Science and Computational Intelligence , (IEEE-CSCI-RTMC), Las Vegas, USA, December 14-16, 2022.
4. Sharma, S, Stigall, J., Bodempudi, S.T., "Situational awareness-based Augmented Reality Instructional (ARI) module for building evacuation", Proceedings of the 27th IEEE Conference on Virtual Reality and 3D User Interfaces, Training XR Workshop, doi: 10.1109/VRW50115.2020.00020, Atlanta, GA, USA, pp. 70-78, March 22-26, 2020.