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INSTITUTE OF ENGINEERING

PASHCHIMANCHAL CAMPUS

DEPARTMENT OF CIVIL AND GEOMATICS ENGINEERING

POKHARA-16, LAMACHOUR

A Proposal on

"Integrated PGIS for the Sustainable Development of Eco-Tourism of Machhapuchchhre Model Trek Route and Development of Mobile Based Application"

COURSE GE 707: GEOMATICS ENGINEERING PROJECT I

Submitted To:

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Introduction

Nepal is a landlocked country with great potential for tourism. Various natural beauties devote her including the world's highest peaks, national parks rich in flora and fauna, snow-fed rivers, exceptional trekking routes, wonderful lakes, and hospitable people. Nepal has been ranked as one of the top-ranked tourist destinations among the different countries. Tourism is the largest industry in Nepal and its largest source of foreign currency exchange and revenue. Possessing eight of the ten highest mountains in the world, Nepal is a hot spot destination for mountaineers, trekking, rock climbers and people seeking adventure. Trekking is a form of walking, undertaken with the specific purpose of exploring and enjoying the scenery. It usually takes place on trails in areas of relatively unspoiled wilderness.

There are many tourist spots in Gandaki Province, some of which are Mardi Mountain trek, Ghandruk, Landruk, Annapurna Base Camp, Machhapuchchhre Mountain Trek. Among them, **The Machhapuchchhre Model Trek** is a new alternative trekking route in the Annapurna Conservation area. The trail route is specifically designed for trekkers who are looking for a less congested, unspoiled trek far from the growing road network. Our project aims to develop **the Machhapuchchhre Model Trek** and informative mobile-based application to facilitate the Machhapuchchhre Trekking.

Machhapuchchhre trekking routes start from the northern point of Pokhara Valley, which would take about an hour by Jeep. This trek can be amazing on foot as the trekkers can observe some of the rural settlements with all their cultural heritages. This location has remained as a base area of the beautiful Mountain Machhapuchchhre and the corridor of Mardi River. This hill lies north to south and spreads up to the Mt. Machhapuchchhre to the north. The major task involved in our project is to explore a proper trek route including major points of attraction. Also, the use of Participatory GIS helped in extracting information regarding attribute data of the trekking area, thus contributing to developing the trek route and android based trek app.

In the present context, the Government of Nepal is working rigorously to ensure successful tourism, celebrating 2020 as **"Visit Nepal 2020"**. The Tourism Board sets a target of 2 million tourist arrivals in 2020. This project to some extent helps to accomplish the "Visit Nepal 2020" mission, which could no doubt uplift and promote the Tourism industry to the next level.

Participatory GIS (PGIS) is a participatory approach to spatial planning and spatial information and communication management. It combines Participatory Learning and Action (PLA) methods with geographic information systems (GIS). PGIS combines a range of geospatial information management tools and methods such as sketch maps, participatory 3D modeling (P3DM), aerial photography, satellite imagery, and global positioning system (GPS) data to represent peoples' spatial knowledge in the forms of (virtual or physical) two- or three-dimensional maps used as a means for spatial learning, discussion, analysis, decision making. In our project, PGIS will be used to promote interactive participation of stakeholders in generating and managing spatial information and to extract information about specific landscapes to facilitate decision-making processes that support effective communication and community advocacy.

Literature Review

To understand the past and present status in our field of research, we studied different articles, journals, etc. From those journals, articles we collect several information on respective topics. Detail description of those topics are listed below:

Trekking:

Trekking is walking in the countryside for pleasure or sport usually meaning for a longer period than hiking. The trekking trails generally meet the needs of outdoor, nature and adventure enthusiasts through offering pristine untouched nature and changing landscapes. The world as trails connects people on the intercultural level in a relaxed environment and a host of other values. Such trails attract tourists from varied tourist market segments like holidays, pilgrimage, adventurous and special interest from all over the world for the ranges of activities in terrestrial, aerial and aquatic forms. It is indicative that 10 percent of tourist hotspots worldwide are developing mountain tourism (Paunovic & Jovanovic, 2017). As per the UNWTO 2014 Global Report on Adventure Tourism, the global trail industry is a multibillion-dollar contribution to the economy. Most of these mountains in the lower altitude with cultural routes also bring tourists to some of the most remote communities on earth.

Trekking has been allowed in Nepal since 1964 when the Nepalese government first allowed foreign visitors. Mountain-related tourism activities are undoubtedly the core of tourism in Nepal, and around 43 percent of all international arrivals participate in trekking (MCTA, 2004).

Every year Nepal attracts more than 200,000 trekkers. That also means that every year more than 200,000 people are faced with the hard choice of selecting which trekking destination to explore in Nepal. Let's face it - this is not an easy choice.

Worst case, some opinions offered by local trekking agencies might be more profit-driven than anything else. Best case, you'll receive good but likely different pieces of advice from various prudent trekking companies in Kathmandu. Because which trek is actually the best in Nepal.

Machhapuchchhre Model Trek:

Trekkers who are searching for a fresh trekking route that offers charming views of mountain series, varieties of flora fauna along with the culture and lifestyle of the ethnic inhabitant then Machhapuchchhre model trek will be the perfect trekking which was identified and developed by TAAN Western Regional Capture Pokhara with the sole objective of promoting Pokhara and its surrounding areas. Machhapuchchhre trekking routes start from the northern point of Pokhara Valley, which would take about an hour by Jeep. This trek can be amazing on foot as the trekkers can observe some of the rural settlements with all their cultural heritages. The east-west sides of the hill are the watershed areas of Seti Mardi river respectively. The whole surrounding is being such wildernesses, even the trekking route is not sometimes very clear. The trekkers, then, have to pass through the dense forest of rhododendron.

Machhapuchchhre Model Trek Management Committee (MMTMC) has carried out some studies on this route to explore tourism in the route. Still, many features and possibilities located there are left for the exploration. So, we are engaged in this topic for more investigation regarding this trek route and explore the potential hot tourism sports there.

Role of the Mobile Application in trekking:

The use of smartphones has been increased rapidly in today's day and the developer has also given their utmost effort in the development of mobile-based applications nowadays. Some people take their phones everywhere. Now they can add the mountains of Nepal to the list. The newly launched Trekking in Nepal application from **HoneyGuide** is intended as both a multi-tool for trekkers in the Nepal Himalaya, and a show of confidence in Nepal's trekking industry, which has taken a massive hit in recent years following the devastating earthquake that hit Nepal in 2015, and a string of other natural disasters.

Available for Android and Apple phones, the app uses GPS technology to beam everything from place-markers for things to see on the trail to warnings about avalanches to trekker's mobile phones. The launch version of the app includes guides to the Everest region and treks around Annapurna Base Camp and Ghorepani/Poon Hill, with plans to expand to other treks around Nepal.

PGIS:

As per the research article on the topic "Participatory GIS and decision-making – practical cases in agriculture, health, livestock and tourism in Cameroon" the following information was obtained.

PGIS has been an alternative method to designate a participatory approach to spatial planning and information and communications management. It put together spatial analysis techniques and living experience of both modern and cultural or archaic practitioners, by combining GIS 'expert' skills with socially differentiated local knowledge.

Since the year 2000, the Ministry of Tourism and Leisure has declared tourism as a "priority economic sector". It then tries to improve the quality of the destination in terms of sustainable governance and planning for more arrivals. For this it has used participatory mapping to conduct fieldwork for ecotourism studies in some attractive areas; the main goals with local populations were then to locate attractions and propose itineraries for a most integrated planning design renewal. In November 2009 and October-December 2015, while conducting fieldwork for his Ph.D. thesis, he found necessary with the local population to divide the space into spatial units based on touristic attractions, and population's daily experience, especially local tourists' guides.

In this scenario, the Government of Nepal is celebrating Visit Nepal 2020 intending to welcome more than 2 million tourists. So, our project to some extent helps to accomplish the government's mission by exploring the potential hot spots for tourism. In this regard, we can also use participatory mapping to conduct fieldwork for ecotourism studies in the respective area having potential for the tourism industry.

Statement of Problem:

Many trekking routes in mountainous areas are not explored properly or not found out by visitors who are mainly focused on adventurous tourism. Many hidden treasures of nature are yet to be discovered. Also, there are lots of misinformation regarding trekking and routes, biased information is found from person to person. So, our project puts concern over these sorts of problems to systemize the trekking and all other activities associated with their tourism. We aim to develop a mobile-based application of Machhapuchchhre Trek Route. Our application is intended to solve all these hindrances in their tourism (or trekking in this case) in Machhapuchchhre Trekking Route. It gives map (locational) information, route for the particular tourist spots, major nearby attractions for tourists, all the associated information (accommodations, food items found, etc.) about the hotels, lodges, restaurants, tourist centers for their easy and luxurious stay.

Our area of concern is to improve trekking routes of Machhapuchchhre model trek and convey information via a mobile-based application and displaying the tourism resource inventories in a wide range. The success of any tourism is determined by tourism planning, tourism development, and research and tourism marketing. Different tourism resources are not properly managed. The proper management and exploration of tourism resources in a spatial way are the most in today's era.

GIS technology offers great opportunities for the development of modern tourism applications using maps. This technology integrates common database operations such as queries with the unique visualization and geographic analysis benefits offered by maps. The integration of tourism data and GIS data is a big challenge for the tourism industry, today.

Objectives

General Objective:

- To develop sustainable tourism in Machhapuchchhre Model Trek Route.

Specific Objective:

- To develop an informative mobile-based application to facilitate the Machhapuchchhre Model Trekking.
- To identify the hot spots in Machhapuchchhre Model Trek tourism for sustainable tourism management.

Scope and Limitation of Study

Some of the scopes of our project are:

- It helps to increase tourists' arrival, thereby promoting the tourism industry to the next level.
- It helps to uplift the economic status of local people providing employment opportunities as tourist guides.
- Development of necessary infrastructures including road network, tourist center, other facilities, etc. after the exploration of the prospects of tourism in the area.

Some of the limitations of the project are as follows:

- The project will be based on the open-source platform rather than the commercial one.

Methodology

Study area:

Machhapuchchhre trek route, located at Kaski, Nepal extends from Pokhara to Sainti Ghatta. Sainti Ghatta is located at the height of 1300m from sea level. This place is rich in culture and tradition. Imu(1400m) is the next destination in our study area. Organic Rabinbow trout and Tokro(1450m) lies on the way, which is a typical Tamang village. Purundhung (1860m), Kaltha(1890m) and Naudhoke Cave (2500m) lies on the route.

The majestic view of the Himalayas and rhododendron forest are the main attraction to the Naudhoke cave, which is famous from the religious point of view. Metapurung(2600m), Coolhill(2653m) is a viewpoint before Meshroom also lies in the study area. From Korchon (3600 m) can view the majestic views of the Lamjung Himal, Machhapuchchhre Range, Annapurna Range, Dhaulagiri Himal, Nilgiri Himal, and Gangapurna Himal. It is perfect for a sunrise view.

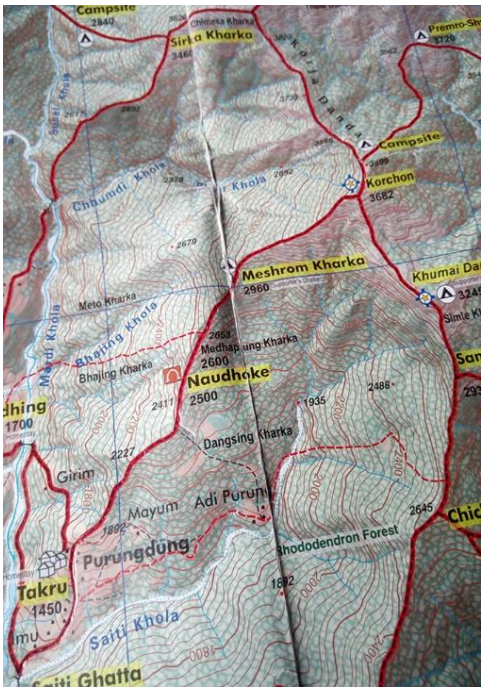

Figure 1 Study Area Map

This location has remained as a base area of the beautiful Mountain Machhapuchchhre and in between the corridor of Mardi River. This trekking route seems like ridge-line trekking because most of the route passes through the ridge-line of Odane hill.

Data collection

Both the spatial as well as non-spatial data will be collected for the study purpose

- **Spatial Data**
  The spatial data representing the location, shape, and size of the real features can be collected using GPS. Also, the remotely sensed data, Digital Elevation Model and existing maps will be used to collect the spatial features
  .
- **Non-Spatial Data**
  The non-spatial data representing the information of the amenities like hotels, restaurants, lodges, hospitals, Tourist Information Desk, Checkpoints, Health posts, etc. are collected using attribute data collectors which are linked with the spatial data.

Modeling

Hence, collected spatial and attribute data are filtered and combined. The outliers are removed. Thus, the corrected data are loaded into the Geographical Information System (GIS) to generate the shapefiles of the different amenities. Thus, generated shapefiles are used in the map server to host the map data and display the map to the client user interface. The mobile application (android or IOS based) will link up the map server and displays the maps as well the attribute information.

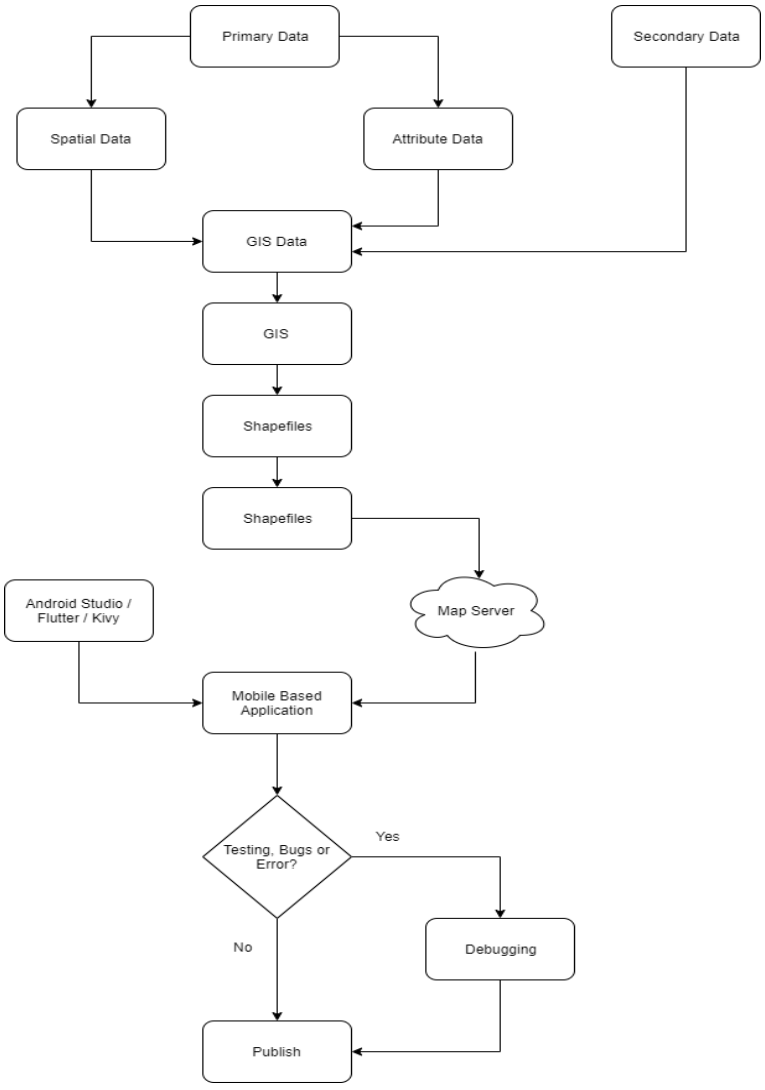

Figure 2 Working Methodology

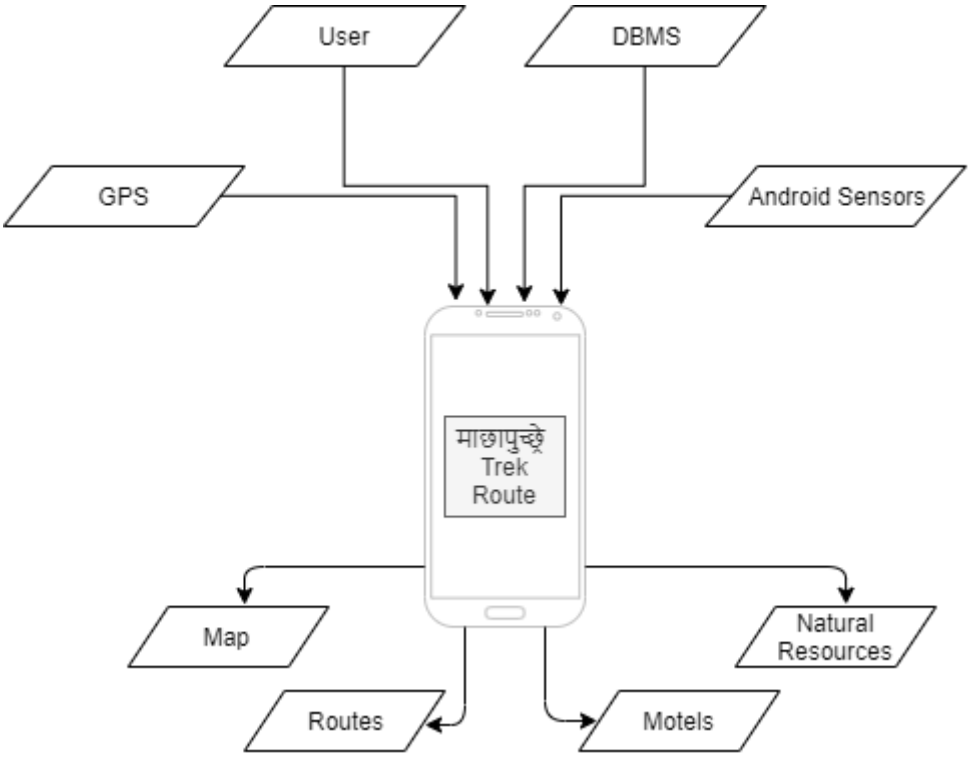

Figure 3 Working Flow of Mobile Application

Work Schedule

Task ID	Task Description	Task Duration	Start Date	End Date
1	Desk Study	5	10-Jan-20	15-Jan-20
2	Planning	10	16-Jan-20	26-Jan-20
3	Front End Development	15	27-Jan-20	11-Feb-20
4	Field Data Collection	9	12-Feb-20	21-Feb-20
5	Data Filtering	4	22-Feb-20	26-Feb-20
6	Mid Term Defense	6	22-Feb-20	28-Feb-20
7	Map Design	20	14-Apr-20	4-May-20
8	Android Studio, Backend Development	40	5-May-20	14-Jun-20
9	Map Server	20	5-May-20	25-May-20
10	DBMS Creation	8	10-May-20	18-May-20
11	Testing and Debugging	15	15-Jun-20	30-Jun-20
12	Publishing	5	1-Jul-20	6-Jul-20

Yes

No

13	Documentation	10	7-Jul-20	17-Jul-20
14	Final Defense	12	18-Jul-20	30-Jul-20

Expected Outcomes

- Machhapuchchhre Model Trek Route will be formed.
- Mobile-based android applications will be developed containing the necessary information for tourists to stay like tourist centers, hotels, lodges, health posts, police stations, etc.
- It helps to accomplish the government's “Visit Nepal 2020” mission, which could no doubt uplift and promote the Tourism industry to the next level.
- Facilities and ease trekking lovers for trekking using the trek model app.

References:

1. Bindloss, J. (2016).Lonely planet: Nepal-goes-hi-tech-new-app-trekking.
2. Jovanovic, V. and Njegus, A. (2008). The application of GIS and its components in tourism. Yogoslav journal of operational research 18(2):261-272.
3. Neupane, D., Joshi, S.P., Lamichhane, T., Parajuli, U. (2075). Tourist Geoinformation system: A model of Pokhara metropolitan city.