

# Location-Aware Real Time Oceanographic Model to Prevent Coastal Drowning

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**Abstract**— A majority of Asian countries are mainly agricultural economies with abundant water resources including coastal regions. Drowning is the second leading cause of accidental deaths in the world, next to road accidents. In Sri Lanka, approximately 1050 people die annually from drowning. This paper provides a novel approach to identify sea level behavior and predict a safe level of sea depth to swim and bath in coastal areas using a dynamically adjustable linear equation that focuses on several related facts affecting the safety of swimmers. A centralized server based system gathers relevant facts and Builds a data storage containing above mentioned facts. A user can directly execute a mobile based application to identify a safety grid around his bathing area using updated weather information. The proposed system will gather relevant environmental data using bathymetric maps, satellite images and online weather stations about the target location. After collecting all relevant data, an oceanographic mathematical model is used to derive the probability of risk for bathing inside the target area. The system will then display a safe region in a grid on the mobile screen to user.

**Keywords** - linear equation, diving, oceanographic data, drowning

## I. INTRODUCTION

According to World Health Organization (WHO), "Drowning is a public health issue that needs worldwide attention. A child drowns every minute in the world and also drowning is the main cause of death next to accidents in children under 5 years of age [1, 18]. About 1050 people die annually in Sri Lanka which is several times higher than the number of deaths due to dengue fever.. Most of these deaths are preventable but there is a lack of mechanism to implement a public awareness program to prevent such strategies in most of the counties that falls into low middle income levels [16, 17].

A number of facts have contributed to sea drowning in countries such as Sri Lanka because of its easy access to abundant waterways and the sea. We identify several important facts to build an information grid around coastal areas to prevent unfortunate sea drowning. The slope type of the coastal area [19], coastal land form [20], type of the beach [21,22], water Level, dangerous currents or waves, wind speed

and direction [22], climatic cycles, climatic condition of the region [23] are the parameters to be used in this grid [1]. Usually sea water level and coastal safety spots for sea bathing change due to above factors rapidly [18]. When a low tide or a high tide occurs in a coastal area, the water level of these fluctuates very rapidly thereby, increasing risk to lives. Most of the developing countries have a problem of having lack of applications or mechanisms to predict most probable coastal safety spots for routine users in real time because of its random behavior.

The main aim of the proposed research is to introduce a novel mechanism to identify coastal safety spots using a dynamically weighted linear equation that returns the probability of risk (or danger) around a specific coastal area and also to implement a central server based system with data mining functionalities combined with a mobile application to identify coastal safety spots for sea bathing.

## II. METHODOLOGY

The proposed safety coastal spots identification mechanism consists of a server-side backend layer and a mobile interface layer. The mobile application layer passes user data to the server side and displays the process data. The server backend layer handles data collection, data aggregation, image processing, algorithmic solving with data mining and result generation process as shown in Fig. 1.

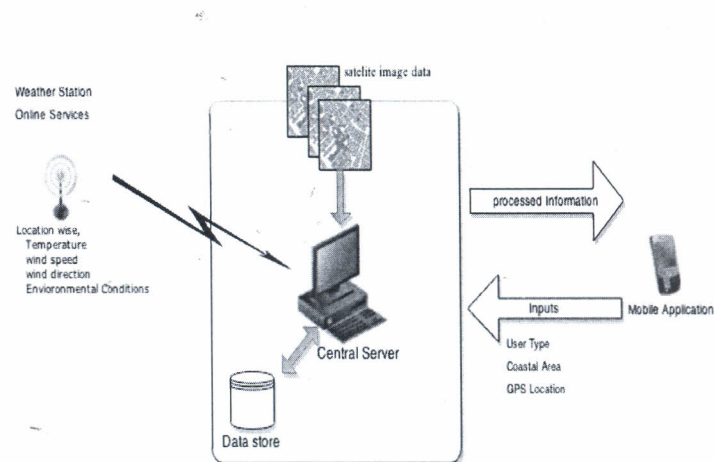


Fig 1: Systems topology