Chapter 8
Mobile-Based Weather Forecasting and Visualization Using Augmented Reality

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ABSTRACT

The aim is to design a 3D augmented reality (AR) weather visualization to investigate future tragedy and daily forecasting. Imagine a world where all physical objects could be made, destroyed, customized, and used in endless ways. Augmented reality (AR) and virtual reality (VR) can create such a place. The background for the study is thus: to analyze, learn implementing and building of an AR Weather application using the OpenWeatherMap Weather API. OpenWeatherMap provides access to local and global weather data via application programming interface (API). OpenWeatherMap serves millions of customers around the world by providing a wide selection of weather-related goods with varying degrees of detail and precision. The research question is if smartphone- and tablet-based 3D AR weather visualizations can be effective tools to enhance current weather forecasting techniques. The methods used in this chapter were making use of AR weather App using unity, AR Foundation, and OpenWeatherMap to stimulate the visualization.

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INTRODUCTION

As a result of using observation data, science, technology, and scientific knowledge, weather forecasting is the prediction of the weather. In early day's weather forecasting was done by the help of observation. Weather forecasting was first done using a computer in 1955 (Sermet et al., 2020) (Ntagiou et al., 2022). It predicts cloud cover, precipitation, wind speed, temperature, hours, days, and month before they happen for a given current location (Bogomolova et al., 2020).

Since the user may physically move real items with 6 degrees of freedom and virtually interact with objects with the same level of control, this definition allows for the inclusion of 2D overlays while maintaining the aim of having interactions in 3D (Aditama et al., 2020). A visual representation of a virtual object is required, but other senses (hearing, touching, tasting, and smelling) may be added as well. In doing so, we reduce the need for expensive sound equipment that can provide spatialized sound. In addition, it places no limitations on the technology employed to produce the illusions, so that undiscovered technologies can be included into the framework in the future.

Both the physical world and the items within it are simulated in virtual reality. That's why it offers a virtual experience that can be much like the real world or entirely alien to it. Despite its seeming insignificance, this modification modifies the feasibility of building such a system(Sassi, M. S. H. et al., 2021). No longer do we have to worry about the finer points of object environment alignment and supporting a viewfinder to make the real environment work in tandem with the objects. The user's stance is now the ground truth rather than being relative to the actual environment's orientation, which greatly simplifies the system (Bhanipati et al., 2021). Because of these factors, it is technically possible for an augmented reality system to provide a virtual environment by masking or otherwise replacing the user's actual surroundings.

Anemometers (wind speed and direction) and hygrometers (humidity) are used to determine the weather conditions for weather forecasting reports (Meister et al., 2022). Weather forecast includes changes in the earth surface due to atmospheric changes such as ice, snow, tides, floods etc. from the mid-20th century, the digital computer had made it possible to calculate the atmospheric change by the initial condition (Seo. et al., 2018). Generally, radar is used to detect precipitation, but it has also been used to detect larger clusters of insects.