

TOWARDS VISUALIZING CANAL CROSS-SECTION USING DATA ACQUIRED FROM TELEOPERATED BOAT

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ABSTRACT: Floods are the most frequent hazard in Thailand and have become a common occurrence over the past three years. To reduce the severity of flooding and minimize the area affected by floods, an effective flood diversion plan is necessary. Field surveys through terrestrial laser scanners can provide profiles of canals and rivers which are critical inputs to develop such a plan. However, they are a slow endeavor and usually provide a discontinuous picture of surveyed area. To overcome these problems, this study equips a teleoperated boat with a 2D laser scanner, a single-beam depth sounder, and GPS/IMU sensors to make it possible to measure canal profiles during navigation along the waterway.

In order for these data to be used for flood preparedness, they must be visualized in 3D. In this paper, we describe the development of an application that enables the visualization of the cross-section of the canals from the laser scanner, depth sounder, and geolocation data. Since both laser scanner data and depth data are acquired in their own local coordinate systems, these data sets must be georeferenced into a common world coordinate system. We explain the processing steps required to do this. We discuss the design and implementation of our solution using the C/C++ language, OpenGL library and Qt library. We then present our experimental results and analysis. We believe that our application to visualize the cross-sections of waterways will effectively support flood management personnel in issuing adequate water diversion plans for flood preparedness.