Bridge-vessel anti-collision monitoring system: design and implementation

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Abstract

Shipping is an important mode of transportation. Due to the rapid development of shipping and the growth of cross channel bridges, vessel-bridge collision accidents have become a serious problem that threatens the safety of cross channel bridges. The active bridge-vessel anti-collision monitoring System is proposed to directly reduce the probability of ship collision accidents and avoid the problems such as economic loss and negative social impact caused by the accidents. The monitoring system monitors the bridge area. The dangerous ships are determined by analyzing the information such as the track; after that, the warning equipment such as sound and light is used to remind the unsafe ships to prevent the ship collision accident. This paper introduces an active bridge-vessel anti-collision monitoring System based on the NVIDIA development board.

Keywords: Vessel-bridge collision accidents; System implementation; Distributed hardware；object detection.

1   Introduction

With the continuous economic growth and the increasing demand for transportation facilities, the number of cross-channel bridges increases. For ships, bridges are artificial obstacles. When ships are navigating under bridges, there is a risk of collision with piers or bridge span structures, which poses a threat to the safety of bridges and ships and poses a threat to the normal operation of waterway and land traffic. Vessel- bridge collision accidents greatly impact the safety of bridge and highway transportation, people's lives and property, and even the development of social economy Significant impact.

There have been serious vessel-bridge collision accidents in many countries. On June 5, 1984, a Russian passenger ship collided with the railway bridge over the Volga River. It causes the collapse of the bridge and killing 240 people. On June 15, 2007, a Chinese sand carrier, when traveling to the Jiujiang River Bridge, deviated from the main channel due to fog and collided with the pier, resulting in the collapse of more than 200 meters of the bridge deck. At the same time, four cars fell into the water, the sand carrier sank, and eight people died. Statistics show that from 1960 to 2006, there were 34 accidents of bridge collapse or serious damage caused by ship collision. About one bridge collapsed or suffered serious harm due to