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Department of Electronics and Communication Engineering

HX8001 - PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP

VIRTUAL – LIFEGUARD FOR SWIMMING POOLS TO DETECT ACTIVE DROWNING

Domain of the Project :Artificial Intelligence
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Objectives

- Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. But the beginners feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident.
- By studying body movement patterns and connecting cameras to artificial intelligence (AI) systems we can devise an underwater pool safety system that reduces the risk of drowning.
- It helps the lifeguard to detect the underwater situation where they can’t easily observe.

Abstract

- Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident.
- By studying body movement patterns and connecting cameras to artificial intelligence (AI) systems we can devise an underwater pool safety system that reduces the risk of drowning.
- The system is not designed to replace a lifeguard or other human monitor, but to act as an additional tool. “It helps the lifeguard to detect the underwater situation where they can’t easily observe.

Introduction

- By studying body movement patterns and connecting cameras to artificial intelligence (AI) systems we can devise an underwater pool safety system that reduces the risk of drowning.
- Usually, such systems can be developed by installing more than 16 cameras underwater and ceiling and analyzing the video feeds to detect any anomalies.
- We can make use of one camera that streams the video underwater and analyses the position of swimmers to assess the probability of drowning
- If it is higher then an alert will be generated to attract lifeguards' attention.

Literature Survey

TITLE	AUTHOR & YEAR	JOURNAL NAME	REMARKS
Visual search for drowning swimmers: Investigating the impact of lifeguarding experience	Victoria laxton & 2020	World Conference on Drowning	The research adds to this literature by examining lifeguard drowning-detection across two studies using naturalistic, dynamic search tasks. Behavioral responses and eye-movement data were recorded as participants watched staged video clips and attempted to identify.
The effect of lifeguard experience upon the detection of drowning victims in a real dynamic visual search task	Laxton, V., and Crundall, D. & 2021	World Conference on Drowning	Lifeguard surveillance is a complex task that is crucial for swimmer safety, though few studies of applied visual search have investigated this domain. Non-lifeguard search skills using dynamic, naturalistic stimuli in drowning.

Literature Survey

TITLE	AUTHOR & YEAR	JOURNAL NAME	REMARKS
Drowning behavior detection in swimming pool based on deep learning	Fei Lei & 2021	International Journal for Research in Applied Science & Engineering Technology	By analyzing the spatial distribution of swimming pool when swimmers are normally swimming, the data labeling and swimmer detection methods are determined.
Characteristics and Function Analysis of Swimming Life Saving System Based on Machine Vision Technology	Juan Du & 2021	The 2nd International Conference on Computing and Data Science	As an integral part of the social system, swimming life-saving activity has become a system, so it is possible to study it from the perspective of system theory. Based on machine vision technology, this paper analyzes the swimming pool positioning lifesaving.

Literature Survey

TITLE	AUTHOR & YEAR	JOURNAL NAME	REMARKS
Drowning Detection System using LRCN Approach	Shardul Sanjay Chavan & 2022	International Journal for Research in Applied Science & Engineering Technology	Most of the swimming pool\'s security mechanisms include CCTV surveillance and lifeguards to help in drowning situations. But this method is not enough for huge swimming pools like in amusement parks.
Testing and Training Lifeguard Visual Search	Victoria Alice Laxton & 2020	Trent University for the degree of Doctor of Philosophy.	Eye tracking measures, recorded on both the simulated and naturalistic clips, failed to reveal any differences between lifeguards and non-lifeguards, suggesting that superior drowning detection for lifeguards did not result from better scanning strategies .

Literature Survey

TITLE	AUTHOR & YEAR	JOURNAL NAME	REMARKS
Automated Vision based Swimming Pool Surveillance System	Darshan V & 2022	International Research Journal of Engineering and Technology	Automated vision based surveillance for a real time human behavior analysis provides an efficient way of detecting the occurrence of any abnormal events amid our surroundings.
Automated drowning detection and security in swimming pool	A .kanchana & 2021	International Research Journal of Engineering and Technology	The children's life is saved during drowning incidents in the swimming pool by lifting the acrylic plate. The proposed approach consists of RF module, Pressure Sensor and Motor Driver.

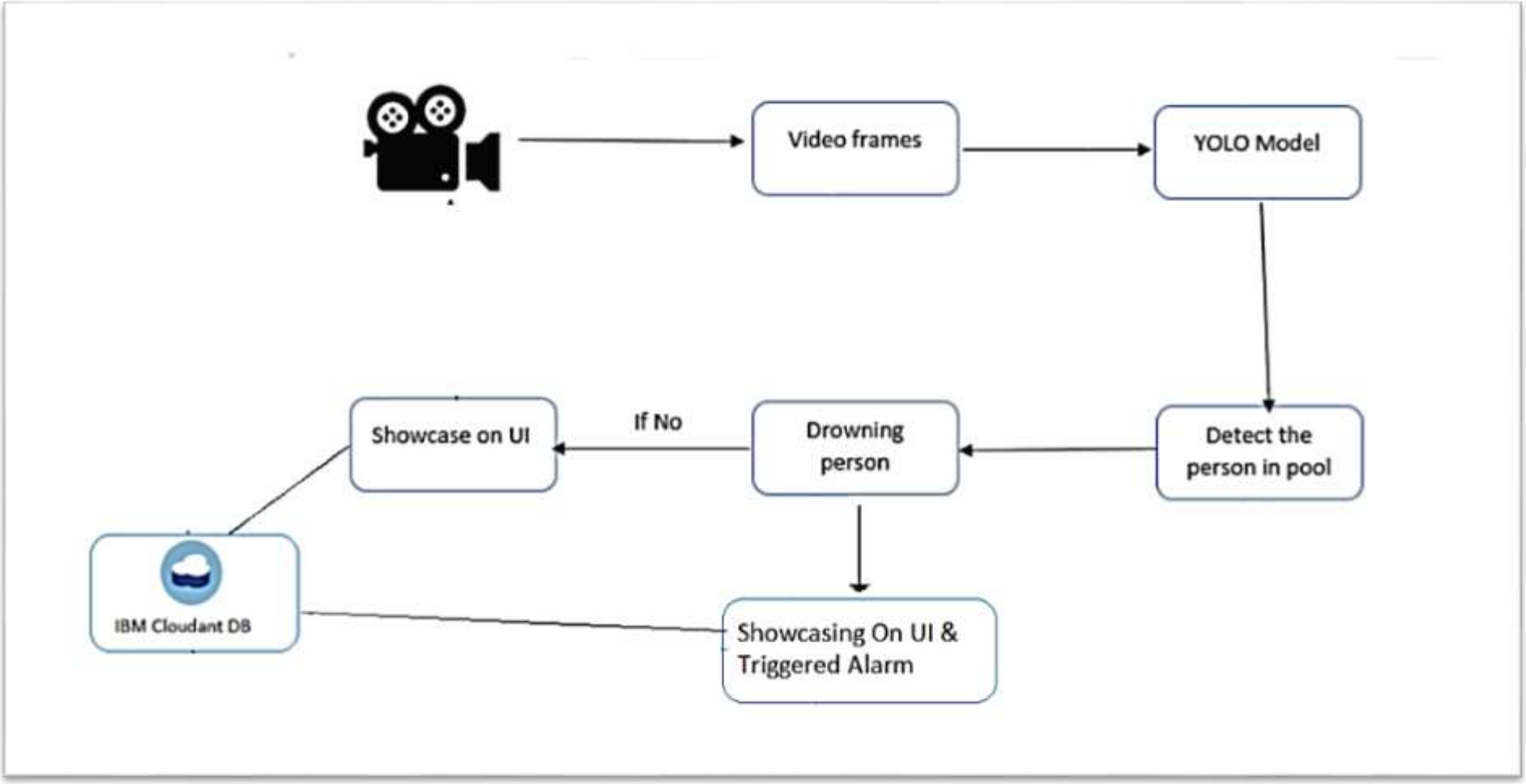
Literature Survey

TITLE	AUTHOR & YEAR	JOURNAL NAME	REMARKS
A novel drowning detection method for safety of swimmers	Ajil Roy & 2020	Proceedings of the National Power Systems Conference	The prototype of the drowning detection method is developed and demonstrated and model of the system is simulated in Proteus design suite. The results of the simulation and hardware experimentation are also reported.
An Automatic Video-based Drowning Detection System for Swimming Pools Using Active Contours	Nasrin Salehi & 2021	International Journal of Image, Graphics and Signal Processing	The tracking approach can change with varying targets and can change from a single camera to multiple camera configurations .Tracking methods in video surveillance use different parameters such as objects motion, path of movement biometrics.

Problem Identification

- Swimming is one of the best exercises that helps people to reduce stress in this urban lifestyle. Swimming pools are found larger in number in hotels, and weekend tourist spots and barely people have them in their house backyard.
- Beginners, especially, often feel it difficult to breathe underwater which causes breathing trouble which in turn causes a drowning accident.
- Worldwide, drowning produces a higher rate of mortality without causing injury to children. Children under six of their age are found to be suffering the highest drowning mortality rates worldwide.
- Such kinds of deaths account for the third cause of unplanned death globally, with about 1.2 million cases yearly.

Block Diagram



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9. A novel drowning detection method for safety of swimmers,Proceedings of the National Power Systems Conference, Ajil Roy,2020.
10. An Automatic Video-based Drowning Detection System for Swimming Pools Using Active Contours, International Journal of Image, Graphics and Signal Processing, Nasrin Salehi, 2021.

Questions & Discussion

THANK YOU