LITERATURE SURVEY

Virtual Eye – Life Guard For Swimming Pools To DetectActive Drowning

PROJECT DESCRIPTION :

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. To overcome this conflict, a meticulous system is to be implemented along the swimming pools to save human life.

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. but AS a POC we 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.

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.

OBJECTIVE :

- YOLO-based Convolutional Neural Network family of models for object detection and the most recent variation called YOLOv3.
- How to train a YOLO model in a windows environment.

1. **TITLE:** Identification of Drowning Victims in Freshwater Bodies using Drift Prediction and Image Processing based on Deep Learning

   AUTHOR: Anjana Unnikrishnan, Roshni A T, Anusha P R, Anju M Vinny, Anuraj C K

   PUBLISHED YEAR: 2022

   DESCRIPTION: Using multiple sensor data in underwater human rescue detection system to spot drifting and drowning person in a natural water eco system. The water flow sensor which is attached to the portable device calculates the drift distance and tracks drowning person.

   ADVANTAGES: The Approach detected human drifting and drowning up to a range of 5m in water bodies. The final result achieved an average of 82.10% accuracy.

   DISADVANTAGES: The performance of the model depends on the nature of the water body concerned as the drift distance is different for different water eco systems.

2. **TITLE:** Computer Vision Enabled Drowning Detection System

   AUTHOR: U. Handalage, N. Nikapotha, C. Subasinghe, T. Prasanga, T. Thilakarthna and D. Kasthurirathna.

   PUBLISHED YEAR: 2021

   DESCRIPTION: Using convolutional neural network (CNN) models, it can detect a drowning person in three stages(drowning detection, the rescuing drone, and the hazardous activity detection). Whenever such a situation like this is detected, the inflatable tube-mounted selfdriven drone will go on a rescue mission, sounding an alarm to inform the nearby lifeguards.

   ADVANTAGES: Identifies drowning victims in a minimum amount of time and dispatches an automated drone to save them

   DISADVANTAGES: Confined with a few of the hardware limitations, such as the use of a single camera and the Jetson Nano at the presence of better-quality hardware, could affect the speed and accuracy of the overall system.

3. **TITLE:** A Survey of Drowning Detection Techniques.

   AUTHOR: Nagato Konishi ; Yo Ishigaki Seizi linuma Tsubasa Nakada Taisuke Hoshino Wataru Nemoto Kazunori Ohkawara.

   PUBLISHED YEAR: 2021

   DESCRIPTION: To track swimmers in a pool using machine learning techniques and prevent drowning accidents .The concepts of image and video processing are used along with machine learning paradigm.

ADVANTAGES: Better accuracy levels with the help of identification of the swimmer's position.

DISADVANTAGES: Safety is paramount in all swimming pools. The current systems expected to address the problem of ensuring safety at swimming pools have significant problems due to their technical aspects.

4. **TITLE:** Deep Learning Used to Recognition Swimmers Drowning

   AUTHOR: Jia-Xian Jian, Chuin-Mu Wang

   PUBLISHED YEAR: 2021

   DESCRIPTION: Using image processing technology to introduce artificial intelligence motion technology,mounting the camera on the bottom of the swimming pool, and use OpenPose to mark the image joint point features, and input the captured joint point features into the recursive neural network to determine whether the swimmer is drowning.

   ADVANTAGES: The final training result is about 89.4% accurate, so it can be used to assist on-site lifeguards to detect swimmers who may be drowning.

   DISADVANTAGES: Too much air bubbles generated by the drowning swimmer in the water will also occur. There is a chance that the action cannot be captured by the computer.

5. **TITLE:** Video Based Drowning Detection System

   AUTHOR: Pavithra P, Nandini S,Nanthana A,Noor Tabreen Aslam, Praveen Kumar P

   PUBLISHED YEAR: 2021

   DESCRIPTION: The proposed system structure here comprises of a raspberry pi (Single Board Computer) equipped with a USB camera for taking the live feed from the pool area. The system also covers the alerting phenomena using a buzzer so that necessary actions are taken intermittently without any delay.

   ADVANTAGES: Alerting a drowning state is done without any delay here, GPIO system for alerting and short message service used in cohession with a raspberry pi computer makes this possible.

   DISADVANTAGES: A working implementation of this module is quite extensive to implement, and multiple hardware compenents working to near proximity of water can also lead to some malfunctioning.