SMART SYSTEM FOR MONITORING AND CONTROL OF SWIMMING POOL

Author：Goncalo Simoes, Carolina Dionísio, Andre Gloria, Pedro Sebastiao,

Nuno Souto.

Abstract

The novel plan put forward in this paper can lessen the need for human intervention in swimming pool maintenance by using a low-cost system based on wireless sensor networks to monitor and control the quality of the pool. This system's primary goal is to offer financial and natural resource savings to the end user, helping to maintain a sustainable environment. This article also introduces a mobile application for interacting with the system that is suggested, allowing users with administrator access to regulate certain acts in the pool in order to maintain certain standards for its quality.

SAFETY ENHANCED SWIMMING POOL WITH EMBEDDED TECHNIQUES TO REDUCE DROWNING ACCIDENTS

Author : S. Karthik, Dhivya Priya E L , Gokul Anand K R , A Sharmila

Abstract

The most popular kind of exercise that many people have used from ancient times is swimming. Beginners frequently find it challenging to breathe underwater, which leads to choking water and eventually a loss of balance that results in a drowning catastrophe. In particular for youngsters, drowning results in a greater rate of fatality without damage globally. An intelligent system should be incorporated with swimming pools to prevent these types of incidents and save lives. The suggested method stops someone from drowning in a pool by activating the alarm and lifting the individual up using a plate. By setting a threshold value, an ultrasonic sensor may determine whether a person drowns in the water or at a higher, safer level.

A NOVEL DROWNING DETECTION METHOD FOR SAFETY OF SWIMMERS

Author: Ajil Roy, Dr. K. Srinivasan

Abstract

Effective drowning detection techniques are crucial for swimmers' safety. This research proposes a novel sort of drowning detection system that addresses many of the drawbacks of existing drowning detectors. The suggested approach guarantees early drowning identification and reporting. The suggested drowning detection system is also a general approach that works with a variety of bodies of water, from swimming pools to oceans, and it is a practical economic strategy for both low- and middle-income nations. The system model is simulated in the Proteus design suite together with the prototype of the drowning detection method. Additionally, the outcomes of the hardware experimentation and simulation are provided.

DROWNING DETECTION BASED ON BACKGROUND SUBTRACTION

Abstract

The primary focus of this paper's study is swimmer detection for pool visual monitoring. This research presents a background-subtracted drowning detection algorithm. The fixed camera mounted in the pool wall captured the continuous visual surveillance sequence. Gaussian Mixed Model, with a self-adapted backdrop model and timely updates, describes each pixel. To achieve effective results after separating the foreground items, the shadows and noises must be eliminated. The outcomes of the studies demonstrate how well this technique works to find drowners and get rid of shadows.

DROWNING DETECTION SYSTEM USING LRCN APPROACH

Author : Shardul Sanjay Chavan, Sanket Tukaram Dhake,

Shubham Virendra Jadhav, Prof.Johnson Mathew

Abstract

This project offers information from a real-time video surveillance system that can recognise drowning accidents in a swimming pool automatically. Because drowning is the third most common cause of unintentional death, reliable security measures must be developed. The majority of the swimming pool's security features at the moment comprise lifeguards who can assist in drowning emergencies and CCTV surveillance. For large swimming pools, such those found at theme parks, this technology is insufficient. These days, several security systems use artificial intelligence (AI) to detect drowning using underwater fixed-position cameras and floating boards with a camera installed on the underside to record the underwater scene. However, the primary issues with these systems occur when the pool is crowded and people are blocking the cameras' field of view. Instead of employing underwater cameras for this project, we are using cameras mounted on top of the swimming pool to gain a higher perspective of the pool and ensure that the entire pool is constantly being watched.

PROPOSED METHODOLOGY

In particular, a specific type of neural networks called Convolutional Neural Networks (cnns) is best suited for the task of image recognition. So implementation of Long Term Recurrent Convolution Network (LRCN) approach suitable for Video Classification & Action Recognition. The Long Term Recurrent Convolution Network methodology is a combination of Convolutional Neural Network (CNN) & Recurrent Neural Network (RNN). LRCN is end-to-end trainable and appropriate for vast visual understanding tasks such as video description, activity recognition and image captioning. The main idea is to learn visual features from video frames with the help of CNN & then use LSTM layers to transform a sequence of image embeddings into a class label, sentences, probabilities, etc. In this segment, we empirically propose LRCN approach for the implementation of drowning detection as CNN extracts the features from the input provided to the model and then the LSTM layers predict the action of the human whether one is drowning, swimming or diving.

COMPUTER VISION ENABLED DROWNING DETECTION SYSTEM

Author : Upulie Handalage, Nisansali Nikapotha, Chanaka Subasinghe,

Tereen Prasanga, Thusithanjana Thilakarthna, Dharshana Kasthurirathna

Abstract

Safety is the top priority at all swimming areas. Due to their technical characteristics, such underwater cameras, and methodological aspects, like the requirement for human engagement in the rescue mission, the present solutions supposed to handle the issue of maintaining safety at swimming pools have serious issues. The effective reduction of drownings and assurance of pool safety can be achieved through the implementation of an automated visual-based monitoring system. This study proposes a ground-breaking device that sends an unmanned drone to help drowning victims after quickly identifying them. It can identify a drowning person in three phases using convolutional neural network (CNN) models. The inflatable tube-mounted self-driven drone will launch a rescue operation if a situation like this is detected, blasting an alarm to alert the nearby lifeguards. The system also keeps a watch out for acts that can be harmful and lead to drowning. Performance evaluations of prototype studies have shown that this technology can save a drowning victim in less than a minute.

PROPOSED METHODOLOGY

The system explained in this paper includes three main functions: detecting drowning victims, sending drones to victims, and detecting dangerous activities. The drowning detection component detects drowning victims through a custom CNN model, which detects drowning in three stages and immediately informs the user through an audio alert. The second component is the rescue drone, activated according to the drowning detection command and sent to the victim's location coordinates. This procedure uses a customconfigured x and y coordinate block system to link to ground GPS coordinates. At the same time, potentially dangerous activities, including running around the swimming pool and drinking, will be notified to authorized personnel in the premises through mobile alarms by the hazard detection component. This will prompt authorized personnel (including lifeguards) to make responsible decisions.

DROWNING DETECTION SYSTEMS

Abstract

The efficiency of drowning detection systems is currently the subject of scant independent research (DDS). Electronic systems that can help with pool and swimmer surveillance are covered by the term DDS. Although DDS must abide by stated criteria, installation in public and private pools is now hindered by the lack of proof of its applicability and efficiency as well as the high cost of installation. DDS are intended to help lifeguards identify and locate swimmers who may be drowning, rather than to completely replace them. In recent years, the artificial intelligence (AI) utilised in many different types of systems has improved, which has fueled the advancement of the technology used in DDS. . Sport England provided funding for the UK Active Study Institute to conduct this research project throughout 2019. A significant amount of information was consolidated, DDS systems were independently tested, and attitudes about lifeguarding and DDS were examined. The manufacturers of the four systems that were tested were informed of the study, and it was agreed that individual results from each system would not be made public. This study was not done to evaluate or contrast different systems; rather, it was done to determine the overall performance of a number of DDS under test settings. Due to this, only the aggregated results of all tests are presented. All of the pools examined for this experiment were 25-meter tiled pools.

PROPOSED METHODOLOGY

The methodology of this review began with establishing a search plan. This involved generating a list of key search terms. As DDS are a global concept, it was important to consider the various synonyms and acronyms under which they are known. The sources identified were then shortlisted according to relevance and reviewed, keeping in mind the potential for bias in market based literature, or literature drawing from funded research that may compromise its partiality. The literature review draws from a range of sources including standards documents from international and national bodies, reports, academic articles, books, online articles, and news reports. To supplement this, a group of key stakeholders involved in pool safety were consulted to signpost towards any sources that were felt to be relevant to this review. Sources on DDS in outdoor environments are beyond the scope of this literature review and have been excluded due to the challenging variance compared with indoor swimming environments.

ANTI DROWNING SYSTEM WITH REMOTE ALERT

Abstract

When someone is drowning in the water, this device can save their life. This is accomplished by telling the lifeguard each swimmer's heart rate. The heart rate will be tracked by our system. The range of its RF transmission will then be between 5 and 6 metres, or between 2-4 metres if submerged. The system contains a receiver and transmitter circuit for this. The transmission circuit is with the person in the water, and the receiving circuit is with the lifeguard to alert them of the individual's heart rate. The transmitter circuit uses a microcontroller from the AVR family connected to an LCD display. . Sport England provided funding for the UK Active Study Institute to conduct this research project throughout 2019. A significant amount of information was consolidated, DDS systems were independently tested, and attitudes about lifeguarding and DDS were examined. The manufacturers of the four systems that were tested were informed of the study, and it was agreed that individual results from each system would not be made public. This study was not done to evaluate or contrast different systems; rather, it was done to determine the overall performance of a number of DDS under test settings. Due to this, only the aggregated results of all tests are presented. All of the pools examined for this experiment were 25-meter tiled pools. Thus, this device aids in alerting the lifeguard as soon as the heartbeat level is outside of the acceptable range, potentially saving the life of a drowning victim.

LIFE GUARD FOR SWIMMING POOLS TO DETECT ACTIVE DROWNING

Abstract

One of the best workouts for stress reduction in modern metropolitan lifestyle is swimming. Fewer people have swimming pools in their backyards; they are more common at hotels and weekend tourist destinations. Beginners, in particular, frequently find it challenging to breathe underwater, which results in respiratory issues and, ultimately, a drowning disaster. Worldwide, drowning results in a higher mortality rate without harming children. The highest global drowning fatality rates are observed to be among children under the age of six. With around 1.2 million incidents each year, these types of deaths rank third among all unexpected deaths worldwide. A careful system is to be implemented along the swimming pools to save lives in order to resolve this dispute. We can design an underwater pool safety system that lowers the chance of drowning by analysing body movement patterns and integrating cameras with artificial intelligence (AI) systems. Such systems are often created by mounting more than 16 cameras underwater and on the ceiling, then reviewing the video streams to look for any irregularities. But as a POC, we employ a single camera that transmits underwater video while analysing swimmer positioning to determine the likelihood of drowning; if it is higher, an alarm will be created to draw lifeguards' attention.

DROWN ALERTING, PREVENTING AND AUTONOMOUS RESCUE SYSTEM USING ARDIUNO, TACTICLE SWITCHE (WEIGHT SENSORS) AND ARTIFICIAL INTELLIGENCE

Author : Pillalamarri. Laxman, Prof.Anuj Jain

Abstract

By utilising the most recent Arduino(IoT) processor board and the framework, this study proposes a revolutionary method of automatic lifesaving swimming pool design to save a drowning sufferer in a helpless position. This technique uses artificial intelligence to prevent drowning victims from dying and also includes linked particular warning devices, such as a loudspeaker, to prevent drowning victims from dying. A swimming pool framework with a responsive elevator assembly surface that covers the entire pool bottom and houses multiple weight-sensitive waterproof tactical switches designed to sense any person or object is proposed in the current paper. Because the water is restricting the victim's mouth, drowning is a silent process. Gravity will cause the drowning victim's body to fall to the pool floor as soon as they have consumed enough water, gained enough weight, and reached the bottom. After a while, the stomach and lungs will develop bacteria, and the corpse will begin to float on water. Depending on the state of the water, this drifting could take several hours or several days. The chances of life without significant brain or organ damage are higher if the drowning victim is removed from the water within five or six minutes.