**LITERATURE SURVEY**

**VirtualEye - Life Guard for Swimming Pools to Detect Active Drowning**

**Author name:** Nasrin Salehi

**Year of publishing:** 2016

**Description**

Safety in swimming pools is a crucial issue. In thispaper, a real time drowning detection method based on HSVcolor space analysis is presented which uses prior knowledge ofthe video sequences to set the best values for the color channels.Our method uses a HSV thresholding mechanism along withContour detection to detect the region of interest in each frameof video sequences. The presented software can detect drowningperson in indoor swimming pools and sends an alarm to thelifeguard rescues if the previously detected person is missing fora specific amount of time. The presented algorithm for thissystem is tested on several video sequences recorded inswimming pools in real conditions and the results are of highaccuracy with a high capability of tracking individuals in realtime. According to the evaluation results, the number of falsealarms generated by the system is minimal and the maximumalarm delay reported by the system is 2.6 sec which canrelatively be reliable compared to the acceptable time for rescueand resuscitation.

**Author name:** Joanna Chan, Yih Yng Ng

**Year of publishing:** 2020

**Description**

Introduction: This study was a descriptive analysis of national ambulance case records, aimed at making practical safety recommendations in order to reduce the incidence of drowning in swimming pools. Methods: A search was performed on a national database of descriptive summaries by first responder paramedics of all 995 calls made to the Singapore Civil Defence Force between 1 January 2012 and 31 December 2014. We included all cases of submersion in both public and private pools for which emergency medical services were activated. Results: The highest proportion of drowning cases occurred in 0-9 years age group. Males accounted for 57.0% (61/107) of cases. Bystander cardiopulmonary resuscitation (CPR) was performed in 91.3% (21/23) and 68.6% (48/70) of cases of cardiac/respiratory arrest from drowning in public and private pools, respectively; the rate of bystander CPR was higher when a lifeguard was present (88.5%, 23/26 vs. 68.7%, 46/67). The majority (72.0%, 77/107) of drowning incidents occurred in private pools, most of which had no lifeguards present. Conclusion: This study is the first in Singapore to examine data from the emergency medical services. Since the majority of incidents occurred in private pools without lifeguards, it is recommended that a lifeguard be present at every pool. In pools that are too small to justify mandatory lifeguard presence, safety measures, such as guidelines for pool design and pool fencing with latched gates, may be considered. As strict enforcement may not be possible, public education and parental vigilance remain vital.

**Author name:** KANCHANA, KAVYA G.R, KAVITHA C, SOUMYASHREE V, SALILA HEGDE

**Year of publishing:**2017

**Description**

Every year, many individuals, including kids under the age of 5 drown in the deeps of the swimming pool, and the lifeguards are not well trained enough to handle these situations. Thus arises the requirement for having a system that will consequently detect the drowning individuals and alarm the life guard at such risk. Swimming pool surveillance systems plays an essential role in safeguarding the premises. In this project differential pressure approach is used for detection of drowning incidents in swimming pools at the earliest possible stage. 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. The demo system based on pressure sensor has an advantage of convenience, cost saving and simple algorithm

**Author name:**. Allison Gomes, Ian Young and Chun-Yip Hon

**Year of publishing:**2022

**Description**

Within the Ontario public pool legislation, a certain number of lifeguards are required for a given number of bathers in a pool at a given time. Of note, these ratios vary across Canada, and there is little to no scientific evidence given for the required lifeguard to bather ratios in legislation or if they are sufficient to ensure bather safety. Our objective was to perform a legislative scan of Canadian public pool legislation as well as a literature review of scientific evidence to support the ratios used in legislation. A case study was also conducted to illustrate the methods found in the literature and apply it to a pool scenario using the lifeguard:bather ratios prescribed in the Ontario legislation. Using keywords across databases, papers were categorized based on five elements that correspond to a proper water rescue (ratio, scanning, technique, vigilance, scanning cues, and zoning). The literature review indicated that more lifeguards allow for a heightened vigilance, an increase in proper scanning technique, as well as coverage of zones. However, more research must be conducted with regards to proper staffing. Additional research should also be conducted to determine the ideal lifeguard:bather ratio, as there is a lack of standardization of these ratios across Canada.

**Author name:** Upulie Handalage, Nisansali Nikapotha, Tereen Prasanga and Chanaka Subasingha

**Year of publishing:** 2021

**Description**

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, such as underwater cameras and methodological aspects such as the need for human intervention in the rescue mission. The use of an automated visual-based monitoring system can help to reduce drownings and assure pool safety effectively. This study introduces a revolutionary technology that identifies drowning victims in a minimum amount of time and dispatches an automated drone to save them. Using convolutional neural network (CNN) models, it can detect a drowning person in three stages. Whenever such a situation like this is detected, the inflatable tube-mounted self-driven drone will go on a rescue mission, sounding an alarm to inform the nearby lifeguards. The system also keeps an eye out for potentially dangerous actions that could result in drowning. This system's ability to save a drowning victim in under a minute has been demonstrated in prototype experiments' performance evaluations.