# Virtual Eye – Life Guard For Swimming Pools To Detect Active Drowning

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## TEAM ID :

- PNT2022TMID23045

# PROBLEM DEFINITION

- Swimming is a great urban stress-reliever. Hotels and tourist spots have more swimming pools than private homes. Beginners have trouble breathing underwater, causing breathing problems and drowning. Drowning increases global mortality without harming children. Under-6-year-olds have the highest drowning mortality rates globally. These deaths are the third cause of unplanned death globally, with 1.2 million cases yearly. To save lives, a meticulous system must be implemented along swimming pools.

- By studying body movement patterns and connecting cameras to AI systems, we can create a safer underwater pool. Installing 16 underwater and ceiling cameras and analysing video feeds can create such systems. As a POC, we use one camera that streams underwater video and analyses swimmers' positions to assess drowning risk; if it's high, an alert is generated to alert lifeguards.

# OBJECTIVE

- To design a system in an economically viable and easily accessible way that acts as a virtual eye to detect the drowning person in the swimming pool and alert the lifeguard using alarms to save the drowning person

# LITERATURE SURVEY

| | | |
|---|---|---|
| **NAME OF THE PAPER** | : | A Novel method for recognition, Localisation and alarming to prevent swimmers from drowning |
| **NAME OF THE AUTHOR** | : | Hanbing Liu<br>Mohamed Ben Haj Frej<br>Bo Wen |
| **JOURNAL PUBLISHED** | : | 2019 IEEE Cloud Summit |
| **MONTH AND YEAR PUBLISHED** | : | 26 March 2020 |
| **OBJECTIVE OF THE PROJECT** | : | To determine whether swimmers are drowning or not, using precise positioning, efficient identification and timely alarms |
| **TECHNOLOGY USED** | : | Feed forward Neural Network to aid the acoustic simulator in analysis of distance of the swimmer |
| **ACCURACY** | : | Better accuracy levels with the help of identification of the swimmer’s 3D position |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | **:** | Demo Abstract:An underwater sonar-based drowning detection system |
| **NAME OF THE AUTHOR** | **:** | Lixing He<br>Haozheng Hu<br>Zhenvu Yan Guoliang Xing |
| **JOURNAL PUBLISHED** | **:** | 2022 - 21st ACM/IEEE International Conference on information processing in sensor network |
| **MONTH AND YEAR PUBLISHED** | **:** | 26 March 2020 |
| **OBJECTIVE OF THE PROJECT** | **:** | To know the position of the swimmer using unmanned surveillance cameras that require non-trivial installations |
| **TECHNOLOGY USED** | **:** | Deep neural network for accurate drowning detection |
| **ACCURACY** | **:** | 88% with a scan time of 1.5 seconds |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | : | Drowning Detection Algorithm For Intelligent Lifebuoy |
| **NAME OF THE AUTHOR** | : | Dasheng Yang ; Yan Cao<br>Yujing Fing ; Zaisheng Pan |
| **JOURNAL PUBLISHED** | : | 2021 IEEE International Conference on Unmanned Systems (ICUS) |
| **MONTH AND YEAR PUBLISHED** | : | 22 December 2021 |
| **OBJECTIVE OF THE PROJECT** | : | To analyze the characteristics of drowning person and provide the requirement of rescue control proposing a drowning detection algorithm for intelligent lifebuoy. |
| **TECHNOLOGY USED** | : | An improved YOLOV4 network is detect the drowning person and a geometric distance measurement method based on the bounding box to detect position. |
| **ACCURACY** | : | High detection accuracy with direction |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | : | An Improved Detection Method of Human Target at Sea Based on Yolov3 |
| **NAME OF THE AUTHOR** | : | Dongjin Li; Rufei Zhang<br>Liu Yu; Jiang Feng<br>Wang Jin |
| **JOURNAL PUBLISHED** | : | 2021 IEEE International Conference on Consumer Electronics and Computer Engineering (ICCECE) |
| **MONTH AND YEAR PUBLISHED** | : | 05 February 2021 |
| **OBJECTIVE OF THE PROJECT** | : | To search for unusual active drowning of person in a pool and to initiate an alarm to rescue the person |
| **TECHNOLOGY USED** | : | Object detection technology,an improved Yolov3 algorithm aided with feature extraction network |
| **ACCURACY** | : | The detection accuracy of the improved algorithm for human targets at sea is 72.17%, which has a good detection effect |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | : | Intelligent Swimming-pool design with Embedded Drown Alerting, Preventing and Autonomous Rescue System |
| **NAME OF THE AUTHOR** | : | Pillalamarri Laxman<br>Anuj Jain |
| **JOURNAL PUBLISHED** | : | 2021 Fourth International Conference on Computational Intelligence and Communication Technologies (CCICT) |
| **MONTH AND YEAR PUBLISHED** | : | 24 August 2021 |
| **OBJECTIVE OF THE PROJECT** | : | To provide a technological multi layer solution to the problem of active drowning with the help of novel algorithm and available technology |
| **TECHNOLOGY USED** | : | A combination of an elevator housing array of Proximity-sensors and deep learning methodologies is used |
| **ACCURACY** | : | The performance of the prototype is satisfactory and giving promising results |

# LITERATURE SURVEY

- **NAME OF THE PAPER** : Computer Vision Enabled Drowning Detection System
- **NAME OF THE AUTHOR** : Upulie Handalage
  Nisansali Nikapotha
  Chanaka Subasinghe
  Tereen Prasanga
  Thusithanjana Thilakarthna
- **JOURNAL PUBLISHED** : 2021 3rd International Conference on Advancements in Computing (ICAC)
- **MONTH AND YEAR PUBLISHED** : 11 January 2022
- **OBJECTIVE OF THE PROJECT** : To reduce drowning and assure pool safety effectively using an automated visual based monitoring system
- **TECHNOLOGY USED** : Using convolutional neural network (CNN) models, it can detect a drowning person in different stages
- **ACCURACY** : A higher degree of accuracy is achieved by identifying the swimmer's 3D position.

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | **:** | Autonomous Utility Vehicle (AUVs) Based Emergency Human Drowning Detection System |
| **NAME OF THE AUTHOR** | **:** | Yaswanthkumar S K<br>Praveen OK<br>Rohit RV |
| **JOURNAL PUBLISHED** | **:** | 2019 IEEE International Conference on Distributed Computing, VLSI, Electrical Circuits and Robotics (DISCOVER) |
| **MONTH AND YEAR PUBLISHED** | **:** | 27 February 2020 |
| **OBJECTIVE OF THE PROJECT** | **:** | To address the question, how an engineered system can save the life of drowning people. |
| **TECHNOLOGY USED** | **:** | Several detection (ranging detection) techniques are used for detection of human body underwater. |
| **ACCURACY** | **:** | The results illustrated the effectiveness of the proposed approach thus increasing its viability. |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | **:** | The Swimmers Motion Detection Using Improved VIBE Algorithm |
| **NAME OF THE AUTHOR** | **:** | Muhammad Aftab Hayat<br>Goutian Yang Atif Iqbal<br>Adeel Saleem<br>Adil hussain<br>Muhammad Mateen |
| **JOURNAL PUBLISHED** | **:** | 2019 International Conference on Robotics and Automation in Industry (ICRAI) |
| **MONTH AND YEAR PUBLISHED** | **:** | 28 January 2020 |
| **OBJECTIVE OF THE PROJECT** | **:** | To suggest a novel technique for pool drowning person detection using video imagery. |
| **TECHNOLOGY USED** | **:** | Frame by frame difference vibe algorithm frame by frame difference vibe algorithm |
| **ACCURACY** | **:** | The outcomes demonstrated the efficacy of the suggested strategy, boosting its viability. |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | **:** | lot Based Safety Enhanced Swimming Pool with Embedded Techniques to reduce drowning accidents |
| **NAME OF THE AUTHOR** | **:** | S. Karthik<br>Dhivya Priya E.L.<br>Gokul Anand K.R. A.<br>Sharmila |
| **JOURNAL PUBLISHED** | **:** | 2020 International Conference on Smart Electronics and Communication (ICOSEC) |
| **MONTH AND YEAR PUBLISHED** | **:** | 07 October 2020 |
| **OBJECTIVE OF THE PROJECT** | **:** | To prevent the drowning of a person in the swimming pool by switching on the alarm |
| **TECHNOLOGY USED** | **:** | Technologies of ultrasonic sensing objects is used along with the embedded system techniques |
| **ACCURACY** | **:** | The results revealed the practicality of the suggested strategy and showed how effective it Is. |

# LITERATURE SURVEY

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|---|---|---|
| **NAME OF THE PAPER** | **:** | Automated Vision-based Surveillance System to Detect Drowning Incidents in Swimming Pools |
| **NAME OF THE AUTHOR** | **:** | Abdel llah N. Alshbatat<br>Shamma Alhameli<br>Shamsa Almazrouei<br>Salama Alhameli<br>Wadhha Almarar |
| **JOURNAL PUBLISHED** | **:** | 2020 Advances in Science and Engineering Technology International Conferences (ASET) |
| **MONTH AND YEAR PUBLISHED** | **:** | 16 June 2020 |
| **OBJECTIVE OF THE PROJECT** | **:** | To track swimmers in a pool using machine learning techniques and prevent drowning accidents |
| **TECHNOLOGY USED** | **:** | Raspberry Pi with the Raspbian operating system,based on the color based algorithm |
| **ACCURACY** | **:** | The system has a unique capability to monitor and track swimmers |

# LITERATURE SURVEY

- **NAME OF THE PAPER** : A Survey of Drowning Detection Techniques
- **NAME OF THE AUTHOR** : Nagato Konishi ; Yo Ishigaki
  Seizi linuma ; Tsubasa Nakada
  Taisuke Hoshino ; Wataru Nemoto
  Kazunori Ohkawara
- **JOURNAL PUBLISHED** : 2021 International Mobile, Intelligent,and Ubiquitous Computing Conference (MIUCC)
- **MONTH AND YEAR PUBLISHED** : 09 June 2021
- **OBJECTIVE OF THE PROJECT** : To track swimmers in a pool using machine learning techniques and prevent drowning accidents
- **TECHNOLOGY USED** : The concepts of image and video processing are used along with machine learning paradigms
- **ACCURACY** : Better accuracy levels with the help of identification of the swimmer’s position

# LITERATURE SURVEY

| | | |
|---|---|---|
| **NAME OF THE PAPER** | : | A novel drowning detection method for safety of Swimmers |
| **NAME OF THE AUTHOR** | : | Ajil Roy<br>K. Srinivasan |
| **JOURNAL PUBLISHED** | : | 2018 20th National Power Systems Conference (NPSC) |
| **MONTH AND YEAR PUBLISHED** | : | 25 July 2019 |
| **OBJECTIVE OF THE PROJECT** | : | To ensure detection of drowning and reporting at the earlier stages by providing generic solution that suites different water bodies from pools to oceans |
| **TECHNOLOGY USED** | : | A method simulated in Proteus design suite. |
| **ACCURACY** | : | Economically viable providing good results;useful for both low and middle income countries and also maintains good accuracy levels |

# CRITICAL FINDINGS:

- These visual monitoring systems make much of a positive contribution.
  It provides a way for the earliest detection of drowning persons through alarms
- It also serves for an easy installation in swimming pools
- Installation of camera(virtual eye) in the swimming pools are not so expensive
- Low maintenance of the installed camera
- Although it offers certain benefits, there are some drawbacks as well.
  There is a possibility of machine misunderstanding the situations
- Requirement of manual monitoring even though visual systems are placed

# THANK YOU