IBM Team 12
Team Leader: R.Krishna Kanth (311519104031)
Team mates: R.S.Gokul Raj (311519104018)
               R.Nanda Kumar (311519104037)
               K.Shahul Hameed (311519104053)
Domain Name: Safety.
Use case Name: VirtualEye – Life Guard for Swimming Pools to Detect Active Drowning.

Paper 1
<u>Authors:</u> Abdel Ilah N. Alshbatat, Shamma Alhameli, Shamsa Almazrouei, Salama Alhameli, Wadhha Almarar.

<u>Year:</u> 2020

<u>Title:</u> Automated Vision - based Surveillance System to Detect Drowning Incidents in Swimming Pools.

<u>Methodology:</u> The proposed system is based on the color-based algorithm to position and rescue swimmers who are drowning. The device then sends an alarm to the lifeguards. To verify the performance of the proposed system, a prototype has been developed, implemented, and tested.

<u>Advantage:</u> The system has a unique capability to monitor and track swimmers, thereby enabling it to mitigate and curb the number of deaths by drowning.

<u>Disadvantage:</u> A current limitation of the use of such a system is discomfort. This discomfort is especially felt by younger children.

Paper 2
<u>Authors:</u> S. Karthik, Dhivya Priya E L, Gokul Anand K R, A Sharmila.

<u>Year:</u> 2020

<u>Title:</u> IoT Based Safety Enhanced Swimming Pool with Embedded Techniques to reduce drowning accidents.

<u>Methodology:</u> The proposed system prevents the person who drowns in the swimming pool by switching on the alarm and lift the person upward using plate. Ultrasonic sensor is used to recognize whether the person drown under water or in a safer level by fixing a threshold value.

<u>Advantage:</u> This intelligent system helps in reducing the mortality rate, especially in concern with the children mortality rate.

<u>Disadvantage:</u> The response time measured in the proposed model will be different from that of the real time implementation as the hardware complexity increases.

Paper 3
<u>Authors:</u> Hanbing Liu, Mohamed Ben Haj Frej, Bo Wen.

<u>Year:</u> 2019

<u>Title:</u> A Novel Method for Recognition, Localization, and Alarming to Prevent Swimmers from Drowning.

<u>Methodology:</u> A novel method allowing precise positioning, efficient identification, and timely alarms to help rescue swimmers from drowning are proposed. The purpose of this study is to mainly focus on determining whether swimmers are drowning or not while they are in the pool.

<u>Advantage:</u> An acoustic simulator has been used to analyze the distance information obtained by the ultrasonic waves. algorithm can precisely calculate the 3D position of the swimmer.

<u>Disadvantage:</u> The market target is for small and medium-sized swimming pools. The risk is the waterproofness of the underwater equipment since a good waterproofing ensures the proper operation of the equipment.

Paper 4
<u>Authors:</u> J. Geetha Ramani, J.Gayathri, R.Aswanth, M.Gunasekaran.

<u>Year:</u> 2019

<u>Title:</u> Automatic prevention of drowning by inflatable wrist band system.

<u>Methodology:</u> An automatic opening of airbag system in the hand by the detection of the motion of the person's body by the sensor is sent to trigger the inflator system of the airbag.

<u>Advantage:</u> This automatic opening of the airbag in the hand of the person who is drowning helps him to get help from the neighbour.

<u>Disadvantage:</u> The idea of using GSM technology under water since it is risky and it is unpredictable with its accuracy.

Paper 5
<u>Authors:</u> Yaswanthkumar S K, Praveen O K, Rohit R V.

<u>Year:</u> 2019

<u>Title:</u> Autonomous Utility Vehicle (AUV's) based emergency human drowning detection system using sonar and thermal detection methods.

<u>Methodology:</u> The devised system has the ability to automatically detect drowning people by making use of two main concepts – one is Sonar (SOund NAvigation & Ranging detection) and the other one is Thermal detection.

Advantage: The proposed approach is a viable solution to devise an innovative, portable, low cost and customizable drowning detection system.

Disadvantage: This system is interfacing a low quality video camera in order to use image processing to detect humans under water who are facing a difficult starvation of air in their life.

Paper 6
Authors: Abdelaziz M. Shehata, Eslam M. Mohamed, Khaled L. Salem, Ahmed M. Mohamed, Mustafa Abdul Salam, Mennatullah M. Gamil.

Year: 2021

Title: A Survey of Drowning Detection Techniques

Methodology: This paper reviews different methods used for drowning detection in swimming pools, that applied the concepts of image processing, accelerometer, pulse and pressure sensing and LASER-LDR techniques.

Advantage: The reviews discussed the process, reliability and goals of each system. By surveying this we represented a comparison between the provided systems. A further discussion of the future challenges facing these systems is also mentioned with ideas to overcome them.

Disadvantage: The major challenge that faces those drowning behavior studies is finding videos of drowning people either under or above water.

S.No	Author	Title of the Paper	Methodology	Pros (Advantage)	Cons (Disadvantage)
1.	Abdel Ilah N. Alshbatat, Shamma Alhameli, Shamsa Almazrouei, Salama Alhameli, Wadhha Almarar. (2020)	Automated Vision - based Surveillance System to Detect Drowning Incidents in Swimming Pools.	The proposed system is based on the color-based algorithm to position and rescue swimmers who are drowning. The device then sends an alarm to the lifeguards. To verify the performance of the proposed system, a prototype has been developed,	The system has a unique capability to monitor and track swimmers, thereby enabling it to mitigate and curb the number of deaths by drowning.	A current limitation of the use of such a system is discomfort. This discomfort is especially felt by younger children.

			implemented, and tested. .		
2.	S. Karthik, Dhivya Priya E L, Gokul Anand K R, A Sharmila. (2020)	IoT Based Safety Enhanced Swimming Pool with Embedded Techniques to reduce drowning accidents.	The proposed system prevents the person who drowns in the swimming pool by switching on the alarm and lift the person upward using plate. Ultrasonic sensor is used to recognize whether the person drown under water or in a safer level by fixing a threshold value. To identify the difference in the drown object, PIR sensor is used to find whether the drown object is human or animal or any other non-living objects.	This intelligent system helps in reducing the mortality rate, especially in concern with the children mortality rate.	The response time measured in the proposed model will be different from that of the real time implementation as the hardware complexity increases.
3.	Hanbing Liu, Mohamed Ben Haj Frej, Bo Wen. (2019)	A Novel Method for Recognition, Localization, and Alarming to Prevent Swimmers from Drowning.	A novel method allowing precise positioning, efficient identification, and timely alarms to help rescue swimmers from drowning are proposed. The purpose of this study is to mainly focus on determining whether swimmers are	Ultrasonic transmitters and receivers are used to determine the swimmer position. Hydraulic pressure detectors are also used to determine how deep the swimmer is going. The hydraulic data is	The market target is for small and medium-sized swimming pools. The risk is the waterproofness of the underwater equipment since a good waterproofing ensures the proper operation of the

			drowning or not while they are in the pool.	transmitted wirelessly to be processed. An acoustic simulator has been used to analyze the distance information obtained by the ultrasonic waves. algorithm can precisely calculate the 3D position of the swimmer.	equipment.
4.	J. Geetha Ramani, J.Gayathri, R.Aswanth, M.Gunasekaran. (2019)	Automatic prevention of drowning by inflatable wrist band system.	A device that can save the life of a person can be brought up. An automatic opening of airbag system in the hand by the detection of the motion of the person's body by the sensor is sent to trigger the inflator system of the airbag.	This automatic opening of the airbag in the hand of the person who is drowning helps him to get help from the neighbour.	The idea of using GSM technology under water since it is risky and it is unpredictable with its accuracy.
5.	Yaswanthkumar S K, Praveen O K, Rohit R V. (2019)	Autonomous Utility Vehicle (AUV's) based emergency human drowning detection system using sonar and thermal detection methods.	The devised system has the ability to automatically detect drowning people by making use of two main concepts – one is Sonar (SOund NAvigation & Ranging detection) and the other one is Thermal detection. Both	The proposed approach is a viable solution to devise an innovative, portable, low cost and customizable drowning detection system.	This system is interfacing a low quality video camera in order to use image processing to detect humans under water who are facing a difficult starvation of air in their life.

			of these detection techniques are used for detection of human body underwater. Thus, the results obtained from individual sensors of both detection techniques illustrate the effectiveness of the proposed approach in saving the life of humans from drowning underwater.		
6.	Abdelaziz M. Shehata, Eslam M. Mohamed, Khaled L. Salem, Ahmed M. Mohamed, Mustafa Abdul Salam, Mennatullah M. Gamil. (2021)	A Survey of Drowning Detection Techniques	This paper reviews different methods used for drowning detection in swimming pools, that applied the concepts of image processing, accelerometer, pulse and pressure sensing and LASER-LDR techniques.	The reviews discussed the process, reliability and goals of each system. By surveying this we represented a comparison between the provided systems. A further discussion of the future challenges facing these systems is also mentioned with ideas to overcome them.	The major challenge that faces those drowning behavior studies is finding videos of drowning people either under or above water.