Proposed Solution

Problem Statement

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.

Idea / Solution description

To resolve the conflict, a system is being implemented along the swimming pools to save human lives. We are developing an underwater pool safety system that reduces the risk of drowning by studying body movement patterns and connecting cameras to artificial intelligence (AI) systems. Typically, such systems are created by installing more than 16 cameras underwater and on the ceiling and analysing the video feeds to detect any anomalies. However, as a point of contact, we use a single camera that streams video underwater and analyses swimmer positions to determine the likelihood of drowning; if the probability is higher, an alert is generated to draw the attention of lifeguards.

Novelty / Uniqueness

1. Unlike other solutions, this is a human assistive system by nature.
2. Errors are minimised but the negligence of humans will not affect the working of this solution.
3. As the cameras are employed with ML, it can work 24/7 and even detect drowning of slightest amount.
4. Instead of using YOLOv1 or YOLOv2 this proposed solution incorporates the lastest version of YOLO which is v3, this is way superior in performance and accuracy than the former.
5. Using night-vision cameras can yield better results of the same solution without any major modification to the existing codebase.
6. As the predicted data and the past video footages are storaged in cloud, the model can be trained again and again as it is used to improve the accuracy with each run and so a life can be saved faster.

Social Impact

Our pool safety system when installed into the pools is expected to reduce the death by drowning to a mere 0.01%, however, a death may occur when a lifeguard fails to do

his job. It would also boost the amount of people who wish to learn to swim because their safety would be secured. It promotes swimming as a safe activity and makes parents to allow their children to swim. There is a maximum chance to make our pool safety system a mandatory tool to be installed in all swimming pools. Countless lives will be saved quickly than before.

Customer Satisfaction

The factors that determine the degree of acceptance of the project by the common people are the ones driving the customers (who deploy the working model) too. Therefore, the actual model should be able to work up to its expectations. Some of the prominent desirables are,

- The AI model being able to detect a person amidst possibly a lot of other things
- The resolution of the camera being good enough for clear monitoring of the live footage
- The AI trained enough to clearly distinguish drowning from other non-harmful actions
- The model keeping track of every alarming action so that it could predict even better in the future
- Possessing a well-developed communication system

These are the important features that the developed final model should possess. And, the cost to implement them should be feasible and not overwhelming. Though the cost may be compromised for the safety of the people, it is always to be kept in mind that these AI models could never replace lifeguards but rather would serve as additional tools to aid them.

Business Model

- Drowning detection system that detects every dangerous situation and accident. The software works in close integration with the cameras installed in the pool to continuously scan the pool. Thanks to this combination of hardware, software and profound innovations, the system would represent excellence in drowning detection.
- Features artificial intelligence technology that adapts to the needs of the user. It is the ultimate drowning detection system for those who demand the ultimate in safety.
- System would be able to record all the activities in the pools and to classify critical situations from normal ones to keep track of what happened.
- Makes itself heard loud and clear in case of danger. The built-in notification system produces alarms within seconds on configurable devices. In addition, the technology would provide real-time location and image of the danger, making rescue operations easier.
- Identify swimmers in distress and raise an alarm which alerts the Lifeguards who can visually assess the developing situation in seconds the developing situation in seconds
- Can provide very stable monitoring and highly effective drowning incident detection.
- Suitable for any swimming pool. New pools or existing pools (full of water), all shapes & sizes, and any construction type.
- Will try to deliver the absolute best-quality products, software, sales-support, service, and maintenance.

Scalability of Solution

The proposed solution of using a single camera system can be scaled to a larger swimming pool area with addition of cameras both under and over the water surface. Along with that, we can also increase the number of alarms fitted in the place to increase the magnitude of alertness that is produced by the system. On the point of efficiency and performance, additional algorithms can be ran with existing ones so as to improve both the compute efficiency and reduce the computational overhead of the proposed solution.