Artificial Lifeguard

1. **Problem Statement**

According to the data from World Health Organization[[1]](#footnote-1), drowning has caused about 236000 deaths every year and caused over 2.5 million deaths in the last decade. Therefore, it is very necessary and important to find solutions to reduce the number of drowning deaths. However, it is very difficult for lifeguards to see a drowning person timely in a large and crowded pool. Also, employing many lifeguards at every part of a pool or within the water all the time is unrealistic since it will cost too much money. Based on the above, a solution to reduce the incidence of drowning deaths is to utilize artificial lifeguard. Artificial lifeguard will process input videos captured by cameras used to monitor the people at a pool with machine learning algorithms and send alerts when someone is found drowning or in need of help. Then the human lifeguards will reach out to provide timely assistance. Thus, artificial lifeguard is an effective and less expensive way to save drowning people’s lives, and it can work for 24/7.

1. **Application**
2. Monitor people’s activities at swimming pools, beaches or within the water from videos captured by cameras and detect potentially dangerous situations such as drowning in real time.
3. Artificial lifeguard robots. Applying robotics techniques and machine learning algorithms to build a robot system. The robots are equipped with cameras that can detect drowning people, then move to provide assistance.
4. Build a wearable automatically controlled assistance device based on cameras and algorithms. People could wear the device when they would like to dive into deep water. When detecting people’s drowning, the equipment will send alerts to human lifeguards and provide lifebuoys for self-rescue.
5. **Initial List of Papers and Open-Source Projects**

[1] Kam, Alvin Harvey et al. “A Video-Based Drowning Detection System.” *European Conference on Computer Vision* (2002).

[2] Liu, Tingzhuang, et al. "A video drowning detection device based on underwater computer vision." IET Image Processing 17.6 (2023): 1905-1918.

[3] Wang, Fan, Yibo Ai, and Weidong Zhang. "Detection of early dangerous state in deep water of indoor swimming pool based on surveillance video." Signal, image and video processing 16.1 (2022): 29-37.

[4] Yang, Dasheng, et al. "Drowning detection algorithm for intelligent lifebuoy." 2021 IEEE international conference on unmanned systems (ICUS). IEEE, 2021.

[5] Hasan, Saifeldin, et al. "A water behavior dataset for an image-based drowning solution." 2021 IEEE green energy and smart systems conference (IGESSC). IEEE, 2021.

[6] <https://github.com/randhana/Drowning-Detection->

[7] https://github.com/Abdul194/001-Drowning-Detection

1. https://www.who.int/campaigns/world-drowning-prevention-day/2023 [↑](#footnote-ref-1)