Prevention of Drowning Incidents in Swimming Pool on Automated Vision Based Surveillance System

Paper Code: COIT19

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Introduction

Observing public and private sites has increasingly become a very sensitive issue.

Drowning incidents in swimming pools can have tragic consequences, making it essential to prevent such accidents. One way to do this is by implementing an automated vision-based surveillance system that uses computer vision algorithms to detect potential drowning incidents in real-time.

By using computer vision algorithms to analyze the video feed from surveillance cameras, the system can detect when a person is in distress or drowning.

Objectives

1. The system consists of a PC/laptop running Windows and Anaconda, an Arduino Uno board, servo motors, an alarm system and motor controllers.

2. The proposed system is based on the circular Hough transform algorithm for locating and rescuing drowning swimmers.

3. The results of the experiments indicate that the system has a unique ability to track and monitor swimmers, allowing it to mitigate and reduce the number of drowning deaths.

Methodology

- The PC/Laptop as well as the Arduino Uno boards will be used in controlling the entire system. Cameras will continuously monitor the swimming pool.

- The capture 2D images will be processed by the internal hardware attached to the cameras. The analyzed data will be sent to the PC/Laptop where a script is running.

- The script will calculate swimmers positions, and time under water. Based on these calculations, the occurrence of any abnormal events will be detected.

- If such events occurs PC/Laptop will send an order to the lifting mesh. The lifting mesh will directly move to up. Meanwhile, a warning signal will alert the life guard of an imminent danger.
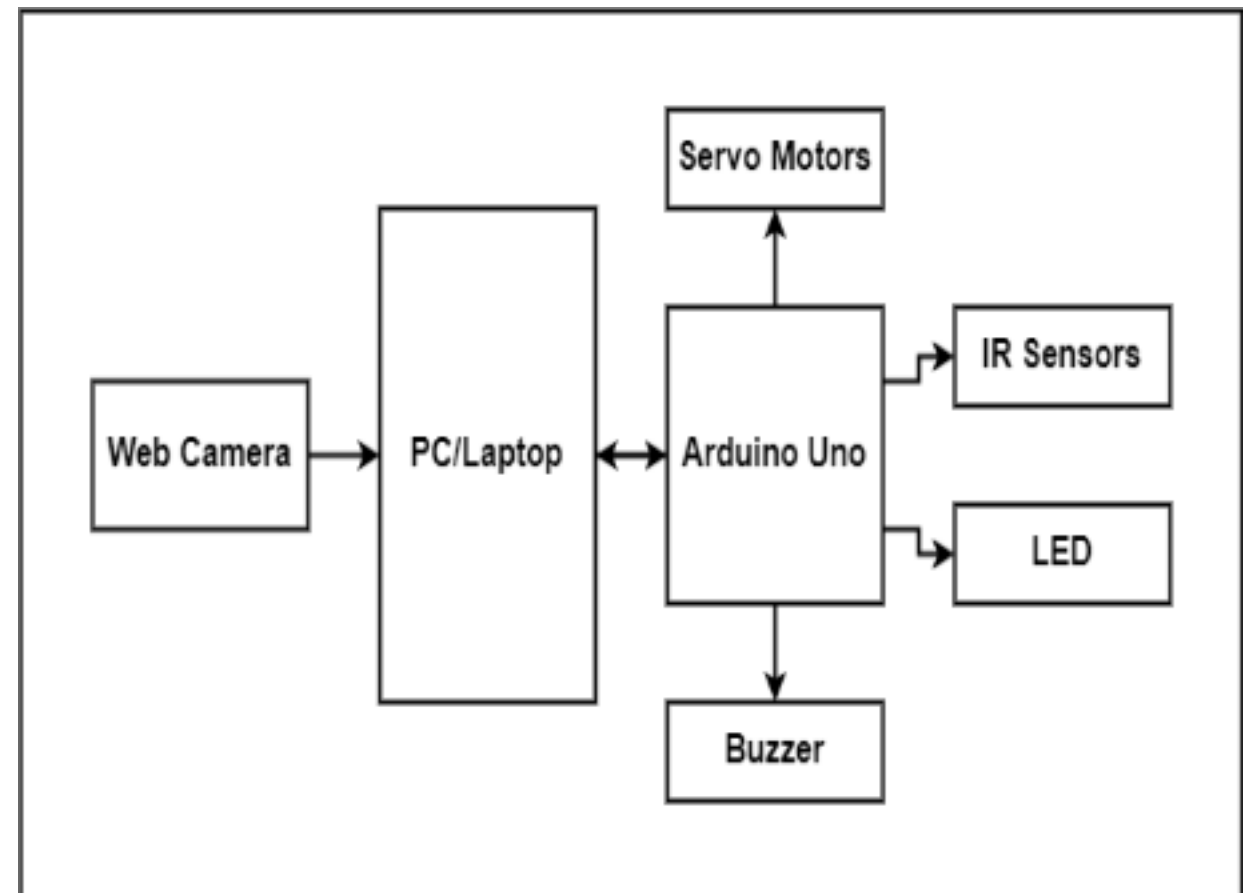
Results and Discussion

Proposed Model

- The prototype has been created by connecting all the components i.e, the Arduino , buzzer , light, servo motors together.

- The Arduino and the camera is connected to the laptop for performing the necessary actions .

- The servo motors are joined together along the mesh to lift it up after detecting the drowning person.
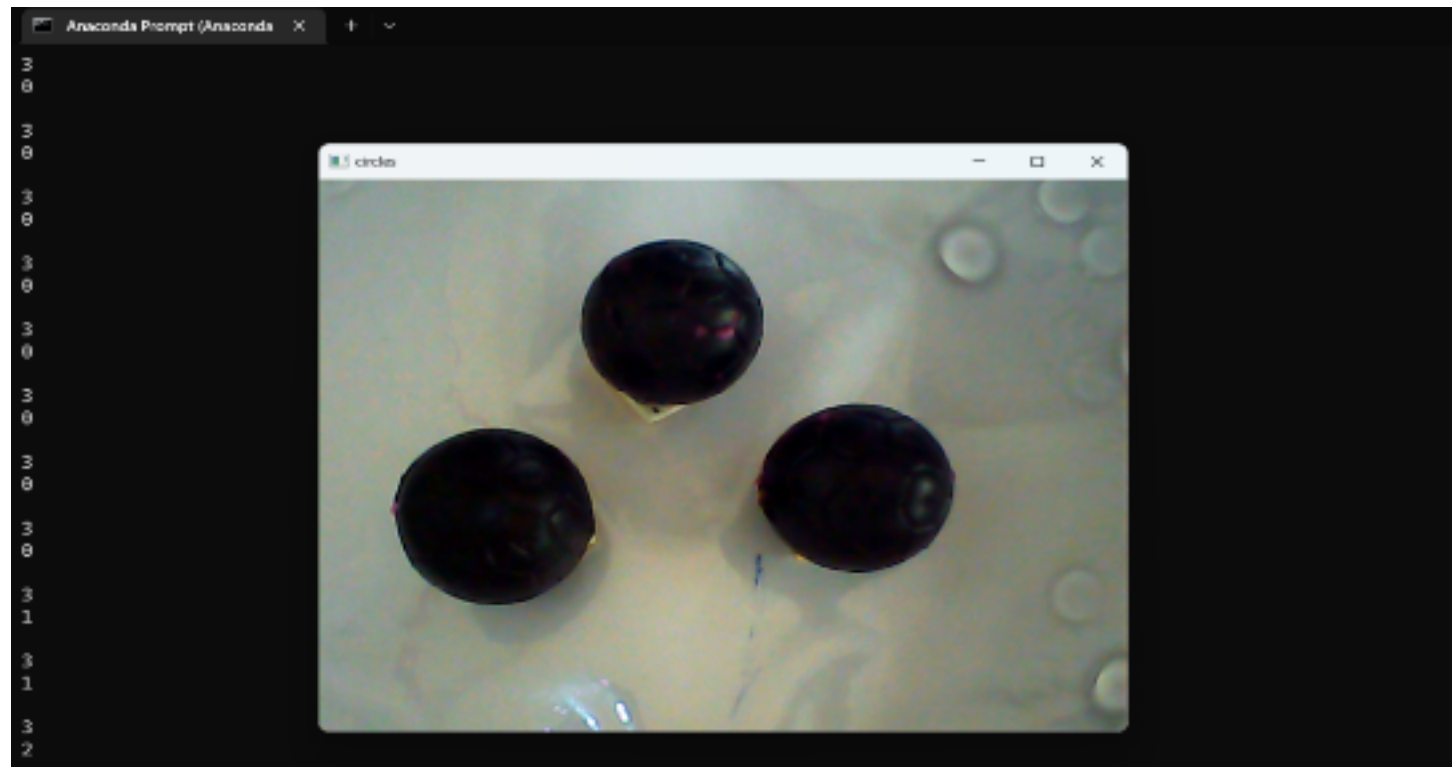
Accuracy
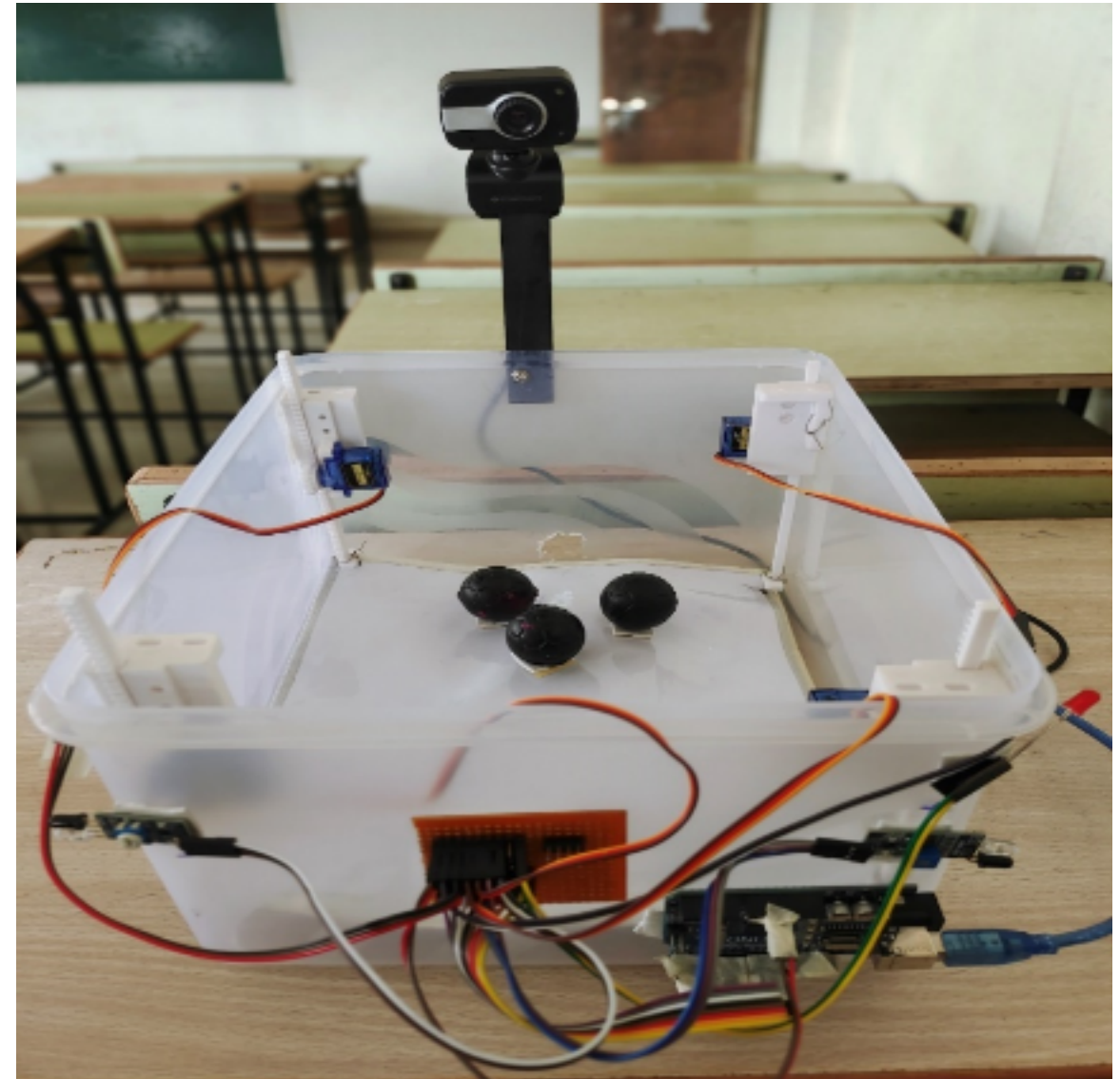
No. of samples vs % Accuracy
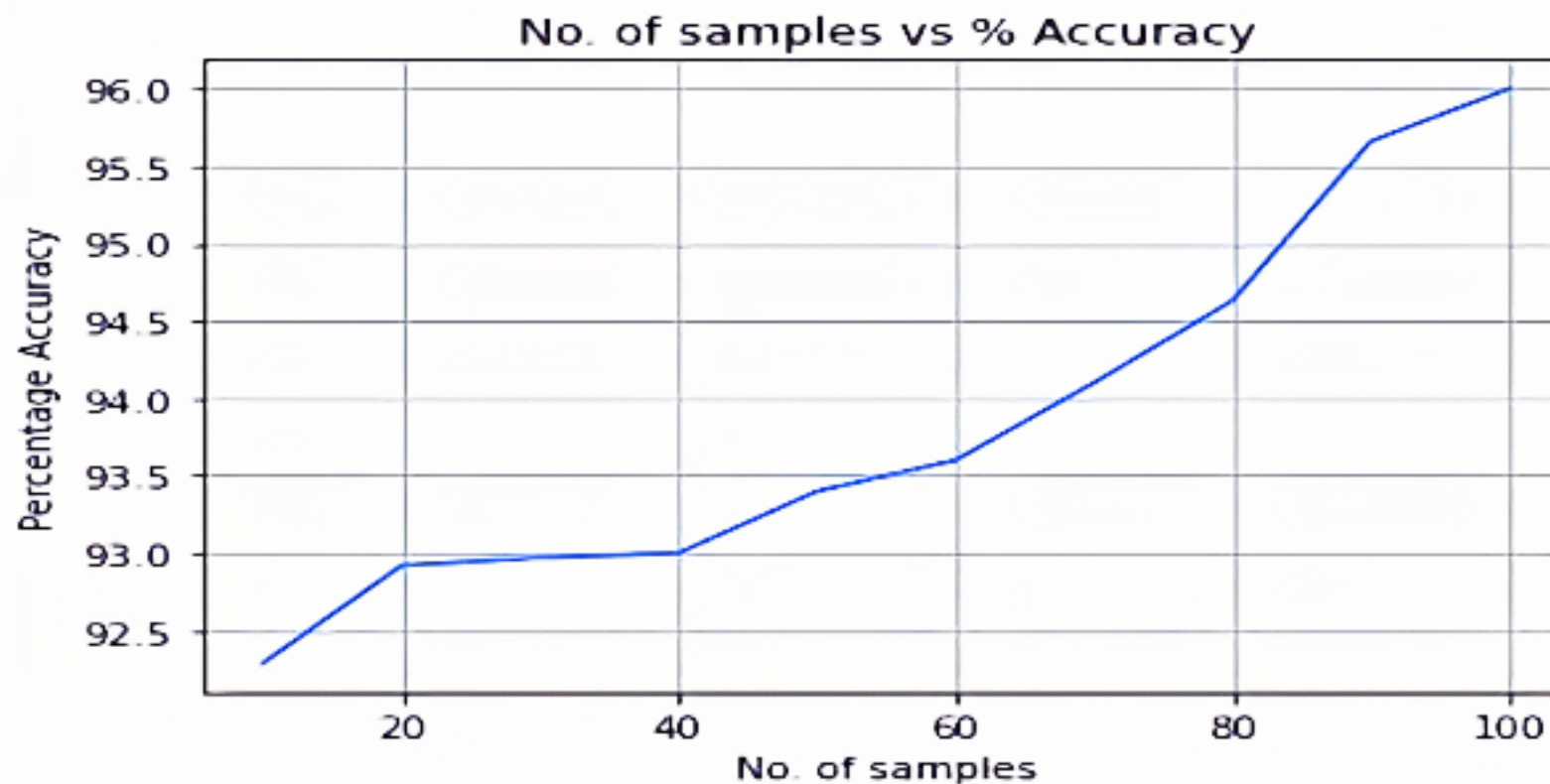
No.of samples are the number of images captured from live camera video ,

Initially the no.of balls in 1 image is 3 balls.So , if the count of balls is 3 for

every increasing image samples then the accuracy will be greater i.e,close to

98%.

Camera Detection

The model will start working with the use of live camera as it detects the number of swimmer in the swimming pool with the help of hough transform algorithm and it will continue to do so until one of the swimmer is missing for a while.

Arduino Uno
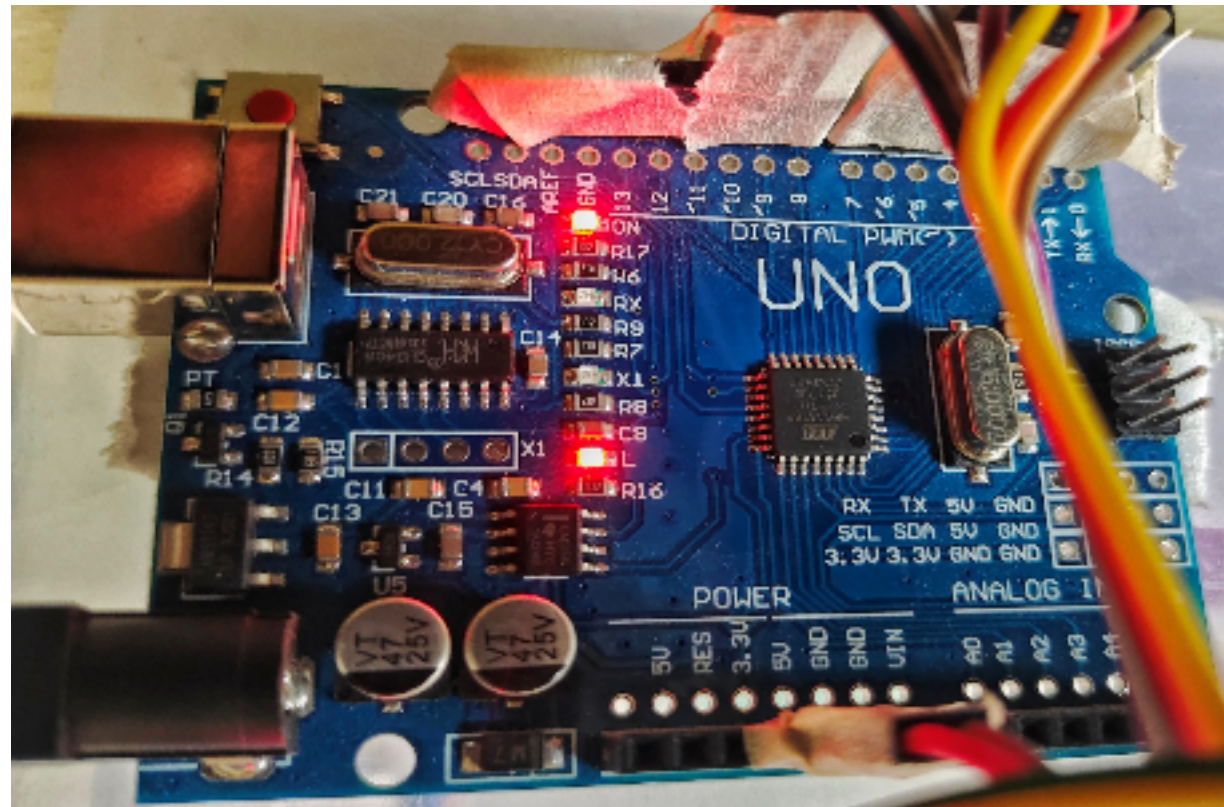
Arduino uno is used to send the command to servo motor for lifting up the mesh , which are connected to servo motor. It will instruct the mesh , light and the buzzer to take the necessary action altogether after a certain break that is assigned in the code

Conclusion

Drowning detection systems can play a critical role in improving the safety and security of swimming pools.

Overall, the development and deployment of drowning detection systems can help reduce the risk of accidents and injuries in swimming pools, improve response times to potential drowning incidents, and provide peace of mind for pool operators and patrons alike.

By leveraging the latest technologies and best practices in safety and security, drowning detection systems can help ensure that swimming pools remain safe and enjoyable places for people of all ages to relax, exercise, and have fun.

Future Scope

In the future, a generative adversarial network will be applied to generate synthesis data, in order to increase the size of the training .

In addition, more classes and libraries will be added to explore and to investigate the efficiency of the proposed system and also additional function of sending the live images of drowning just as a notification directly to the owner of the pool as currently only text messages is forwarded to the owner.

THANK YOU

Q&A