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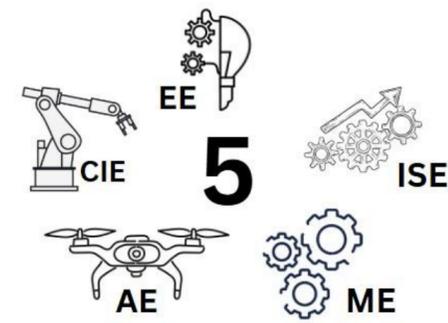
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PROBLEM STATEMENT

Drowning is the third leading cause of unintentional injury deaths globally, with 236,000 annual fatalities. Traditional lifeguard responses often exceed the critical 2-minute window needed to prevent brain damage or death. Our Aerial Life-Saving Drone System offers a faster, more effective solution using real-time video and remote life jacket deployment. This technology enhances rescue efficiency and empowers lifeguards to save more lives.

Prototype design

- Quadratic Drone that can payload of 10Kg



Testing

The range (R) for the response times in each subgroup was consistently within the UCL (39.7 ms) and LCL (0 ms), indicating that the variability in response times was stable and controlled.

$$R = (\text{Max value in the sample}) - (\text{Min value in the sample})$$

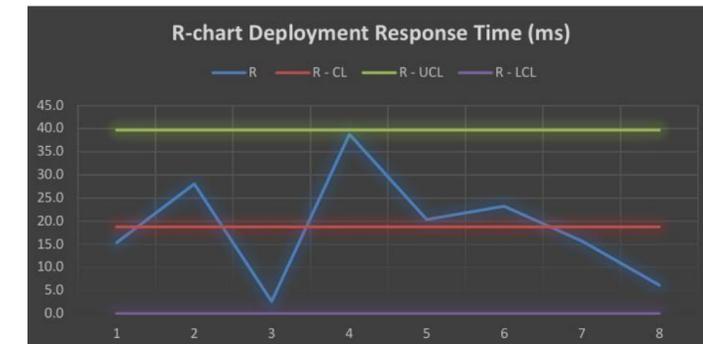
Upper Control Limit (UCL):

$$UCL = D_4 \bar{R}$$

Lower Control Limit (LCL):

$$LCL = D_3 \bar{R}$$

Validation



The deployment response time process is in control, as both the mean response time and the variation remain within the established control limits.

Specifications

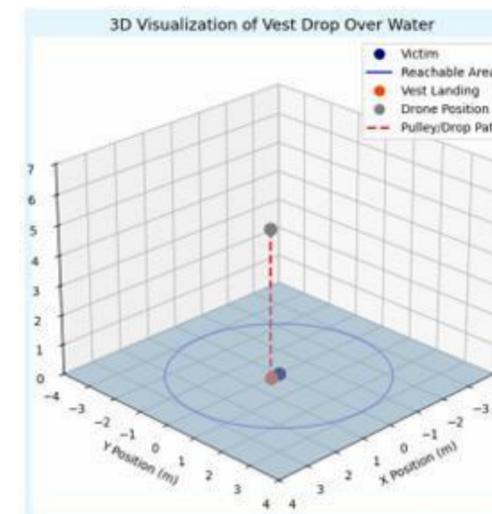
- Response Time:** < 2 minutes
- Video Feedback:** 1080p real-time stream
- Hanger Weight:** Max 5 kg payload
- Reload Time:** Under 30 seconds
- Communication Range:** 100-meter radius
- Altitude Accuracy:** ±1 meter precision
- Motor Power:** >400 W output
- Battery Duration:** 1-hour operation
- Max Altitude:** Up to 100 meters
- Max Airspeed:** 20 m/s speed
- Thrust Ratio:** 2–3 range

Constrains

- Budget:** Max 8,000 SAR
- Payload Capacity:** ≥2.5 kg stable
- Jacket Deployment:** ≤200 ms response
- Flight Time:** ≥20 min loaded
- Wind Resistance:** Up to 40 km/h

Integrated Specifications

- System Startup:** Ready in 2 seconds
- Drop Accuracy:** ±0.5 m precision
- Temperature Range:** -10°C to 50°C
- Water Resistance:** 5 m for 30 min



The target specifications were achieved using simulation results from ANSYS workbench software and manual calculations.

Conclusion

The Aerial Life-Saving Drone enhances water rescues with fast response, precise life jacket deployment, and real-time control. Its innovative pulley system ensures accuracy, making it ideal for emergency and maritime operations.