

# Deep Learning for Safeguards Surveillance: FY19 Team Meeting



PRESENTED BY

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Project Team: Zoe Gastelum (PI), Michael Smith, Michael Hamel

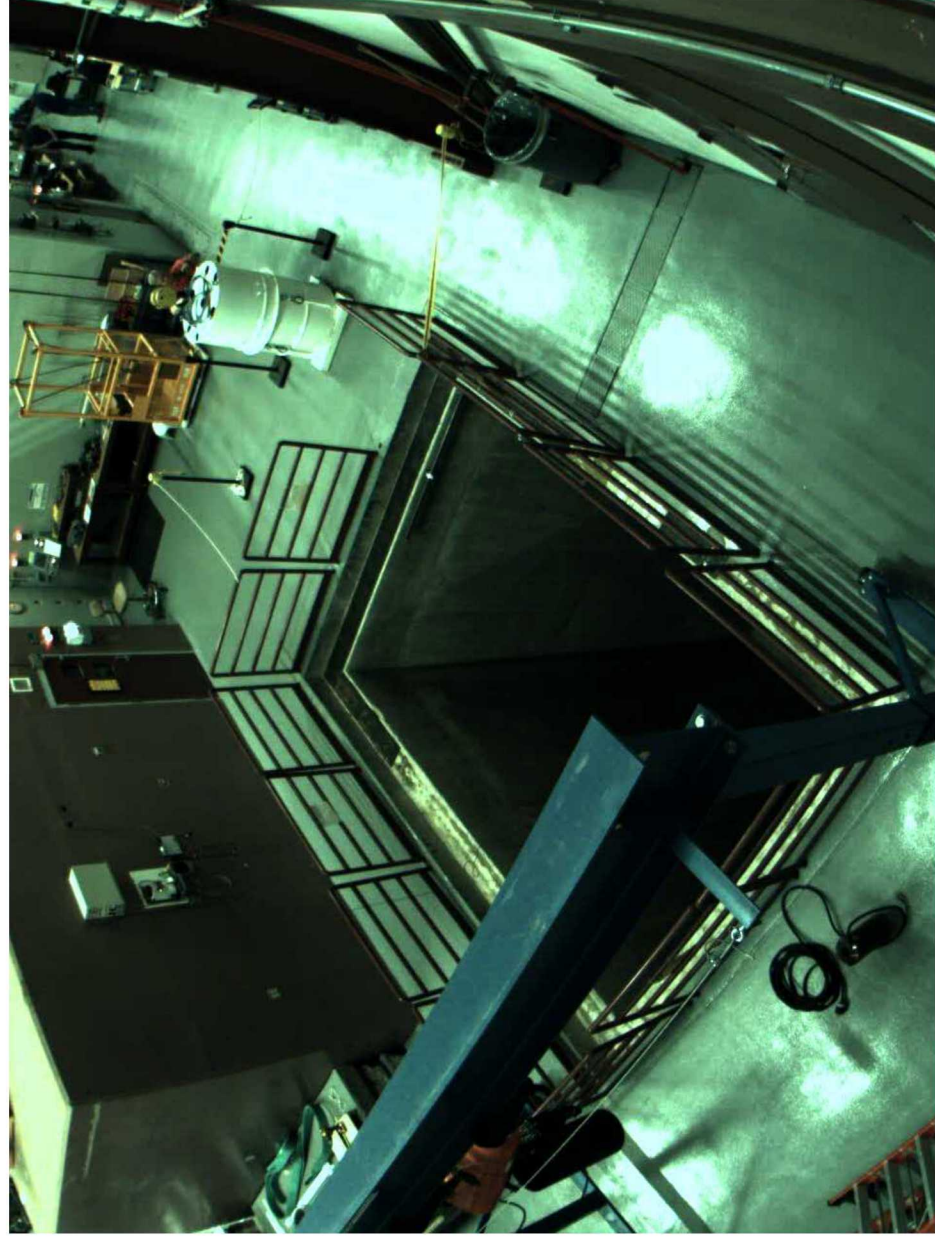
## FY19 Planned Scope

- ❑ Test the PredNet algorithm across multiple scenarios and cameras, including fabricated and intentional anomalous activities to more subtle scenarios
- ❑ Once initial capacities of the algorithm are understood, test safeguards-specific scenarios including: increased picture taking interval (PTI) and grey-scale images
- ❑ Document findings and recommendations in a final report

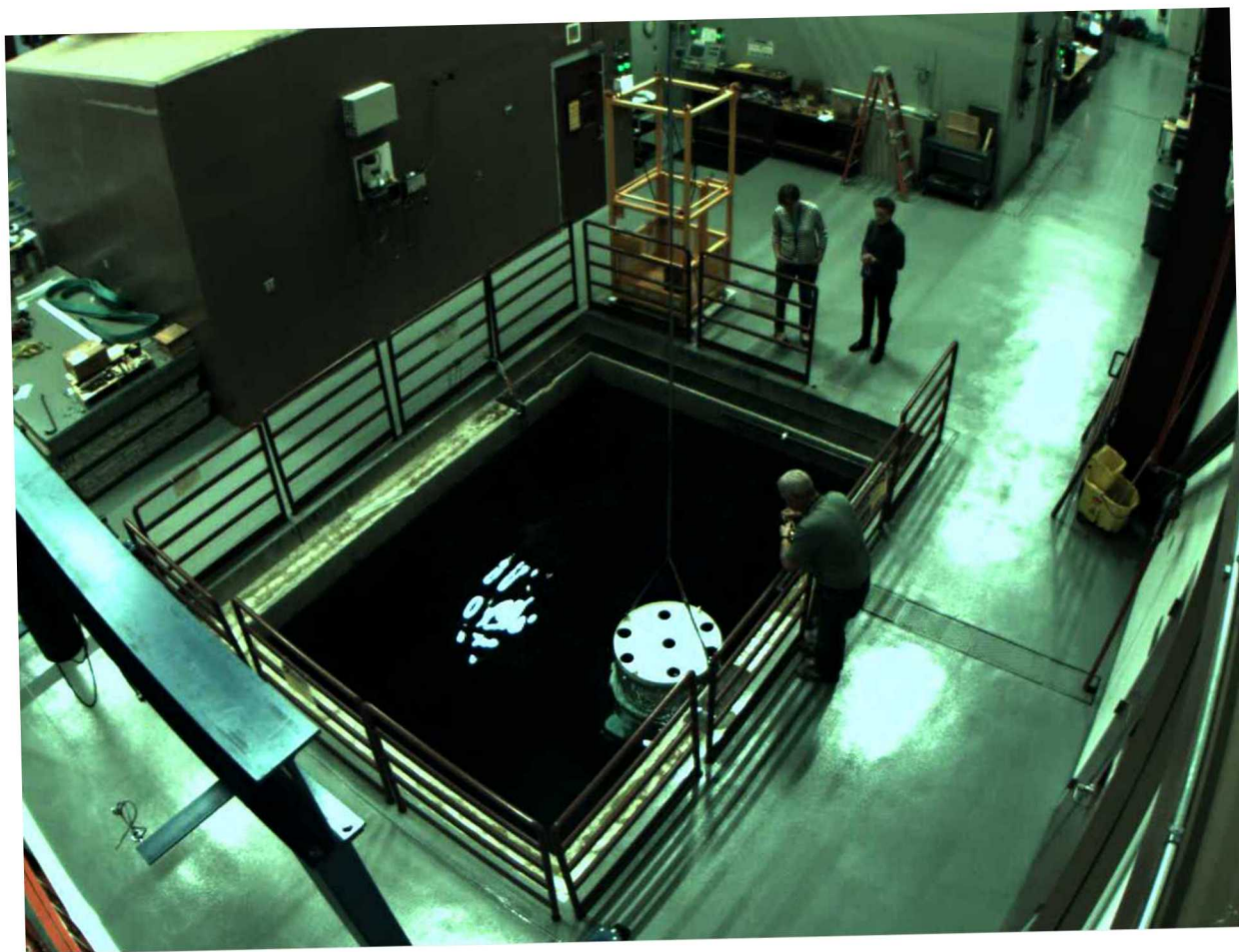
### Questions:

- ❑ PWP text describes testing and evaluation of the PredNet algorithm, while task summary table describes software deliverables. We intend only minimal code augmentation. **Recommend** detailed documentation of testing and evaluation results with recommendations.
- ❑ IAEA data is required for Task 4, Milestone 2. **Recommend** backup plan of testing alternative unsupervised approaches (specifically, clustering)









## Test Plan - Models

- ☐ Dry, wide angle
- ☐ Dry, shorter angle
- ☐ Wet, wide angle
- ☐ Wet, shorter angle

# Test Plan

## Intentional Anomalies

- Wet/dry swap
- Container disappear/appear

## Operational Anomalies

- New container presence
- New container in new location
- New container in pool
- Off-container in pool

## Unintentional Anomalies

- What registers from one camera
- Same sequence between two cameras
- Similar sequence from two scenarios in one camera

## Safeguards scenarios

- Change in sample rate (test)
- Testing in B&W

# Test Videos

1. Wet All X: View over several days of wet testing from Camera X
2. Wet All Y: View over several days of wet testing from Camera Y
3. Wet Short X: Condensed view of the several hours of active wet testing from Camera X
4. Wet Short Y: Condensed view of the several hours of active wet testing from Camera Y
5. Dry Short X: View of several hours of active dry testing (occurred all at once) from Camera X. Includes the operational anomalies of new and “different” containers
6. Dry Short Y: View of several hours of active dry testing (occurred all at once) from Camera Y. Includes the operational anomalies of new and “different” containers
7. Dry Spliced X: View of dry testing from camera X with spliced in wet scenes and container disappearance
8. Dry Short B&W
9. Time Lapse X

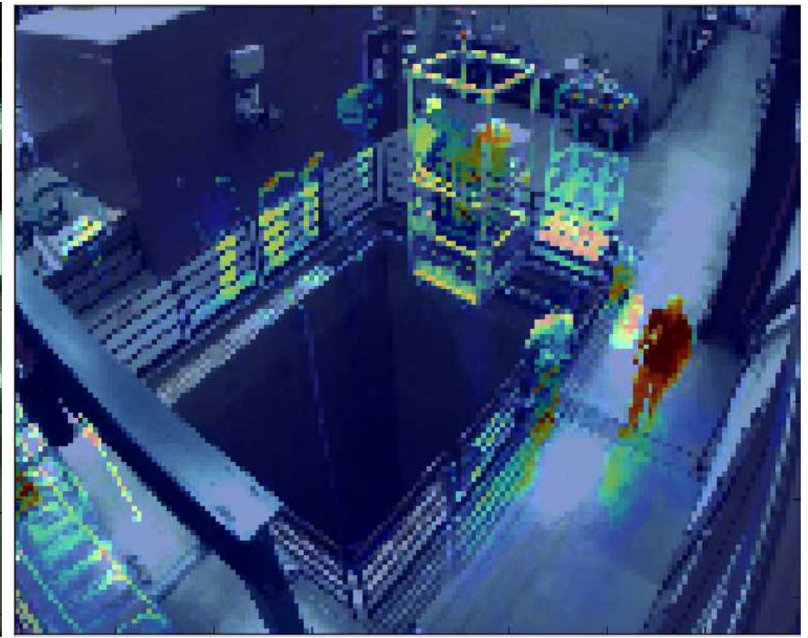
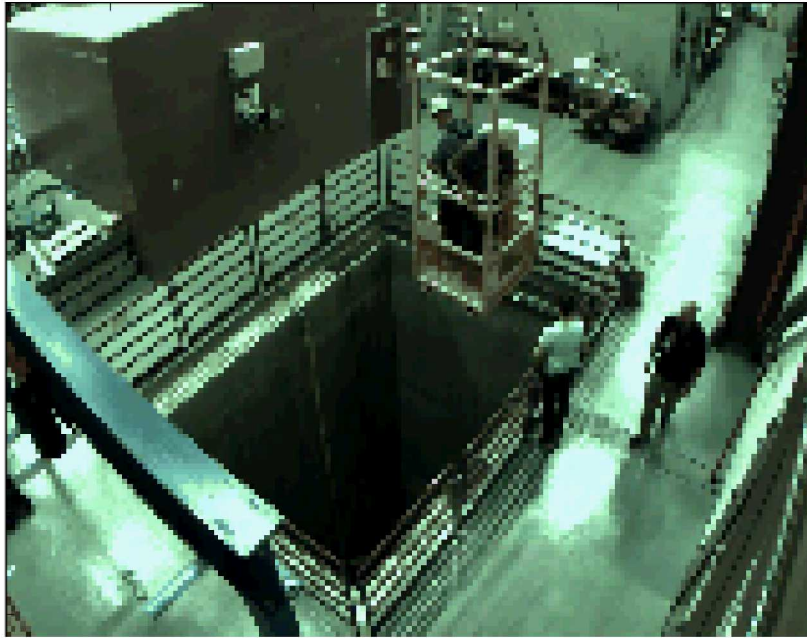
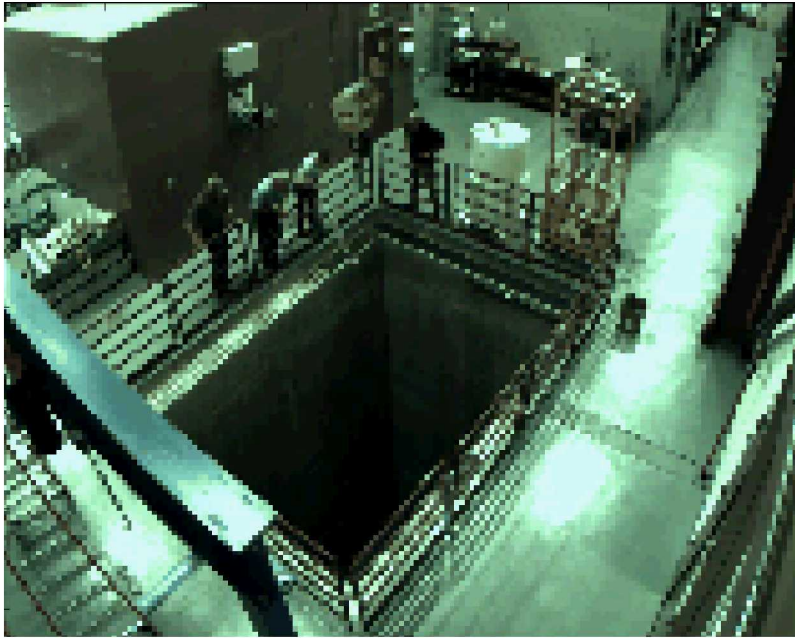


## Sample PredNet Results

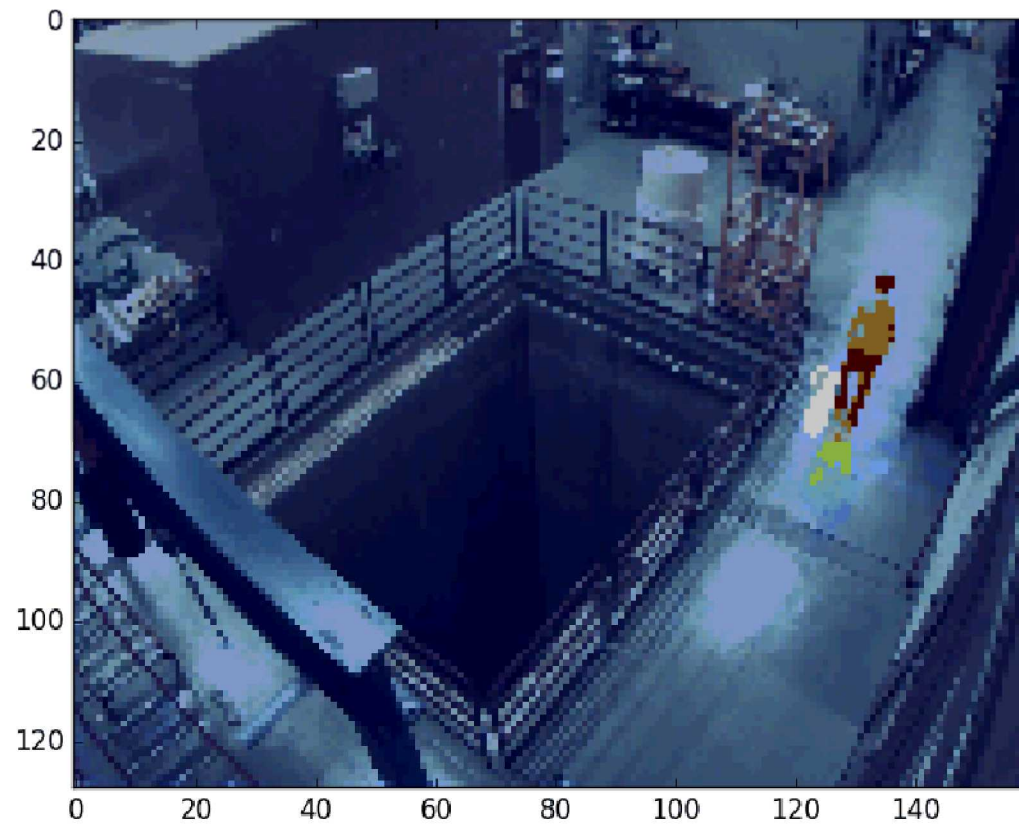




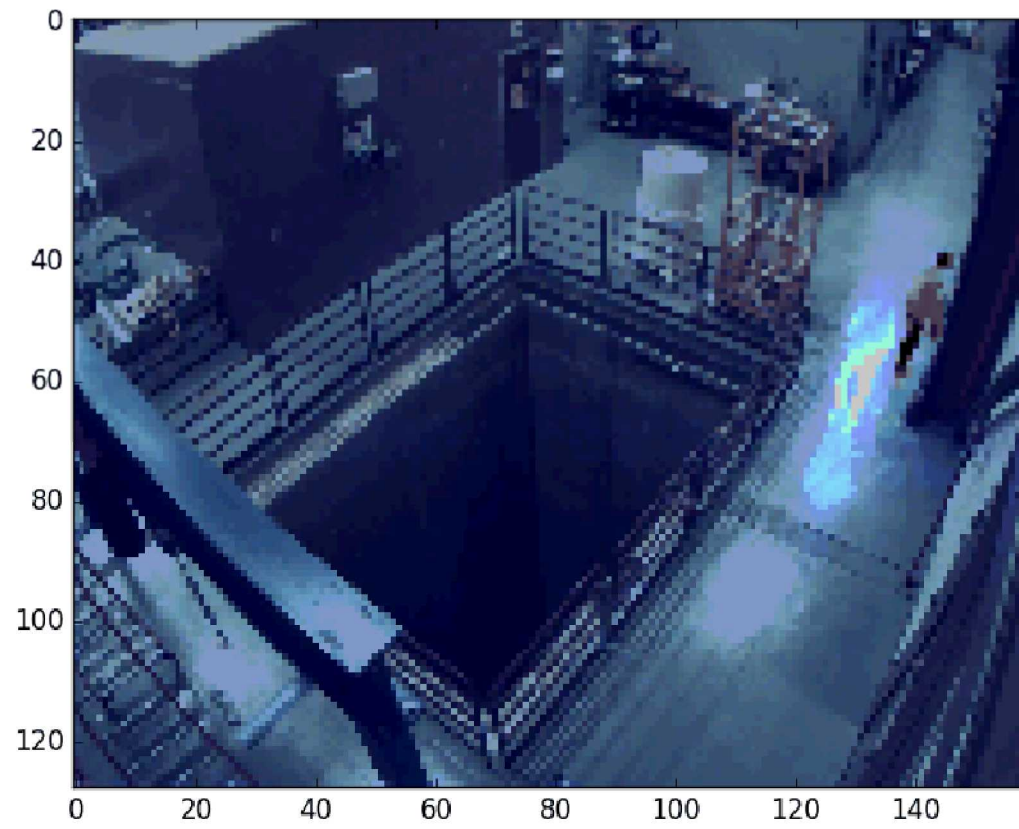
## Sample PredNet Results



## Motion Detection-Like Capability

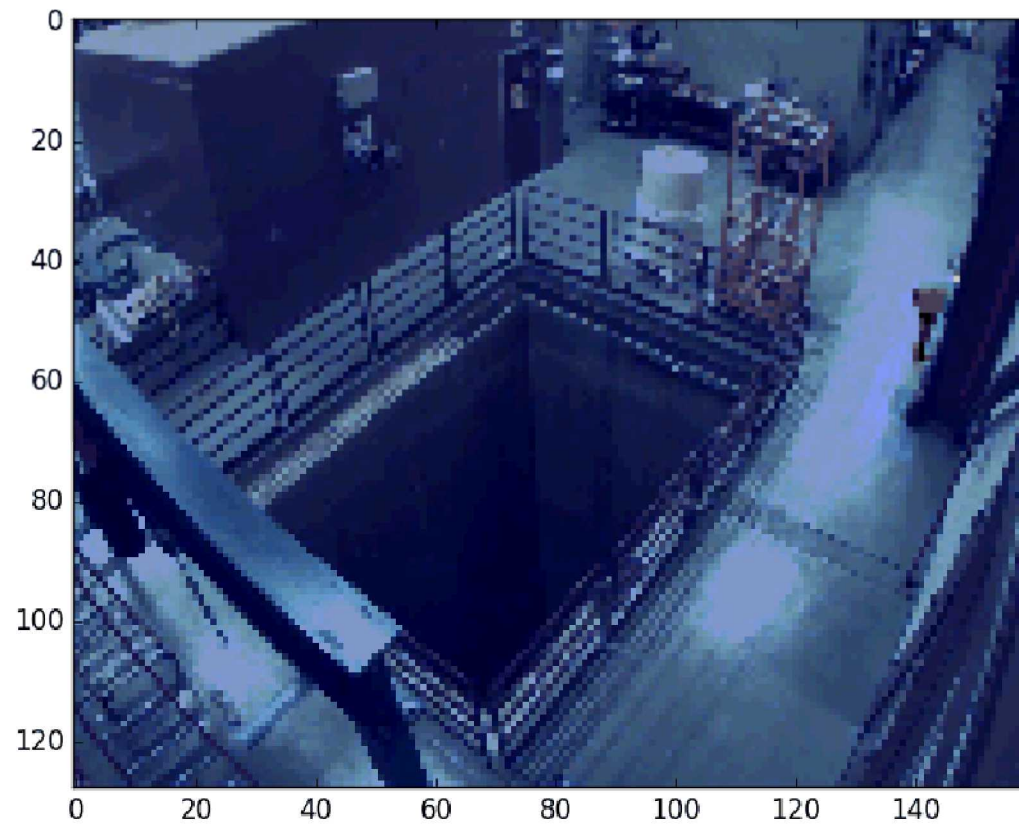


## Motion Detection-Like Capability

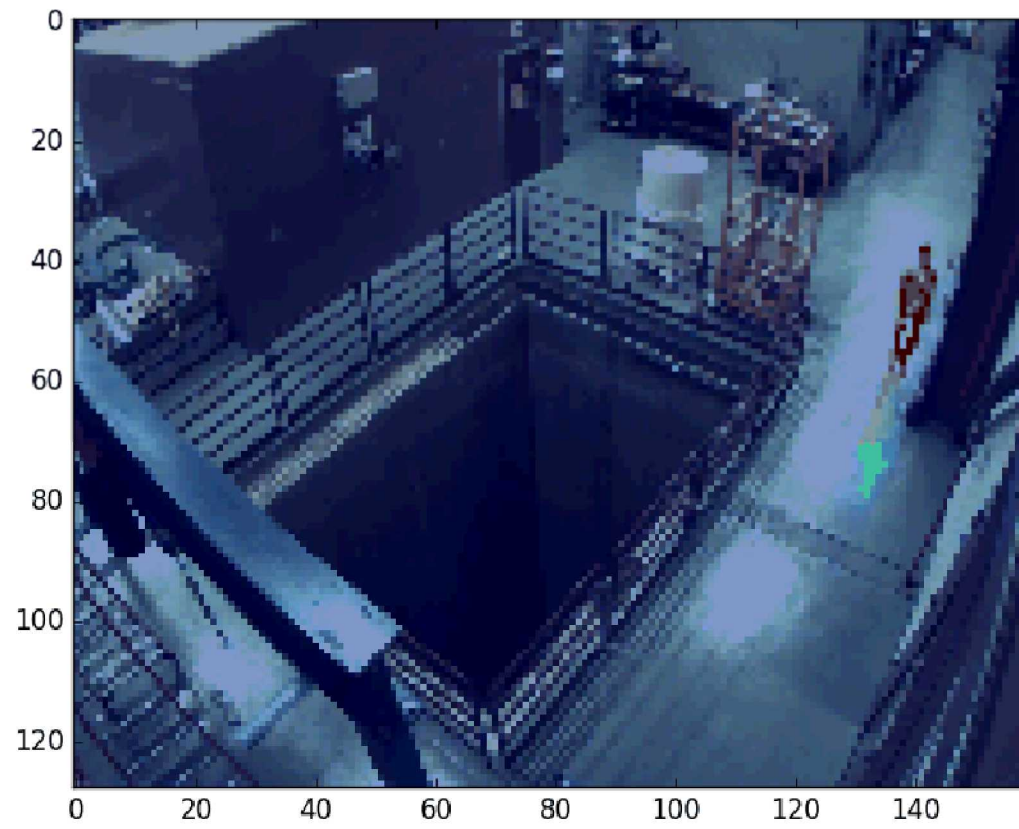




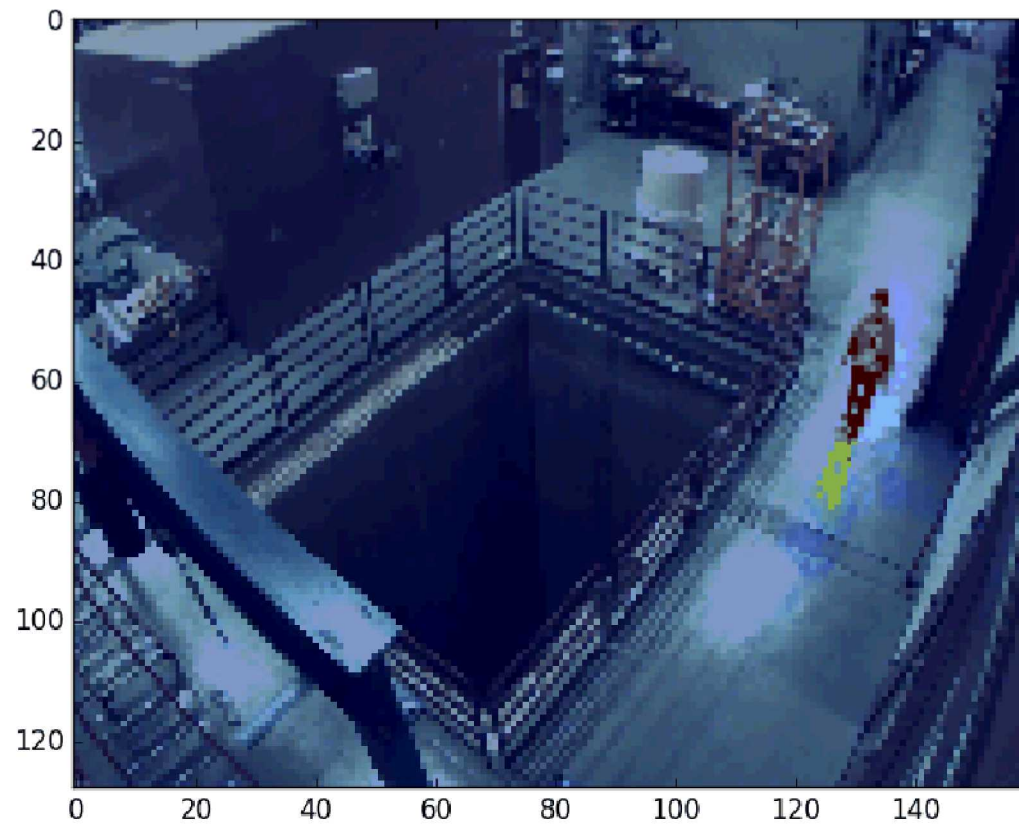
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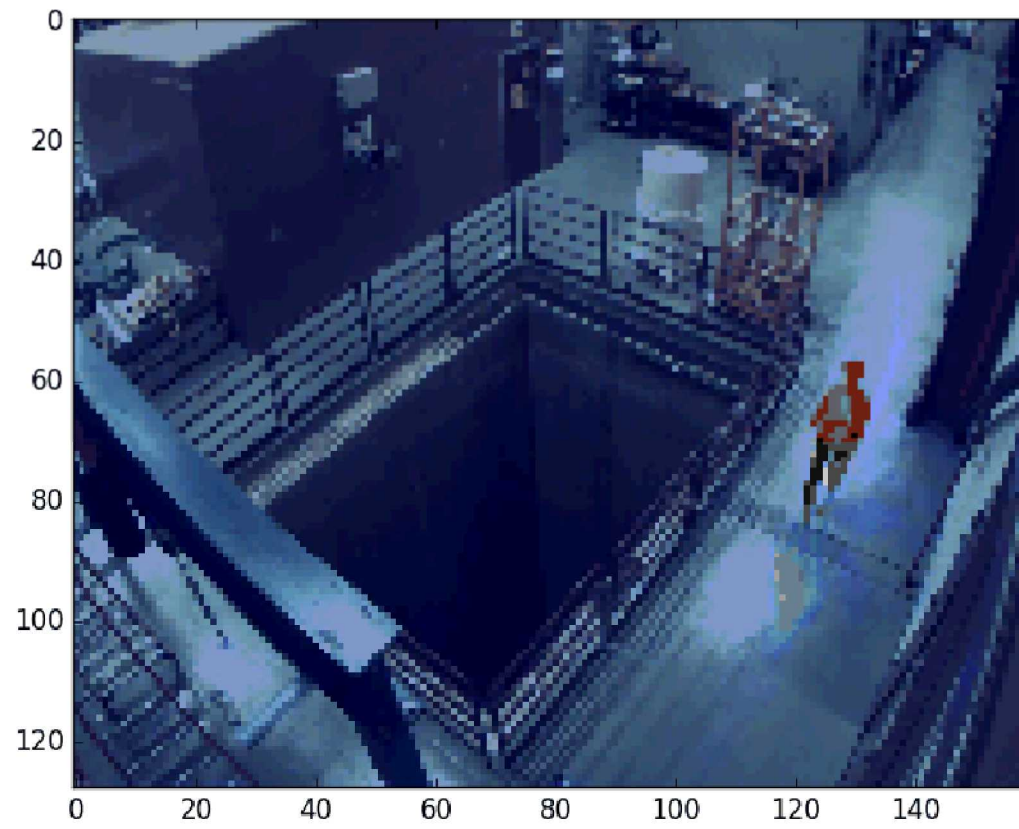


## Motion Detection-Like Capability





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## Motion Detection-Like Capability

