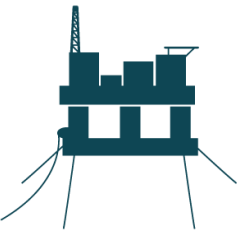


GLOBAL OFFSHORE

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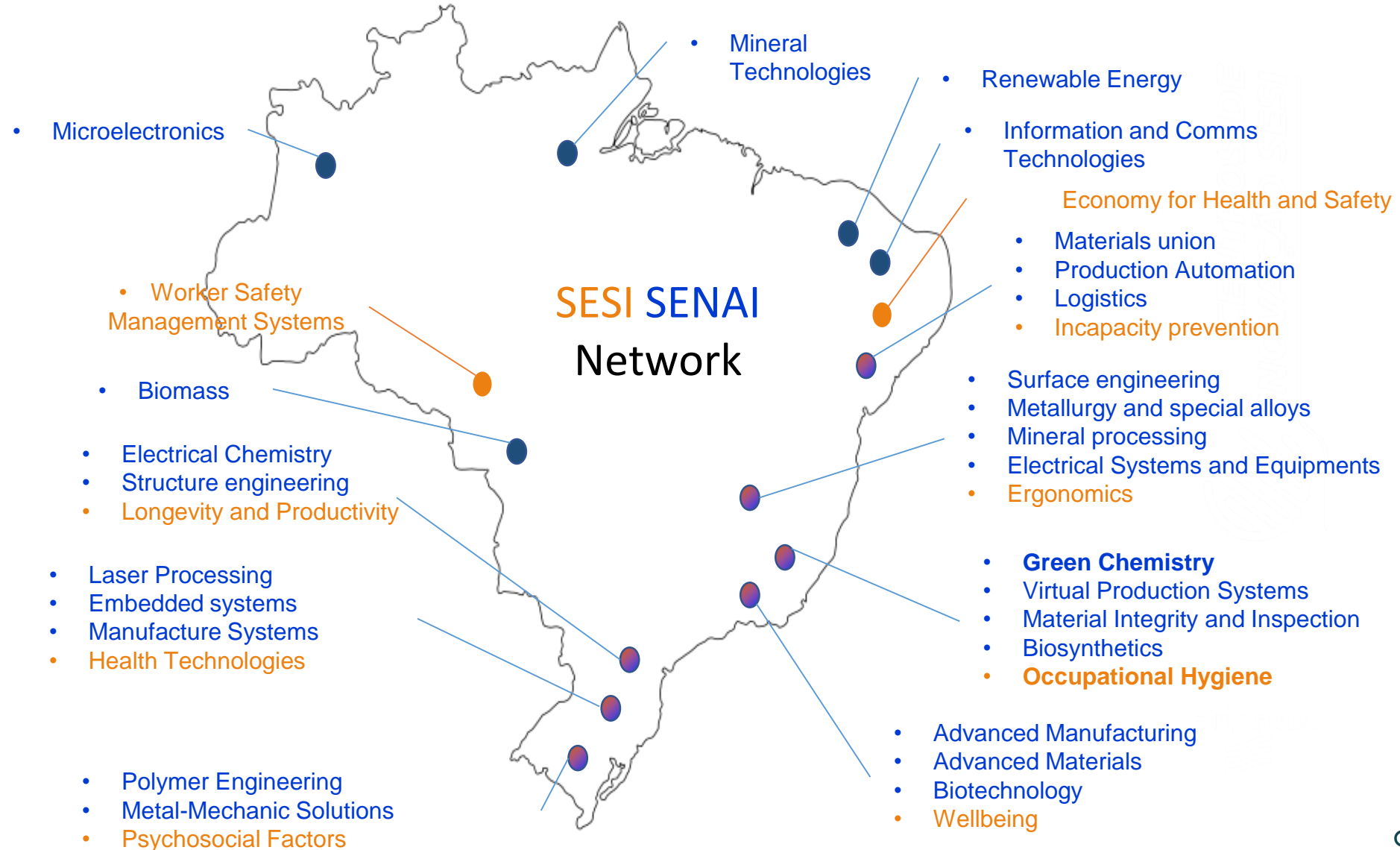


Computer Vision applications toward Offshore HSE goals

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FIRJAN



SESI Innovation Centers



SESI Innovation Centers

- The offshore setting is a dynamic and challenging workplace where it is of utmost importance having well defined policies to ensure HSE goals.
- Such challenges include the movement of heavy loads, the handling of chemicals and the risk of leaks and explosions.
- In this presentation we discuss three potential computer vision applications to tackle these challenges:
 - PPE and Ergonomics evaluation through Object Detection and Pose Estimation
 - Exposure timers
 - Multispectral imaging for detection of leaks and spillage



Worker Evaluation in Real Time

Worker Evaluation in Real Time

- Offshore work presents challenges such as:
 - fire, after ignition of released hydrocarbons;
 - explosion, after gas release, formation and ignition of an explosive cloud;
 - oil release on sea surface or subsea
- Adherence to PPE policies are key factors influencing worker safety in hazardous conditions.
- Workplace PPE checklists may be use to guarantee worker compliance

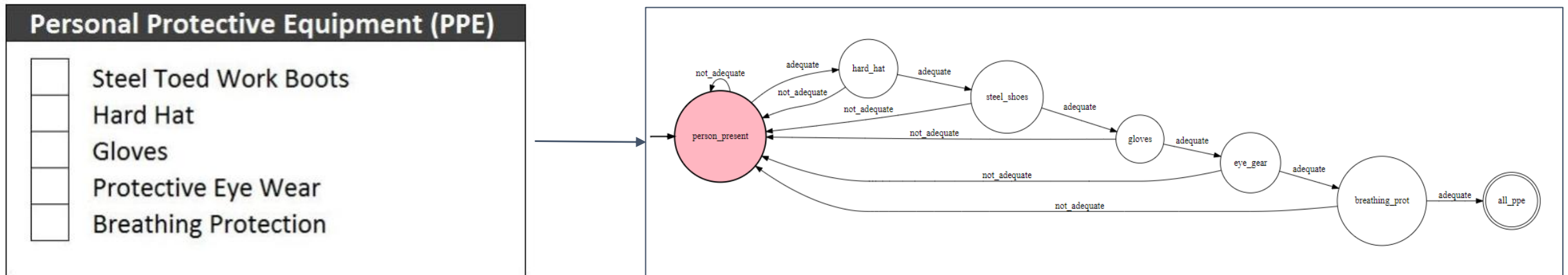
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<input type="checkbox"/>	Steel Toed Work Boots
<input type="checkbox"/>	Hard Hat
<input type="checkbox"/>	Gloves
<input type="checkbox"/>	Protective Eye Wear
<input type="checkbox"/>	Breathing Protection



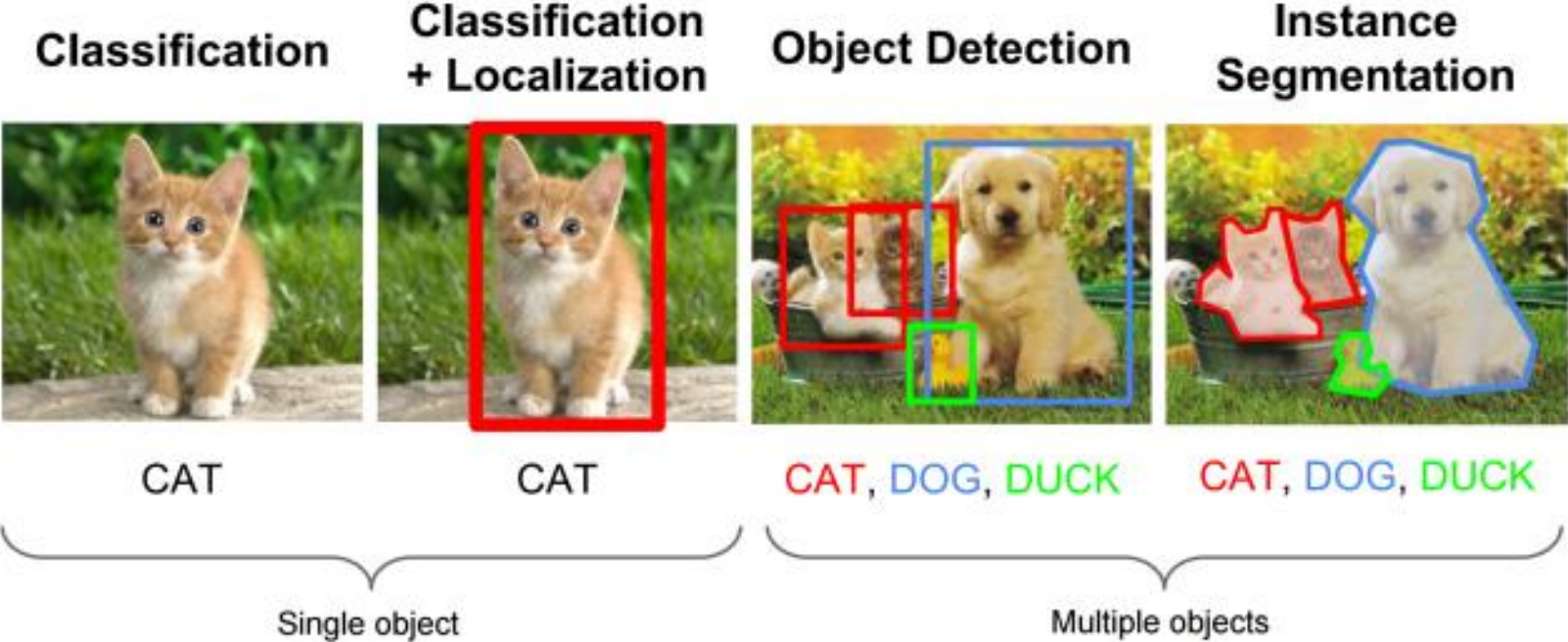
Personal Protective Equipment (PPE)	
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<input checked="" type="checkbox"/>	Hard Hat
<input checked="" type="checkbox"/>	Gloves
<input checked="" type="checkbox"/>	Protective Eye Wear
<input type="checkbox"/>	Breathing Protection

Worker Evaluation in Real Time

- Computers can be taught to detect objects and monitor workplace compliance to PPE policies.
- Such checklist procedures can be automated and implemented through computer vision methods such as object detection and instance segmentation



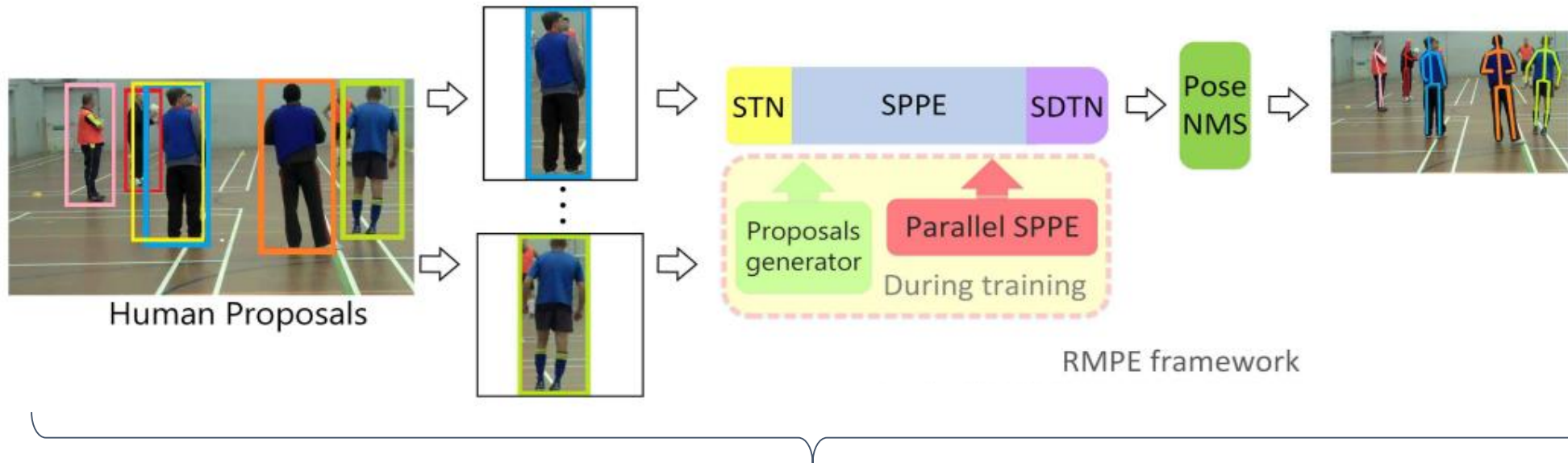
Real time PPE Detection



Instances of objects are classified through the identification of features of a given class through machine learning techniques



Worker Evaluation in Real Time



Such approaches can be extended to also be used to evaluate human posture through the technique of pose estimation.

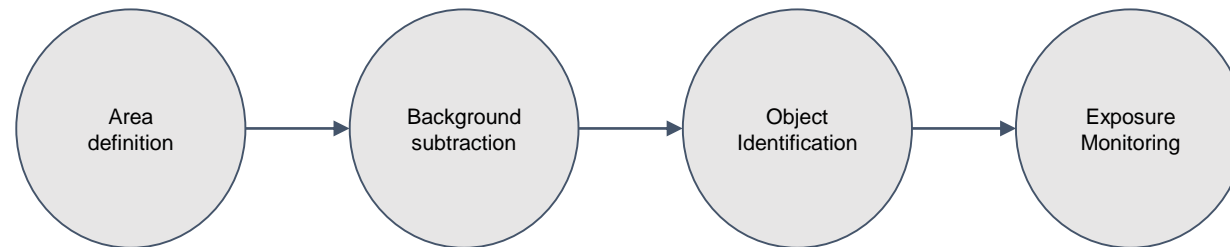
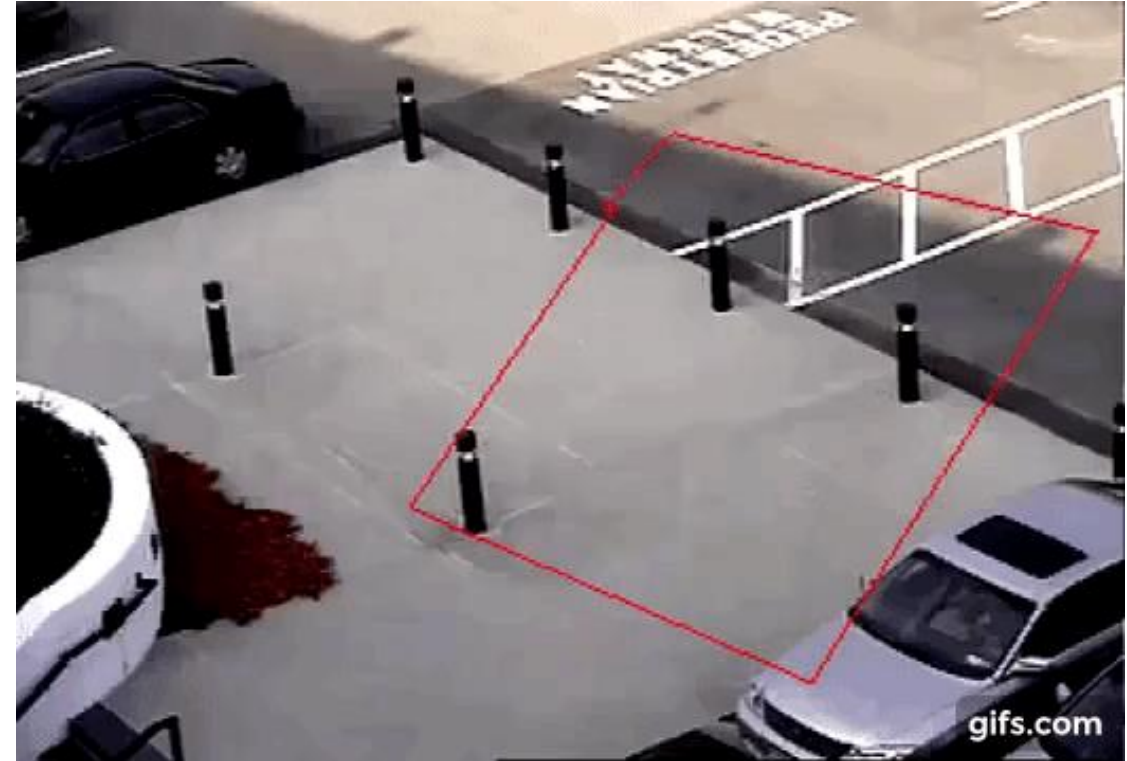
This opens up approaches that can evaluate and model ergonomics in the the offshore work environment.



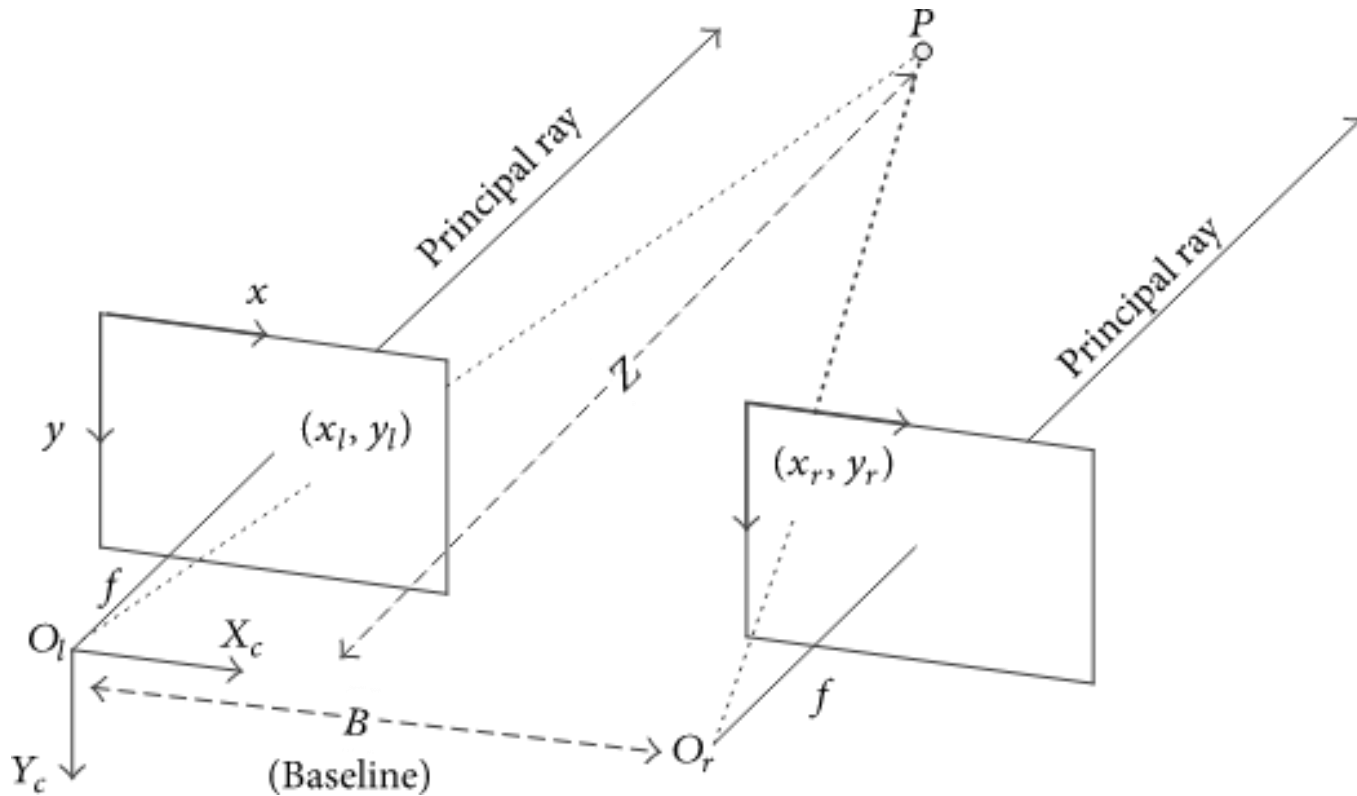
Exposure Timers

Exposure Timers

- Some workplaces present challenges that required a well controlled amount of exposure to hazards such as loud noises or intense heat.
- Computer vision methods allow defining these areas and setting policies for timed exposure. Once a worker enters the exposure area, the computer will count the time and set off an alarm when the defined timer ends.
- That increases worker safety by enforcing a strict time policy around high risk exposure zones. More than one area can be defined, each with its own policy or set of policies to be followed.



Exposure Timers



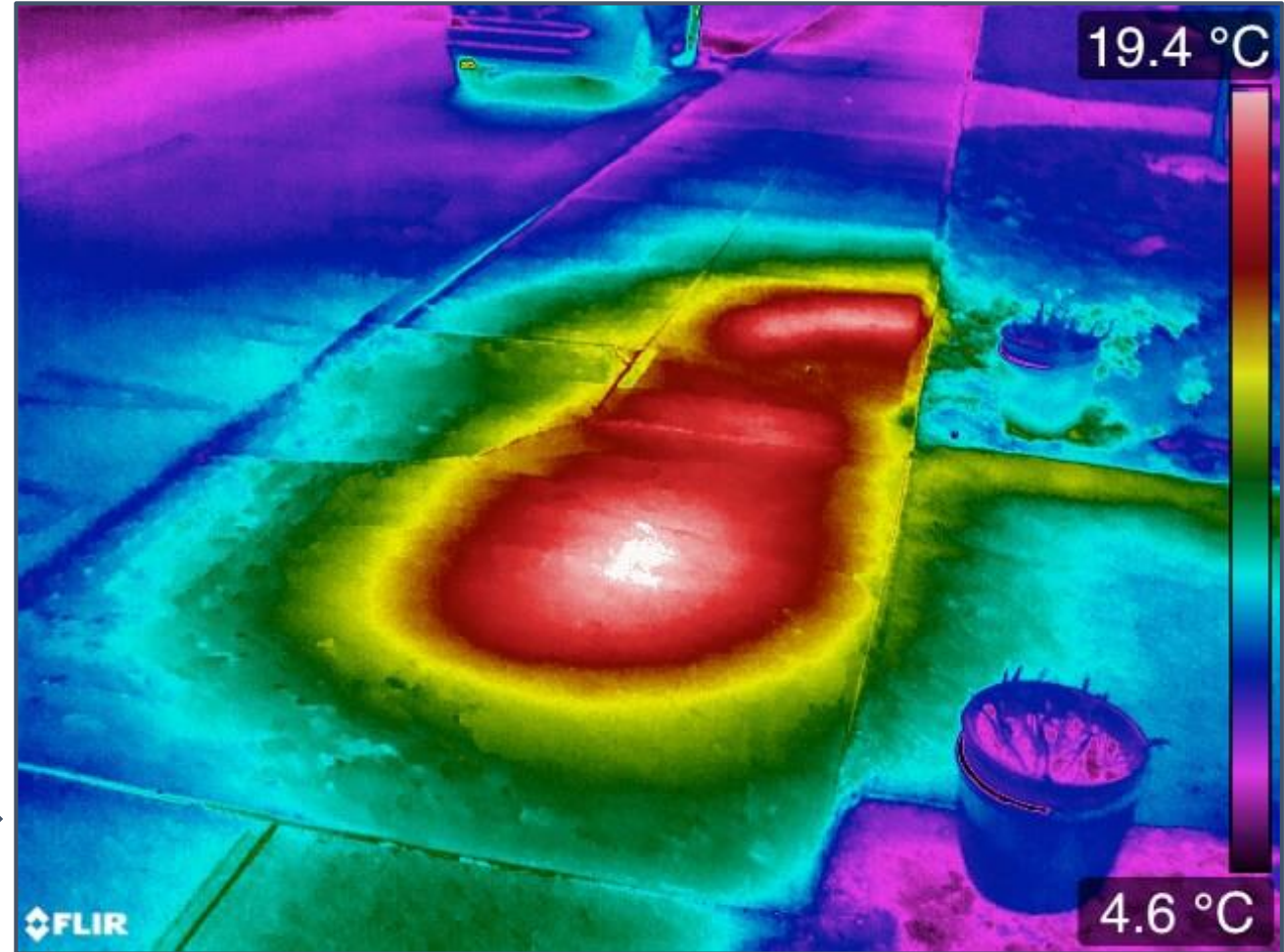
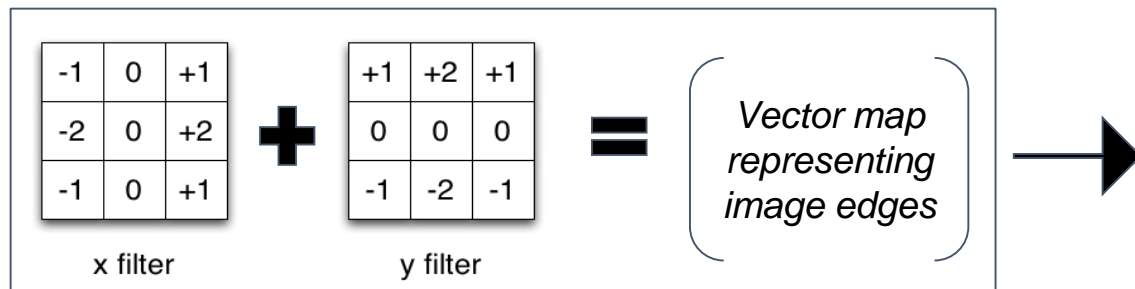
- By using more than one camera set at once, it is possible to more accurately evaluate depth
- This allows for the building of dynamic “no-go zones”, such as areas in the offshore where overhead maneuvering of heavy loads may present a hazard.
- By checking the load’s shadow in respect with the ground, it is possible to define restricted areas under the load path.



Multispectral Imaging for hazard detection

Multispectral Imaging for hazard detection

- Light has many different interactions with materials depending on its frequency - i.e.: IR can signal heat signatures
- Through the use of Hyperspectral cameras, we can signal hazards such as small oil spills by defining sharp contrasts.
- By identifying such hazards a computer can quickly signal the occurrence of unwanted events and ensure a faster response time.



Thank you