

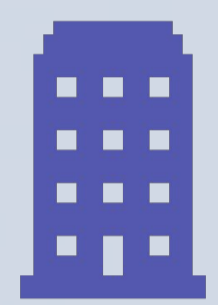
Project 13: Siemens Gamesa Renewable Energy “Movement Detection in Wind Turbines”

Who is involved ?

Team members:



- Aditi Prasad
- Bahaeddine El Dabett
- Baibhav Amrit
- Fatma Moustafa
- Marco Winkel
- Munib Mahadik



Project Sponsor:

SIEMENS Gamesa
RENEWABLE ENERGY

What is the project about ?



Until now, the flow of work done inside wind turbines during the commissioning phase is completely unknown

We set out to develop a system that would be able to identify:

- Work paths
- Time needed for each task



What to consider when choosing a solution ?

1. Privacy



The identity of the workers should not be revealed while they do their work
Consequence: Cameras and wearable devices could not be used

2. Energy



As the wind turbines are offshore, a constant supply of energy could not be secured

Consequence: only energy efficient approaches could be considered

General Approach

- The Wind turbine is divided into several smaller areas (workstations)
- Each area is monitored by a sensors system



Data that can be collected

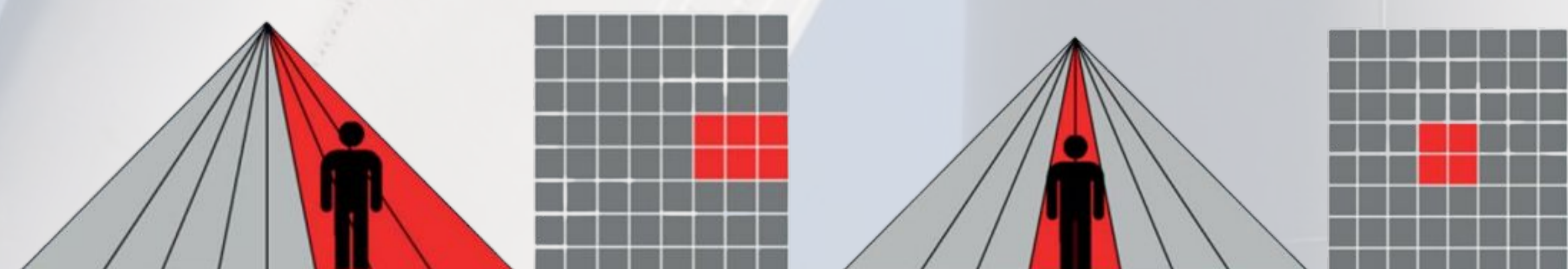
- The needed amount of time for one specific task during commissioning and maintaining
- The general paths of the tools movements and positioning while protecting the identity of the workers



Two sensor systems could be used to monitor each area

Grid Eye Sensor

- What is a grid eye sensor
 - thermopile elements(sensors) in an 8x8 grid format
 - Signal generated in each thermopile when temperature is changed in its range of detection
 - One Grid eye sensor Can cover an area of 7 m²
 - Several Grid eye sensors can be used in combination and therefore a greater area can be monitored
- Approach
 - After dividing the nacelle into smaller areas, grid eye sensors can be installed on the roof and can monitor the activities in these smaller areas.
- What type of output will grid eye sensors produce?
 - Heatmaps
 - Data about how many people entered and left each workstation
 - How much time is spent in each area (workstation)



RFID Tags and Readers

- RFID technology to track tools movement and positioning
- RFID readers mounted on walls
 - Proposed usage of RFID readers that are suited for a metal environment
 - Readers must be temperature- and humidity-resistant
 - Limited reader range requires multiple readers mounted on walls
 - High reader cost demands usage of low number of readers
- RFID tags mounted on tools
 - Proposed usage of passive tags to reduce energy consumption
 - Small tags so tools functionality isn't inhibited

