SITUATION:
Most fires in the UAE occur in warehouses in industrial areas. Current firefighting systems in warehouses rely heavily on firefighters to manually extinguish fires. Due to heavy congestion in these areas, firefighters' emergency response time is too high to prevent loss of human lives and reduce major property damage.

PROBLEM & SOLUTIONS

CHEMICAL TURRET & PUMPING SYSTEM

PROBLEM
- Decision of which element to remove from the fire triangle to ensure most efficient fire suppression depending on the class of fire (Figure 1).
- Selection of chemicals that are not toxic or impractical for widespread usage.

SOLUTION
- Creating a system that uses a combination of CO₂, H₂O and foam to fight fire.
- Ensuring elimination of oxygen from the fire triangle, thus extinguishing the fire.
- Addressing classes A, B and C of fires [4].
- Confirming no lasting toxicity and convenient availability.

TURRET & PUMPING SYSTEM

PROBLEM
- Adjustment of size of turret to compensate for its heavy weight (Figure 2).
- Customization of currently used turrets to be fitted in warehouses.

SOLUTION
- Scaling down the turret for a reasonable size which also reduces weight [5].
- Redesigning the turret so it can be fitted on the walls or ceilings.

SMART FIRE EXTINGUISHER SYSTEM (SFES)

The Smart Fire Extinguishing System (SFES) is an automated, immediate and efficient emergency response solution that can save lives and reduce fire damages.

PROBLEMS & SOLUTIONS

CHEMICAL COMPOSITION & STORAGE TANK

PROBLEM
- Decision of which element to remove from the fire triangle to ensure most efficient fire suppression depending on the class of fire (Figure 1).
- Selection of chemicals that are not toxic or impractical for widespread usage.

SOLUTION
- Creating a system that uses a combination of CO₂, H₂O and foam to fight fire.
- Ensuring elimination of oxygen from the fire triangle, thus extinguishing the fire.
- Addressing classes A, B and C of fires [4].
- Confirming no lasting toxicity and convenient availability.

PUMPING SYSTEM

PROBLEM
- Prevention of lateral movement of smoke in the building.
- Extraction of smoke in a quick and efficient manner.

SOLUTION
- Implementing automated smoke curtains that can prevent lateral smoke movement [6].
- Using thermal imaging sensors with raw that can be wirelessly transmitted [7] (Figure 4).
- Employing Delanya Triangulation algorithm to locate source of fire.

THE SMART CONTROL UNIT

The smart control unit coordinates all the components in the system to respond to an emergency situation without any human interference.

The control system takes preliminary measures to suppress the fire, hence reducing response time, which is a key factor in saving lives.

THE SMART FIRE EXTINGUISHER SYSTEM

CONTROL UNIT ALGORITHMS

PROBLEM
- Detection of human presence in the room.
- Design of a fallback system that avoids false alarms to ensure that people respond to alerts promptly.
- Identification of the source of the fire to target pumping systems using mathematical algorithms.

SOLUTION
- Using thermal imaging sensors with raw that can be wirelessly transmitted [7] (Figure 4).
- Employing Delanya Triangulation algorithm to locate source of fire.

REFERENCES