Fire Suppression & Alarm System

This example, although a traditional one, is one of the most advanced and crucial applications of embedded systems. To avoid all the problems mentioned about the current firefighting system and to have a better and more reliable security system against fire accidents. There is used fire sensor which senses fire. If the fire starts, the motor turns ON. If there is no fire, the motor is turned OFF.

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| Fire Suppression System 1,1,1,2,3,3,3-Heptafluoropropane Gaseous Fire  Suppression Fire Alarm  Fig: Fire Alarm with Sprinklers |
| Image Source: favpng.com |

In places where such systems were installed, it was seldom observed that they posed more problems than solutions. For example, many times the sprinklers went off because of the smoke caused by some harmless reason thereby creating a lot of mess and nuisance even when there was no fire. Thus, a problem of the false alarm was there.

# The characteristics of Embedded Systems are:

* Reactive systems: The Fire alarm System must set an alarm and turn ON the sprinklers upon detecting a fire. Thus, the system must react instantly to the sensed input(fire/smoke).
* Real-time systems: The Fire Alarm System is a real-time system as it has a feature of recording the exact event (fire) with a time stamp.
* Continuous/discrete/hybrid systems: The IR sensor senses the radiation caused by fire and triggers an alarm by setting a pin of the microcontroller to high (1). Upon receiving a high (1) from the sensor, the microcontroller should send a high (1) on a pin to which the sprinkler motor is connected. Thus the ‘Fire Alarm’ as a system is discrete (1/0 or High/low).
* Dependable systems: Fire can cause monetary loss as well as a threat to life. Therefore, this system should be highly dependable and error-free. Although monetary losses can be compensated, one cannot take a chance on human life
* Distributed systems: This system can be considered a distributed system as we might need an additional controller to manage the water flow/level of the tank for sprinklers. The result/output of the fire alarm system is to spray water. Water tanks can be installed on the roof or can be present underground. A motor is needed to pump this water with high pressure and a controller is needed to continually sense the level of water in the tank and refill the tank accordingly.

Although this system is present at the back end, it must be highly reliable because when the fire alarm goes on, the next and most important state of the system is to sprinkle the water and extinguish the fire immediately. If there is no water in the tank or if the sprinkler malfunctions, the entire system is in vain and is of no use.