

**CHAPTER ONE**  
**INTRODUCTION**

## 1.1 Preface

Each year fire kills more than four thousand civilian and a hundred firefighters in the United States alone [1], its dangerous professions that call for quick decisions in high stress environment, constant reassessment of dynamic situation and close coordination within terms. Furthermore, the smoke, heat, and noise in a structure fire mask the environment and force firefighters to operate with an incomplete picture of the situation.

Fire fighting today still remains a dangerous job. Especially in indoor environments numerous accidents may be avoided by providing better tools for orientation. Various location systems for firefighters based on WSNs have been previously developed, but they either require a fixed infrastructure or have high computational demands making them hardly practical.

So The Automatic fire detection is important for early detection and promptly extinguishing fire. There are examples studies investigating the best sensor combinations and appropriate techniques for early fire detection. These different approaches stem from different backgrounds of researchers dealing with fire, such as computer science, geography and earth observation, and fire safety.

There are many concerns in automatic fire detection, of which the most important ones are about different sensor combinations and appropriate technique for quick and noise-tolerant fire detection.

## 1.2 Problem Statement

The existing firefighting system in the Sudanese gas complex is purely manual system which means slower response time and recovery mechanism damage, loss of materials and resources, and affects the safety of the human life.

## 1.3 Proposed Solution

Converting from manual detection to automatic detection using UV/IR sensor to detect fire, and also to detect the suitable environment ignitions the fire. Moreover, to detect the leakage of gas, gas sensor is used.

## 1.4 Objective

The main aim of this project is to enhance and improve the method which used in the gas companies for firefighting and that is achieved by the following objectives:

- Improve the response time.
- Avoid or reduces the risks which facing the workers in the environment.
- Enhance the communication with the civilian defense and making it more efficient by converting the system to be automatically.
- Decreasing the physical effort and the cost for long period of time.

## 1.5 Methodology

To accomplish this project, the work was divided into three phases:

In the first phase the types and details of all sensors that used in this work will be discussed.

The procedures of detecting fire and gas will be shown in phase two in which the process was done by using four flame sensors and(mq2) gas sensor connected together by (ArduinoLinkIt ONE) to detect the fire and the leakage of the gas in the area and send the result to the civilian defense unit .

The simulation was created using Protues software.

## 1.6 Thesis Organizations

The reminder of this work is organized in the following manner:

**Chapter Two** is a theoretical background definition of fire sensors and there types.

**Chapter Three** describes how to connect the sensors using (arduino linkIt one) board and sending the result by web server.

**Chapter Four** discusses the results of simulation and implementation.

**Chapter Five** draws the conclusion and the future ideas that can be performed.