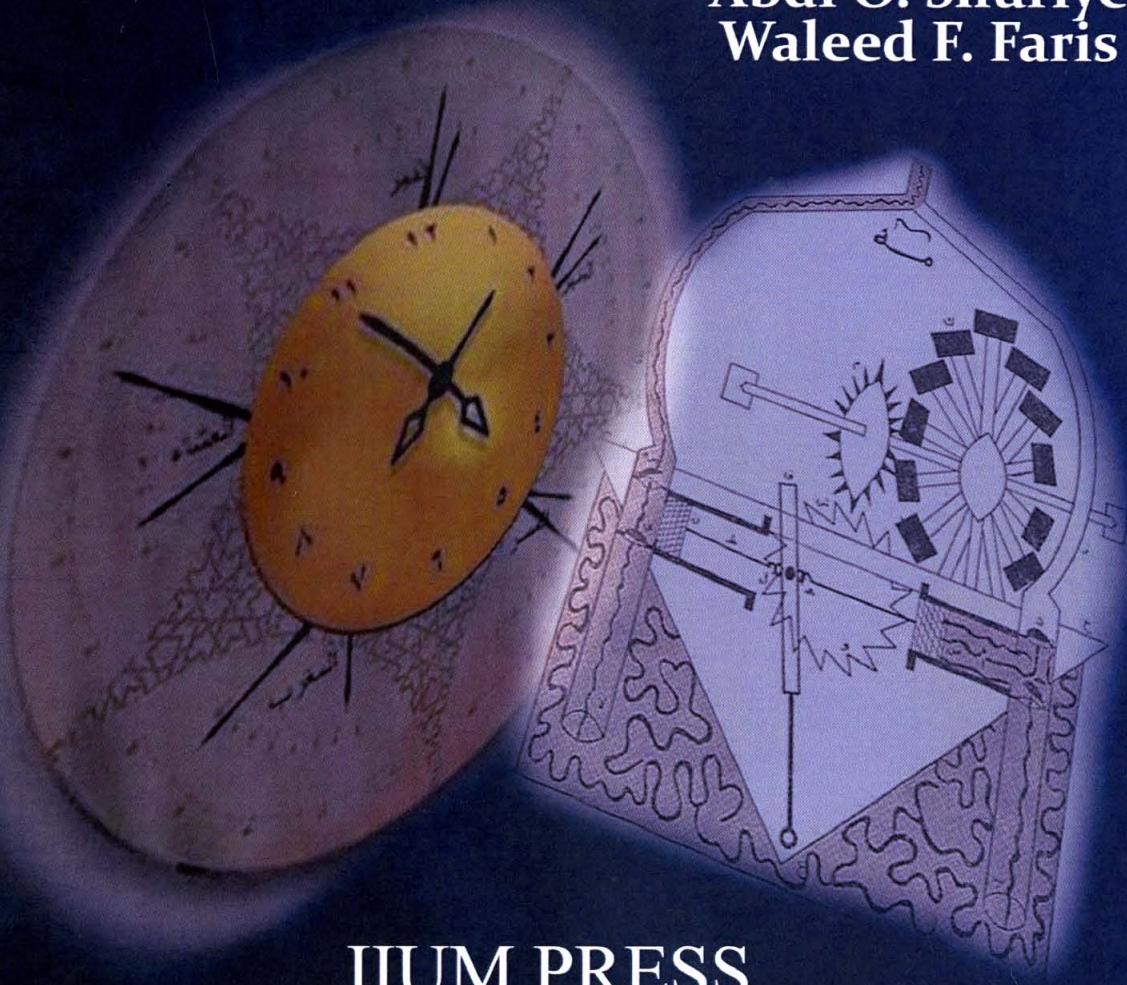


Contributions of Early Muslim Scientists to Engineering Studies and Related Sciences

Abdi O. Shuriye
Waleed F. Faris



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Editors

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CHAPTER TWENTY THREE

CONTRIBUTION OF LOFTI ASKER ZADEH TO FUZZY LOGIC

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23.1 INTRODUCTION

The objective of this chapter is to highlight the contribution of Lotfi Asker Zadeh, the founder of fuzzy logic. Lotfi Zadeh introduced the concept of fuzzy logic through his published paper 'Fuzzy sets' in 1965. The literal meaning of fuzzy is vague, imprecise, subjective or uncertain which gives impression that fuzzy logic is the 'logic' that is fuzzy. However, that assumption is misleading since the actual meaning of fuzzy logic is the logic used to describe fuzziness or imprecise thing (Negnevitsky, 2002, p. 87). Fuzzy logic allows machine to imitate the human thought process, while solving uncertainty problems by means of 'computing with the words' technique. In this technique, all the words by given each of linguistic variables have different degree of membership values (base on human perception) in the fuzzy set. This idea is similar to human decision making technique since used to judge something with linguistic variable such as 'good', 'better', 'nice' which are uncertain and very subjective because it based on individual perception of something which and thus may differ from one person to another. Fuzzy set theory led to development of various intelligent machines that able to decide the solution in the way more to 'human like manner' which called Intelligent System (IS) to deal with uncertainty and impreciseness of real world problems.

The method used in this chapter is based on review of various historical and theoretical publications about Lotfi Zadeh and fuzzy logic. The chapter framework based on (Negnevitsky, 2002) which explain the emergence of intelligent machine from historical and theoretical perspective. The main focus of this research is to point out Lotfi Zadeh contribution to fuzzy logic. This chapter explore the fuzzy logic theory which is innovate by Lotfi Zadeh and emergence of other engineering systems based on this theory. The significant of this chapter will acknowledge Lotfi Zadeh as one of Muslims contributor to engineering field.

23.2 ZADEH'S FUZZY THEORIES

Basically, fuzzy logic concept is very close to existing classical logic founded by Greek philosopher and mathematician, Aristotle. The major discrepancy between fuzzy logic and classical logic theories is the principle called 'Law of exclude middle' applied by classical logic (Zadeh, 2002, pp. 88-89). The law of exclude middle describe that any answer, solution to problem or prepositions should be either completely true or completely false. Therefore, classical logic program discriminate any propositions clearly by giving value 1 (completely true) or value 0 (completely false). In other word, there no other vague or unsure answer for any problems which considered as 'middle answer' that needs to be