Washing Machine Controller Using Fuzzy Logic Technique

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ABSTRACT: : *In this paper , we proposed a fuzzy logic model for washing machine controller by using the different packages available in anaconda. We provide three different types of input to control washing machine by using fuzzy controller by single output. A number of cycle needed in washing machine depends on available input values to clean the clothes. We will perform the implementation of washing machine by importing package Numpy and SKFuzzy from Anaconda. The proposed algorithm is useful for washing machine to save the time of washing machine to save the time of task with three input and one output based fuzzy techniques.*

Key Words: *Fuzzy logic Controller, anaconda , Trigular Membership Function.*

I.INTRODUCTION

The washing machine is very important household appliance to every people in this world. Maximum people are using it for cleaning their clothes . The fuzzy logic techniques makes washing machine to run in automatic mode. The fuzzy logic decides that how many cycles needed to clean the clothes. The fuzzy logic controller works on pre defined rules based on the input variable of clothes. Fuzzy logic controllers take more than one input and may produce one or more outputs. The rules defined on fuzzy logic controller based on IF-Then conditional statement. The proposed methodology based on two input variables like Amount of Load and Load of Cloths needed to clean the cloths. All calculation are done in python language under Anaconda Programming Environment.

II. LITERATURE REVIEW

LA Zadah 1965 , He developed a fuzzy membership values ranges from 0 to 1. It is calculated my membership function defined on fuzzy system. There are many types of membership function like Triangular membership function,Trapezoidal membership function, rectangular membership function etc. these function is useful in calculating membership values of linguistic variable of fuzzy system. In fuzzy logic, The crisp data sets are actual input in fuzzy system and it is coverted into fuzzy values called Fuzzification. The reverse of fuzzification is called defuzzification. The defuzzification converts the fuzzy values into Crisp values.

Hugang Han et all 2001, The Authors deals with the non linear system for fuzzy logic controller. It constructed the parametrized fuzzy system by using Radial Basis Function (RBF) as a membership function. The proposed fuzzy system reduces the approximation error and improving the performance of fuzzy system.

L.A Zadeh 1973 "Outline of a new approach to the analysis of complex system and decision process". The Author, In this paper works on 3 distinguishing features of fuzzy logic. 1) uses of linguistic variables 2) Relationship of variables while applying fuzzy conditional statement and 3) Characterization of complex relation of fuzzy system.Fuzzy Conditional statement uses IF-THEN rules to produces the final result.

Shi Jaun et all 1973, The authors developed a model for power system stabilizers. In this model the Authors Protect the costly home appliance from low and high voltage fluctuation using fuzzy logic techniques. If power supply is less then this devices increases the voltage and if power supply is more than the normal then it decreases the voltages to prevent it from being damaged.

H Taliyat et all 1996, The Authors view toward the electricity is that the it is most dynamic system in this world. It means that the electricity sometimes suddenly increases and sometime suddenly decreases. It damaged our home appliances. They developed a model to overcome such type of problem using fuzzy logic techniques.

Geoge J Kilr et all, the proposed a new model to control washing machine by taking five different types of input like type of dirt , amount of dirt, types of clothes, Amount of clothes, and temperature. The proposed model produces 3 different outputs like the wash time of clothes, Rinse period and spin period. They uses 216 rules

for wash time , 216 rules for rinse period and 25 rules for calculating spin period.

Shikha Roa et all, 2011, The Authors proposed a comparison chart for perce of fuzzy logic controller by using different types of membership function by using MATLAB tools. They analyses the performances of different type of fuzzy logic membership function depending upon the types of input it holds.

Sonia Chhabra 2007, He proposed a fuzzy logic controller model for VHDL(VHSIC Hardware Description Language) . It is used in Automation of electronic design to describe digital and mixed signal system such as field programmable gate arrays and integrated circuit.

Ibrahim H Banat et all ,2011 , The Authors built a model of fuzzy logic controller system for fuzzy logic. They uses membership function to calculate fuzzy values and defuzzifies to get the final output.

Lohani et all 2009, The authors developed an improved controller microchip for washing machine.

Suchitra et all 2014, She made a fuzzy logic controller for Air Condition bytaking two crisp input , Temperature and Humidity and produces a singleton output function. Three defuzzifiers are used to control the actuator, coolers fan, water pump and room exhaust fan.

Manish agrawal 2011, Proposed the fuzzy logic controller for washing machine by taking two input variable and one output variable. It uses sensor to analyse the amount of dirt. The fuzzy logic controls washing machine according to amount of dirt.

III. PROPOSED METHODOLOGY

To solve the problem of washing machine using fuzzy logic controller. The fuzzy logic is a method of reasoning and fuzzy logic adopts the decision capability like human being.

The following are the probabilities occurred in the input and output variables if washing machine problem.

The washing machine takes an input.

1) Amount of Dirtiness (AOD)

Universe(i.e Crisp Vale Range): How the clothes are dirty in the range of 46 to 53.

Fuzzy Linguistic variables Low,Medium and High.

2) Load of Clothes (LOC)

Universe The load of clothes are defined are defined in the range of 66 to 69.

Fuzzy Linguistic variables Low,Medium and High

The following membership functioned are defined to solve the problem of washing machine.

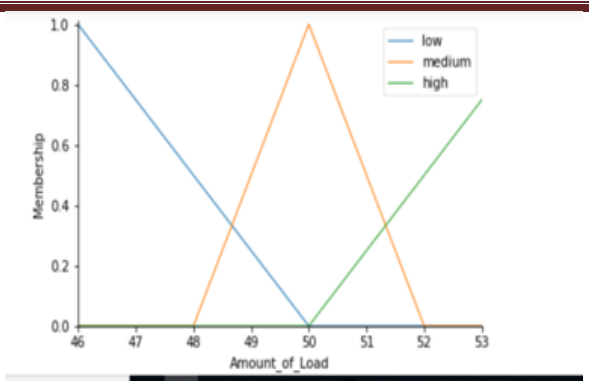

Figure No 1.1 Membership Function for Amount of Load

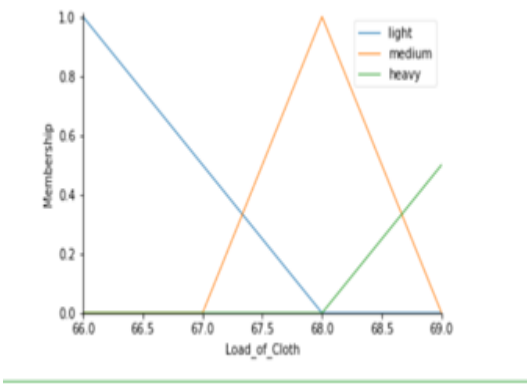

Figure No 1.2 Membership Function for Load of Clothes

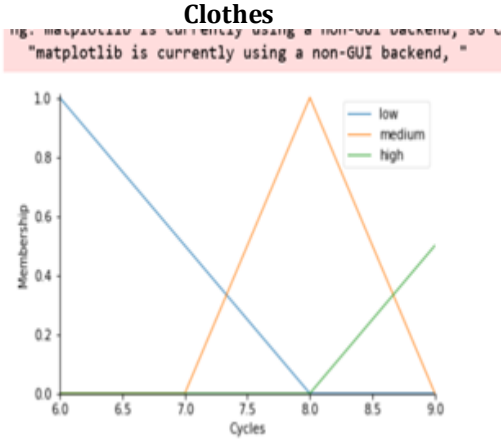

Figure No 1.2 Membership Function for No of Cycles

The following rules are involved in the fuzzy controller for producing the result in term of number of cycles needed to clean the clothes.

RULES

rule1 = ctrl.Rule(aod['low'] & loc['light'], cycles['low'])

rule2 = ctrl.Rule(aod['medium'] & loc['light'], cycles['low'])

rule3 = ctrl.Rule(aod['low'] & loc['medium'], ycles['medium'])

rule4 = ctrl.Rule(aod['medium'] & loc['medium'], cycles ['medium'])
rule5 = ctrl.Rule(aod['high'] | loc['heavy'], cycles['high'])
Case 1: wm.input['Amount_of_Load'] = 48.8
wm.input['Load_of_Cloth'] =70
wm.compute()
print(wm.output['Cycles'])
cycles.view(sim=wm)
8.666666666666666

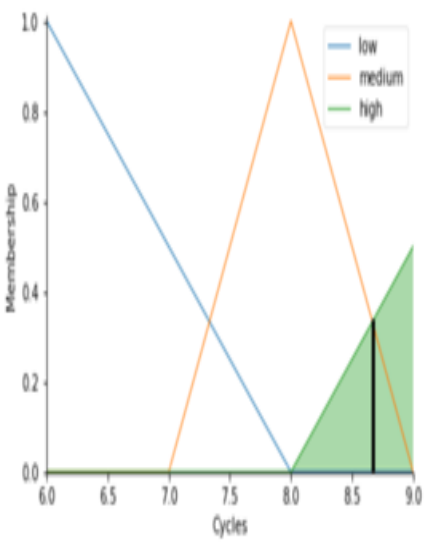

Figure No 1.4 Output I

Case: 2 wm.input['Amount_of_Load'] = 48.8
wm.input['Load_of_Cloth'] =55.5
wm.compute()
print(wm.output['Cycles'])
cycles.view(sim=wm)
6.816666666666666

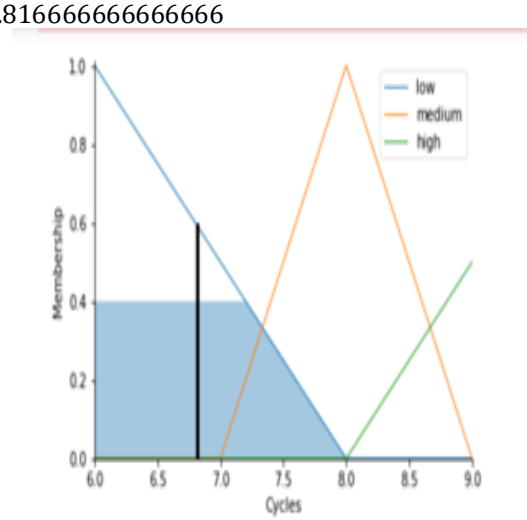

Figure No 1.5 Output II

Case :3 wm.input['Amount_of_Load'] = 50
wm.input['Load_of_Cloth'] =68
wm.compute()
print(wm.output['Cycles'])
cycles.view(sim=wm)
8

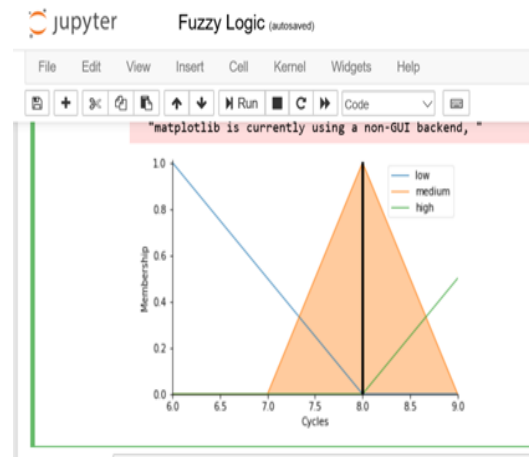

Figure No 1.6 Output III

V.CONCLUSIONS

By using the proposed fuzzy logic controller, we have able to obtain the different number of cycles according to the value of two different types of input parameter. i.e the amount of dirt and the load of clothes. The proposed methodology leads to saving the electricity energy and time taken by washing machine.

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