ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An UGC Approved Journal)

Website: www.ijareeie.com

Vol. 6, Issue 9, September 2017

Implementation of Fuzzy Based Washing Machine

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ABSTRACT: The general washing machine is an example of the advance washer control with a great technology. This advancement helped the household scenario very well. But we need to make it more advance from the previous one. Here, the system will consist of the neuro- fuzzy and fuzzy techniques that will help the system to take its own decisions like release of water and washing powder as per need of cloth. Also the fabric detection technique will implement with the help of these techniques.

KEYWORDS: Fuzzy –controller, Neuro-fuzzy logic, Washing machine, Fuzzy techniques.

I. INTRODUCTION

At present, the washing machine has becomes an essential electrical appliance in our life. In this project we will introduce an intelligent algorithm to the system. In this, we will build a neural network fuzzy control model on the basis of the washing machine's own characteristics and some external factors. "We are now entering the generation where there is more concern for the quality of life rather than mere material reward. So home appliances should be supplied to realize the higher quality of life. In this trend, neural network is one key technology toward this. As examples of the applications of neural networks the intelligent washing machine, the intelligent rice cooker and the intelligent air-conditioner are introduced. And what is going on the fundamental research toward intelligent home appliances are introduced.

As a typical example related to clothing, there is an automatic washing machines controlled to its optimum condition. This is attained by combining the logic of fuzzy reasoning with the learning capability of neural network. Whereas more of the modern automatic household machines are controlled by fuzzy reasoning, the reasoning employed there should be more detailed in order to make the control finer although the finer control is possible by providing a large number of various sensors and by utilizing the information derived by these, this is only possible by sacrificing the machine cost. Therefore, the establishment of the desired inference rules by existing sensors is desired. This means the accomplishment of human-like judgment t by using only one type of physical data.

At a primitive stage, the control of washing machine is accomplished by the fuzzy reasoning with three independent sensors. These sensors are an optical sensor, a current sensor and a water-level sensor an optical sensor detects the degree and type of soiling and the type of detergents. A current sensor detects the amount of washing clothes. A water-level sensor detects the amount of water The washing and rising periods, number of rinsing cycles, spinning time, water-level and current strength are reasoned out by using those sensors' outputs.

In order to make the machine control finer, it is necessary to acquire more washing information such as the type of clothes, preferred washing course, water quality and the dissolution of detergent (water temperature and the amount of the detergent). Although these can be done by providing sensors dedicated for this purpose, this will certainly increase the machine cost. It has been found that this problem can be solved by optimizing the parameters of the membership functions of fuzzy reasoning after those are roughly set initially. This optimization can be done by the

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trainability of neural network, and this process is called "neuro-fuzzy". Despite an increased amount of judging information, the increase of design and product costs is very low and also the machine operation can be optimized.

II. PROBLEM DEFINITION

While using washing machine consumer estimates the wash time according to amounts of clothes which are in the washing machine. This is incorrect up to some degree. To amplify washing quality we need to auto mate the cleaning process by using fabric detection sensor which includes type of fabric, level of dirt, no. of spins and amount of water and detergent to be released. But, calculating the presides washing time mathematically, is very complex since large variation in volume of cloth and type of dirt. This was the major problem in general washing machine which was somehow dealt by try and error method along with experience. Since washing machines were not fully automatic, consumer had to make all the decisions such as amount of washing time, amount of water and amount of detergent. TO resolve this problem we have used fuzzy logic. It is been used because it gives the approximately correct washing time according to type of type of cloths.

Objectives:

1. Main objective is to design a self-decision making washing machine which widely used for home appliances to improve performance.
2. A system which will be able to take all the decisions accordingly with the help of fuzzy rules and neural training.
3. It is a type of mechatronic system which has very less errors and maintenance.
4. The use of Embedded System should give rise to many interesting applications like auto fabric detection in washing machine.

III. DESIGN OF FUZZY CONTROLLER

Interfacing with Sensor Network

Fabric detection is one of the important features of the washing machine here. This provides a great advancement to the system. This detection of the fabric type is based on the reflectrometry technique. After detection of various fabric one after another the machine used to take the average of all the fabric type detected by the sensor.

Here, a group of optical sensors is used in order to sense the load as well the other factors of the washing machine like dirt, fabric type, temperature of water and many more. According to these sensors output the automatic dispenser of washing powder and water will release. An optical sensor is a device that converts light rays into electronic signals. It measures the physical quantity of light and translates it into a form read by the instrument. The features of an optical sensor are its ability to measure the changes from one or more light beams. Diffusion scattering caused due to venation in reflective index which is caused by complex situation. Variation of scattering along the interface can be estimated by measuring of secular's reflectivity. The component is introduced due to scattering which is parallel to incident beam.

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Fig.1 Interfacing with Sensor Network

Membership Functions

In X domain binary is membership function each point. Therefore A becomes the addition of all the values. For example A=0.2/2+0.5/3+1/4+0.2/6. Thus subset of fuzzy variable get defines. The input and output of the washing machine which are control by it provides the degree function as shown in figure. So that the successive fuzzy sub set can be determine easily.

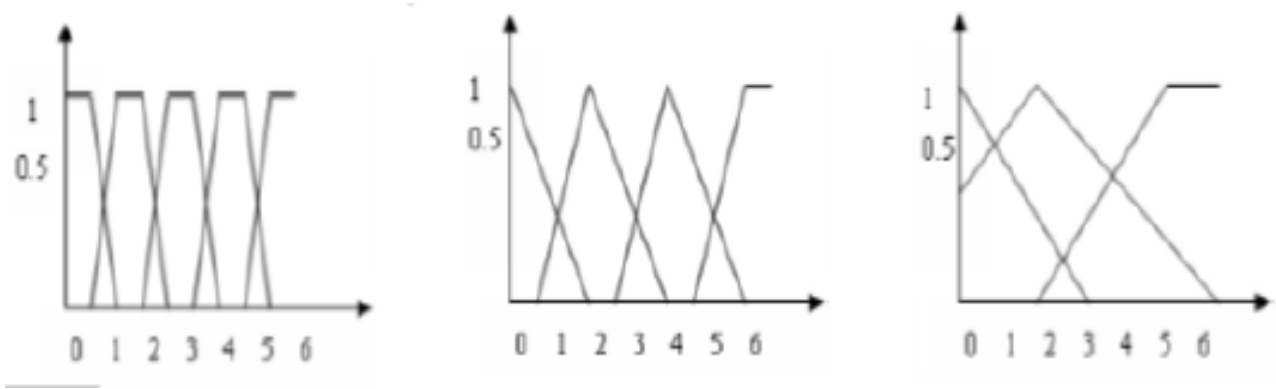

Figure 3.5 Membership Function of Washing Machine Fuzzy Variables

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Fuzzy Rule based

The idea behind fuzzy inference is to interpret the values in the input vector, based on some set of rules, to assign values to the output vector (like No. of spin). That's really all there is to it. For our thermostat problem, some of the fuzzy "if-then" rules are:

- If CLOTH is LESS DIRTY and WATER is 3lt and DETERGENT is 10ml THEN SPINS will be 4.
- If CLOTH is DIRTY and WATER is 6lt and DETERGENT is 15ml THEN SPINS will be 6.
- If CLOTH is VERYDIRTY and WATER is 8lt and DETERGENT is 20ml THEN SPINS will be 8.

	AND		THEN
Clothes	Water	Detergent	Spins
Less Dirty	3 lt	10ml	4
Dirty	6 lt	15ml	6
Very Dirty	8 lt	20ml	8

IV. RESULT AND DISCUSSION

The fuzzy rule windows and the graphical output windows:

Fuzzy Editor Windows

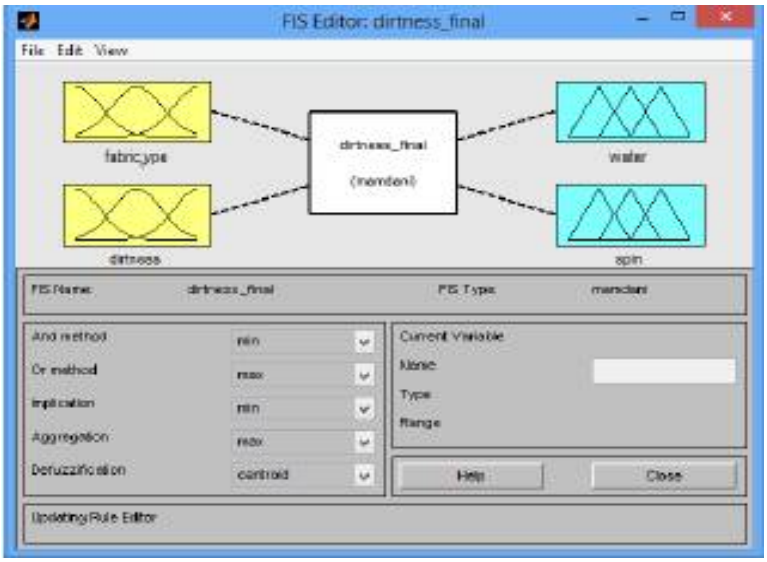

Figure 7. Fuzzy Interface Editor Window

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Here, the main four parameters have been decided namely Fabric type, Dirtiness, Water, and Spin that too with the help of the editor function of the mat lab. Various parameters can get its values here. Whatever the required parameters are there can be introduces here.

Fuzzy Function Windows

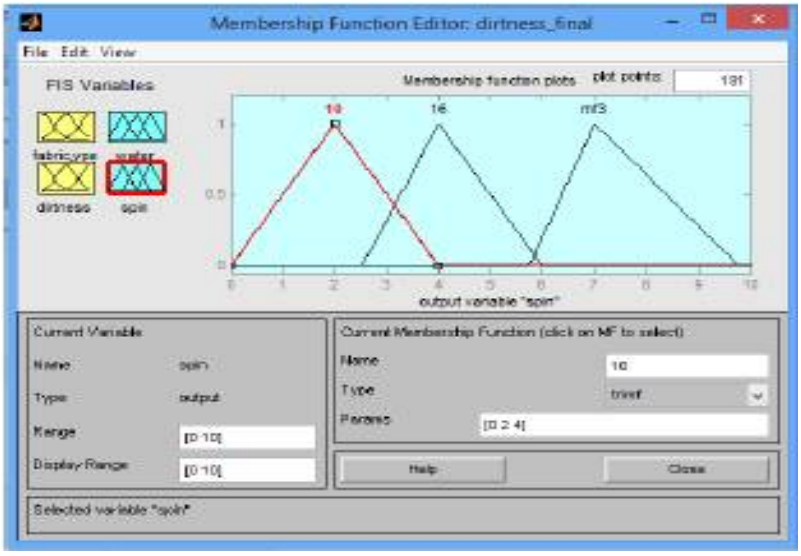

Figure 8. Membership Function Editor Window No of Spin

The particular spin parameters are taking place here. The three function are specifies on the basis of which the rules will get decide.

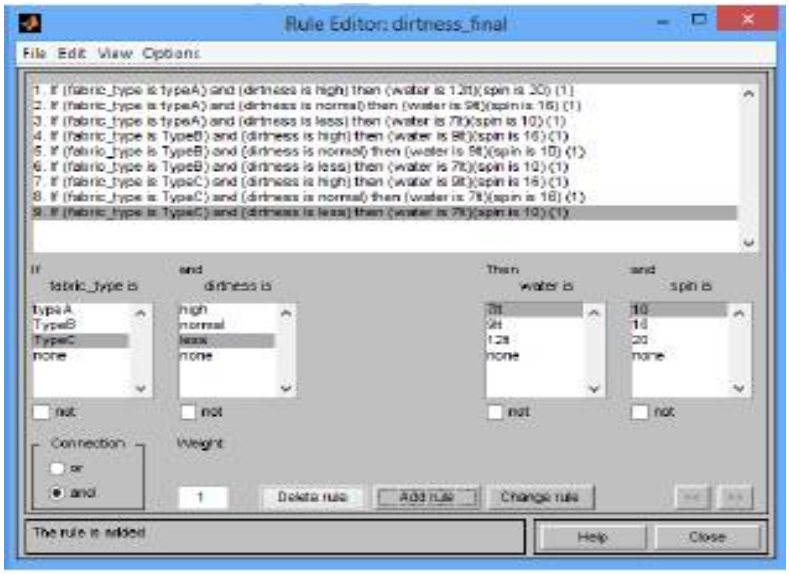

Figure 9. Fuzzy Rules Editor Window

Here, the implemented fuzzy rules have been shown. As per the rules, machine will be able to take its own decisions.

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Output Viewer Window

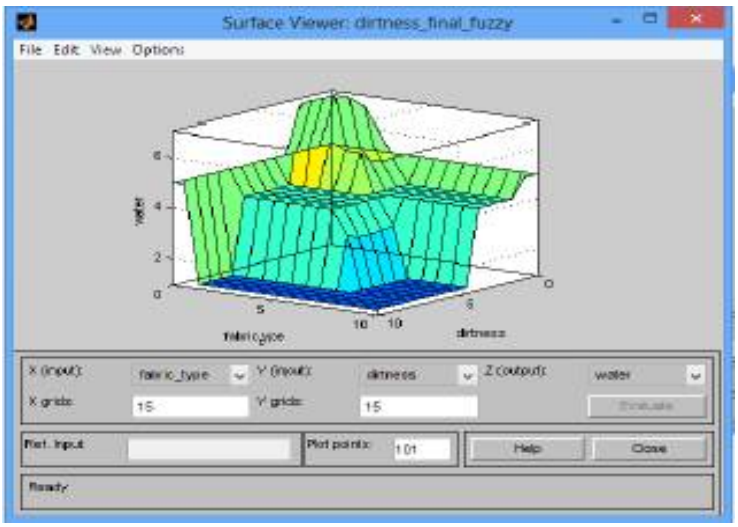

Figure 10. Graphical Output Viewer Window

The output of the fuzzy rules made in the graphical form can get easily. This graphical view revolves in the 3 directions. So that every parameters can be seen varying.

Rules Viewer Window

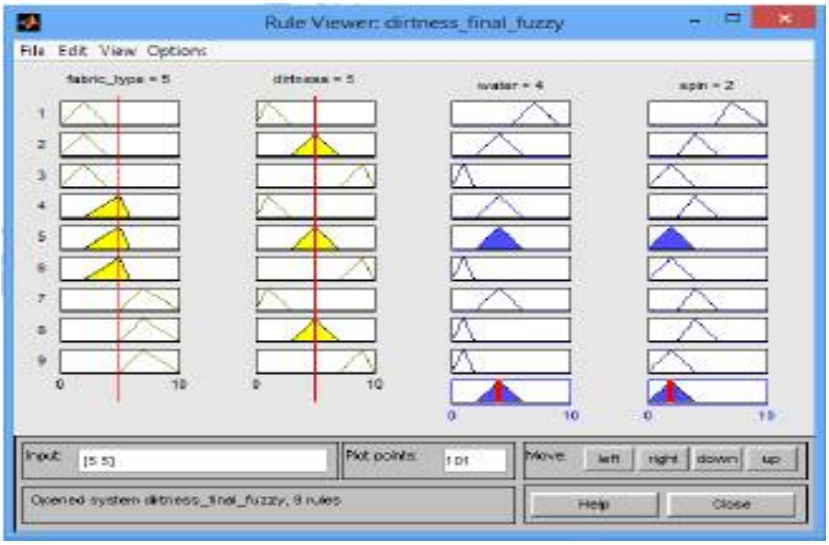

Figure 11. Fuzzy Rules Viewer Window

The rule viewer helps the user to get the different curve and difference at the different point.

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V.CONCLUSION

The ultimate conclusion is that more the machine is automatic more will be the conveniences to the user hence this project delivers a new arrangement by enhancing the decision making ability of machines by using fuzzy logic. Although the arrangement is at entry/basic level but the advantages due to our method over conventional are clearly visible.

Thus, a time and energy saver machine will build which will be suitable in every aspect. By putting all the possible technology together, it finally comes out to be with less labour and easy handling element. This fully automatic washing machine will be a great combination of technology and intelligence.

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BIOGRAPHY

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Vol. 6, Issue 9, September 2017

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