

Intelligent Washing Machine Using Soft Computing

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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

Toward present, the washing machine needs turns into a crucial electrical machine on our existence. In this task an intelligent algorithm will present of the framework. This framework will worth of effort with the system, which will tell the framework turn into canny. Over this, a neural system fluffy control model is expanding on that foundation of the washing machine's own aspects and a portion outer variable. After implementation, the machine required get capable will make its identity or choice likewise for every those prepared organize.

Warren McCulloch and Walter Pitts (1943) created a computational model for neural networks based on mathematics and algorithms which was followed by many and hence was published and submitted to eastern Mediterranean university. They called this model threshold logic. The model paved the way for neural network research to split into two distinct approaches. One approach focused on biological processes in the brain and the other focused on the application of neural networks to artificial intelligence.

In the late 1940s psychologist Donald Hebb created a hypothesis of learning based on the mechanism of neural plasticity that is now known as Hebbian learning. Hebbian learning is considered to be a 'typical' unsupervised learning rule and its later variants were early models for long term potentiation. These ideas started being applied to computational models in 1948 with Turing's B-type machines.

Farley and Wesley A. Clark (1954) first used computational machines, and then called calculators, to simulate a Hebbian network at MIT. Where other neural network computational machines were created by Rochester, Holland, Habit and Duda (1956).

Frank Rosenblatt (1958) created the perceptron, an algorithm for pattern recognition based on a two-layer learning computer network using simple addition and subtraction. With mathematical notation, Rosenblatt also described circuitry not in the basic perceptron, such as the exclusive-or circuit, a circuit whose mathematical computation could not be processed until after the backpropagation algorithm was created by Paul Werbos (1975).

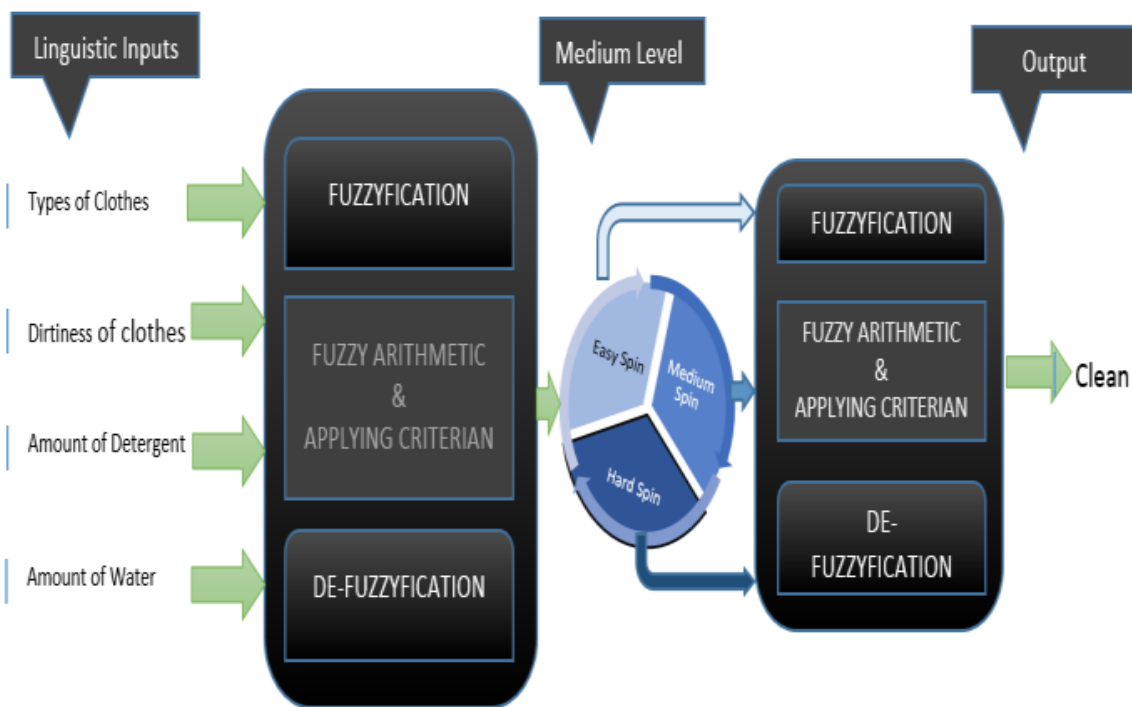
Neural network research stagnated after the publication of machine learning research by Marvin Minsky and Seymour Papert (1969). They discovered two key issues with the computational machines that processed neural networks. The first issue was that single-layer neural networks were incapable of processing the exclusive-or circuit. The second significant issue was that computers were not sophisticated enough to effectively handle the long run time required by large neural networks.

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

II. SYSTEM OVERVIEW

The washing process uses energy, which is subdivided into heating, mechanical action and pumping. The amount of energy used for heating is influenced by the amount of water, the wash load, the temperature of the cold water inlet and the temperature to be reached. The energy used for mechanical action total wash time dependant. The energy use for pumping is in general fixed in the wash programme. During the washing process the energy used to heat the water also flows to other parts of the machine, for example the steel drum, the glass door and the wash load and also part is lost to the environment.

The amount of energy that is lost to the environment depends on a number of variables, among which the insulation of the machine, the duration of the cycle, the ambient temperature and the temperature of the heated water. Future energy savings are expected to take place through efficient motor technology, lower washing temperature, increased load capacity, rinsing phase optimization and sophisticated electronic controls.



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Neural network and fuzzy system can deal with non-linearity by using multiple based function. These techniques are extremely effective where mathematical equation is hard to explain. In this system membership function responds to based function. Every input is partition by fuzzy logic with help of this function to design every input variable by synthesisation of rules in fuzzy system characteristic can be predicted. Function of neuron control based function neural network.

III. IMPLEMENTATION

A group of optical sensors is used so that it can sense the load as well as 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. A washing machine also includes a sensor i.e. optical sensor so that it can detect a light permeability of detergent solution and rinse water in a washer tank. The optical sensor includes a light emitting element and a light receiving element. A microprocessor (Fuzzy Controller) is provided for controlling a luminous intensity of the light emitted from the light emitting element.

The most important utility a customer can derive from a washing machine is that he saves the effort he/she had to put in brushing, agitating and washing the cloth. Most of the people wouldn't have noticed (but can reason out very well) that different type of cloth need different amount of washing time which depends directly on the type of dirt, amount of dirt, cloth quality etc. The washing machines that are used today (the one not using fuzzy logic control) serves all the purpose of washing, but which cloth needs what amount of agitation time is a business which has not been dealt with properly.

In most of the cases either the user is compelled to give all the cloth same agitation or is provided with a restricted amount of control. The thing is that the washing machines used are not as automatic as they should be and can be. The purpose of this project is to design a simulation system of fuzzy logic controller for washing machine automatic control by using simulation package which is Fuzzy Logic Toolbox and Simulink in MATLAB software. The paper describes the procedure that can be used to get automatic dispenser of water and detergent as per the fabric type. The process is based entirely on the principle of taking non-precise inputs from the sensors, subjecting them to fuzzy arithmetic and obtaining a crisp value of the washing time.

IV. CONCLUSION

Those development washing machines bring those load sensors on it in place on mechanize the framework. This framework provides for headway of the engineering something like that Likewise of the science. All the more fully programmed washing machine will be direct will configuration utilizing fluffy rationale innovation. Expanding those controller fill in that controls just those wash chance of a washing machine, will outline procedure could make broadened to other control variables for example, water level Furthermore turn velocity. The plan Furthermore execution from claiming participation capacities What's more decides may be comparable to that demonstrated to wash chance. Full "Fuzzy Logic" programmed control framework incorporates that temperature control, washing time, What's more washing pace. The general utilization of fluffy in the framework will execute in the machine that will control the load and also the water also washing powder dispensers. A number different result creator and commercial enterprises utilized the fluffy systems over their manner. There need aid Different provisions created utilizing this innovation however the blending from claiming neural furthermore fluffy is new in this range. This blending will provide for Ascent on another commitment of the science and engineering organization. This blending for fluffy Also neural system will used to recognize those fabric kind that will those practically development framework and the commitment towards the framework.

REFERENCES

- [1] Aykut Kentli Department of Mechanical Engineering Marmara University, 34722 Kadıköy, Istanbul, "Studies On Fuzzy Logic Control Of Electrical Machines In Turkish Universities" Mathematical and Computational Applications, Vol. 16, No. 1, pp. 236-247, 2013. © Association for Scientific Research.
- [2] Ahmet Yorukoglu and Erdinc, Altuğ, Member, IEEE, "Estimation of Unbalanced Loads in Washing Machines Using Fuzzy Neural Network" in *IEEE/ASME transactions on mechatronics*, vol. 18, no. 3, June 2013.
- [3] Paulo Leitão 1,2, Nelson Rodrigues 1, "Modelling and Validating the Multi-agent System Behaviour for a Washing Machine Production Line", in Polytechnic Institute of Bragança, Campus Sta Apolónia, Apartado 1134, 5301-857 Bragança, Portugal {pleitao, nrodrigues} and Artificial Intelligence and Computer Science Laboratory, Rua Campo Alegre 102, 4169-007 Porto, Portugal.
- [4] Zhu Xiaoliang Computing Center Hebei United University Tangshan, China and Zhang Wei Computing Center Hebei United University Tangshan, China Research on "Fuzzy Control System" in 2012 International Conference on Industrial Control and Electronics Engineering.
- [5] Yu Zhen Dept. of Automation Xiamen University Xiamen, China and Xu Fang Dept. of Automation Xiamen University Xiamen, China "The Fuzzy Decision and Simulation of Washer Control" in The 6th International Conference on Computer Science & Education (ICCSE 2011) August 3-5, 2011. SuperStar Virgo, Singapore.
- [6] Hu Lianhua, Li Xiping, Tang Wei, Liu Qingli Shaanxi University of Science & Technology, Xian, Shaanxi, 710021, China "The Application of Fuzzy Control in Pulp Washing Process" in 2011 Third International Conference on Measuring Technology and Mechatronics Automation.
- [7] LI Jin-song, LING Min, "The status & development of fuzzycontrol", Vol.8.No.5, Oct.2010.
- [8] S.Hata, K.Hayashi, J.Hayashi, H.Hojoh, T.Hamada: "Recognition of Marks in Many Texture Noises on Washing Clothes," IEEE ICMA2010, pp.1195-1198(2010).
- [9] Ahmet Yörükoğlu, Erdinç Altuğ, "Determining the Mass and Angular Position of the Unbalanced Load in Horizontal Washing Machines" 2009 IEEE/ASME International Conference on Advanced Intelligent Mechatronics.
- [10] Roberto Di Stefano and Fabrizio Marignetti Department of automation "Maurizio Scarano" The University of Cassino Cassino, Italy "An Axial Flux Permanent Magnet Machine with Charged Polymer Stator Core" 2011 IEEE.



- [11] Chen Xizhen¹, Chen Guangjian², Jia Jinling², Yu Han¹, Zhou Tianpeng¹ I. Faculty of Automation and Information, Sichuan University of Science and Engineering, Zigong, China; “Design of Automatic Washing Machine Based on Verilog HDL Language” 2011 International Conference on Electronics and Optoelectronics (ICEOE 2011).
- [12] Zheng Zeng, Huan Yang, Rongxiang Zhao, Shengqing Tang College of Electrical Engineering Zhejiang University “An Electromechanical Coupling Model for an Inclined Drum Washing Machine Vibration System” 2011 IEEE International Electric Machines & Drives Conference (IEMDC).

BIOGRAPHIES



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