J. Basic. Appl. Sci. Res., 1(11)2069-2072, 2011

ISSN 2090-4304
Journal of Basic and Applied Scientific Research
www.textroad.com

Neural NetworkContinuousValued Logic Controllers

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ABSTRACT

This paper presents a new concept of neural network continuous valued logic applicable (NNCVL) in controllers. The main advantageof the proposed controller appears to be its ability to eliminatepersistent oscillations. As the NNCVL controller can tolerate bigger modeling errors, it is more robust than CVL controllers. Another interesting observation is that the performances of both controllers are similar for the nominal plant, indicating that robustness isobtained with little performance trade-offs.Finally, this concept has applied to a speedcontroller. The result shows good capability of the proposed neural network in control systems.

Keywords:neural networks, PWM, NNCVL controllers

I. INTRODUCTION

In this paper continues valued logic has presented ascontinuation of Multi-valued logic. Because of this we first of all describe Multi valued logical calculi in which there are more than two possible truth values [1 and 2]. Traditionally, logical calculi are bivalent. There are only two possible truth values for any proposition, true and false (which generally correspond to our intuitive notions of truth and falsity) [3 and 4]. But bivalence is only one possible range of truth values that may be assigned, and other logical systems have been developed with variations on bivalence, or with more than two possible truth-value assignments [5 and 6].

II. Neural Network continuous-valued Logic

NNCV logic performs a mapping between n inputs and single output.
For MVN, which performs a mapping described by k-valued function, we have exactly k domains. Geometrically they are the sectors on the complex plane (Fig. 1).

Note that and are both adjustable scalar parametersof the neuron [7, 8, 9 and 10]. Typically the transfer function ischosen by the designer and then the parametersand will be adjusted by some learning rule so thatthe neuron input/output relationship meets somespecific goal [11 and 12].

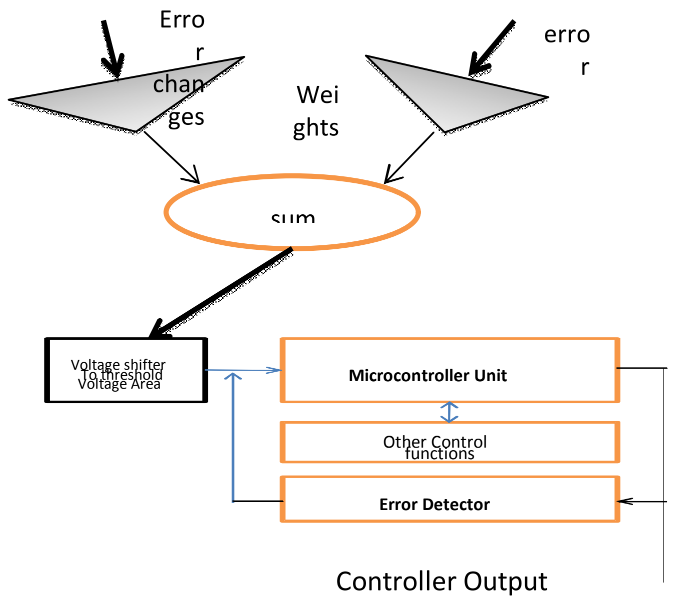

Fig. 1: The basis of NNCVL Control

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The transfer function in Figure 2 may be a linear or a nonlinear function of. A particular transfer functions chosen to satisfy some specification of theproblem that the neuron is attempting to solve.

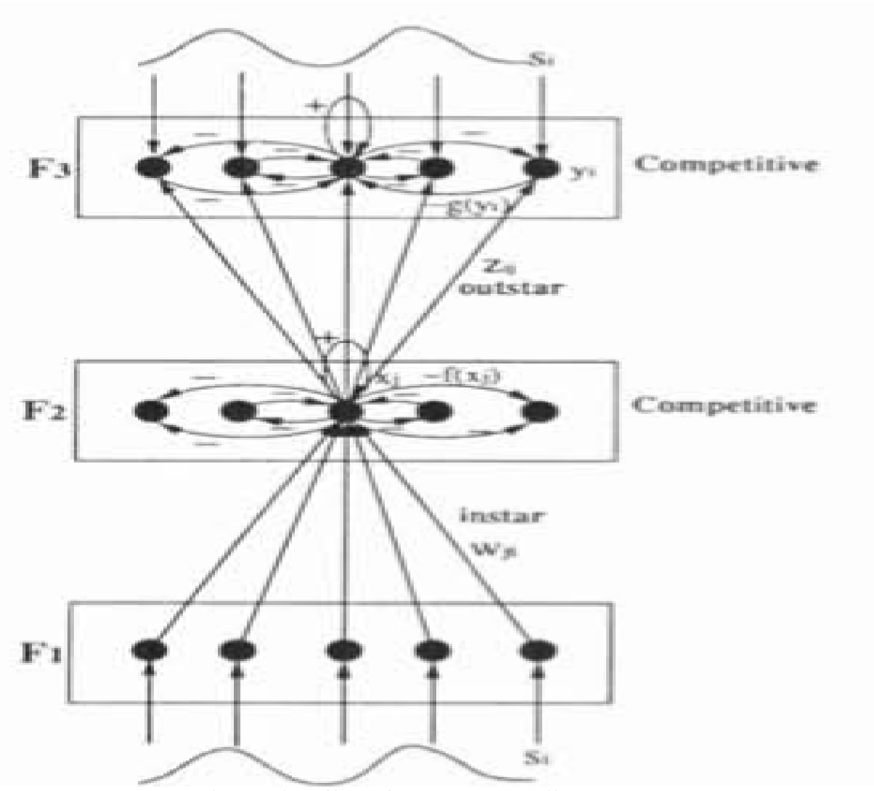

Fig. 2: The effect of NNCVL controller

We would like to draw networks with several neurons,each having several inputs. Further, we wouldlike to have more than one layer of neurons. You canimagine how complex such a network might appearif all the lines were drawn. It would take a lot of ink,could hardly be read, and the mass of detail mightobscure the main features.
As shown in Figure 3, the input vector is representedby the solid vertical bar at the left. The dimensionsof are displayed below the variable as indicating that the input is a single vector ofelements. These inputs go to the weight matrixwhich has columns but only one row in thissingle neuron case.
Note that the number of inputs to a network is set bythe external specifications of the problem. If, for instance,you want to design a neural network that isto predict kite-flying conditions and the inputs areair temperature, wind velocity and humidity, thenthere would be three inputs to the network.

III. Using Neural Network Continuous-Valued Logic in Control Processes

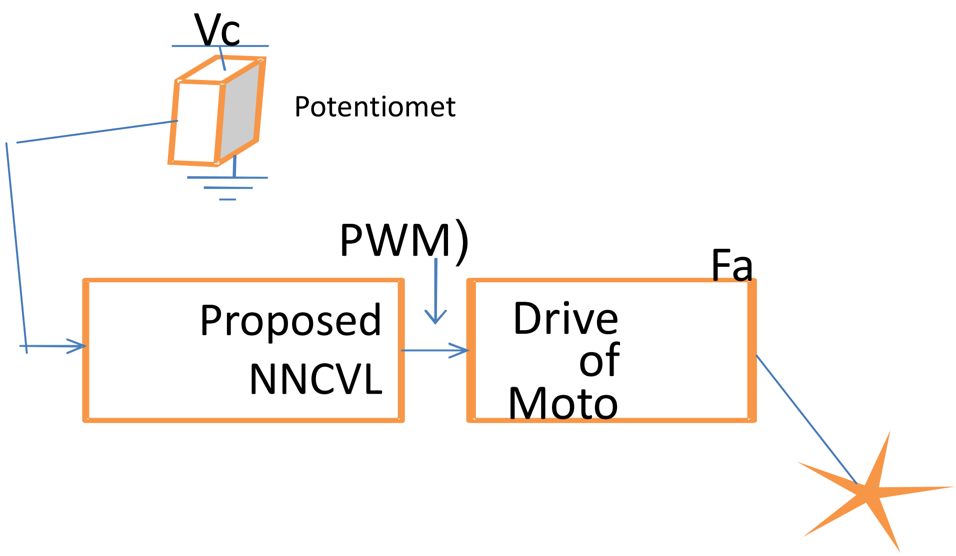

Fig.3: Neural Network Continuous-valued Logic test Circuit

Some early generation computers did not need active ventilation. Power supplies eventually needed forced cooling, and soon took up the duty of cooling the rest of the NNVCL Controller with the PQR standard. The byproduct of increased heat generation is that the fan(s) need to move increasing amounts air and thus, need to be more powerful. In fact, if one installs extra fans in a computer case, the noise levels can reach 80 dB. Since fan noise increases with the fifth power of the fan [13]rotation speed, reducing rotations per minute (RPM) by a small amount potentially means a reduction in fan noise.

This must be done cautiously, as excessive reduction in speed may cause components to overheat and be damaged. If done properly fan noise can be drastically reduced.

The main block of this controller is voltage shifter to threshold voltage area block in which analog input signal come from sensors has to shift to the voltage area which causes the microprocessor to oscillate.

Lastly, the ability of the two controllers to deal with a larger speed delay was studied. First, a 2-second speed of a fan was added to the system. The step responsesand the control signal are shown in Fig. 4. When a 4-second one was added to the system, the results are shownin Fig. 4, too. Once again, the NNCVL controller outperforms its counterpart especially when the uncertainty is large. Thus, itmay be concluded that the NNCVL is more robust than the CVL controllers.

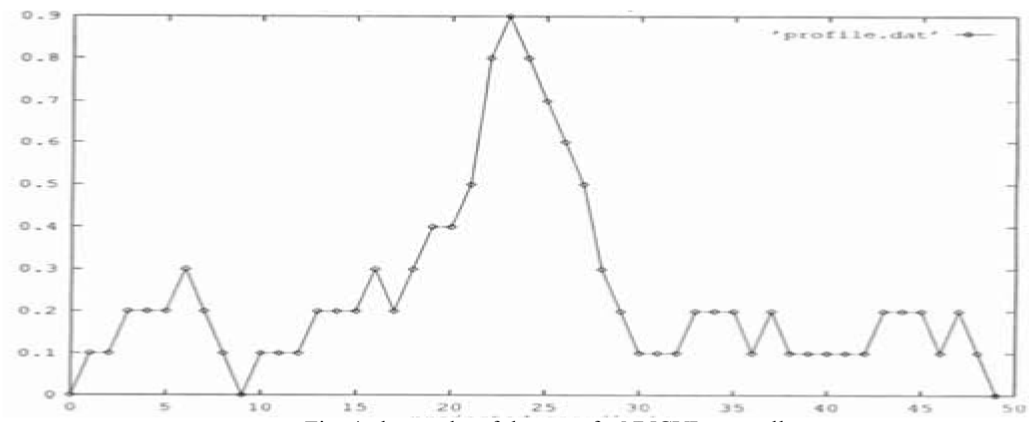

Fig. 4: the results of the test of a NNCVL controller

IV. Conclusion

In this paper, a NNCVL approach for designing a singletoninterval controller is proposed and used to design a controllerfor a coupled-tank liquid-level system. Experimental resultsshow that the proposed controller outperforms its CVL controller counterpartsignificantly when the modeling error is large. The basis of Neural Network Continuous-Valued Logic (NNCVL) relies on the unstable generated oscillation of a digital output where the program referred Schmitt input, is detecting (0) and (1) values at the stage of Threshold Voltage. Another concept of NNCVL can be applied to control the pulse width of an internally generated PWM in a Microcontroller. The input threshold voltage can be also considered as the Reference Voltage.

REFERENCES

[1].Koshkouei, A. J. and Zinober, A. S. I., sliding mode controller-observer design for SISO linear systems. Int. J. systems Science, 29, 1363-1373,1998.

[2].Drakunov, S. V. and Utkin, V. I., Sliding mode control in dynamic systems. Int. J. Control, 55, 1029-1037, 1992.

[3].T.C. Manjunath," Design of Moving Sliding Surfaces in A Variable Structure Plant & Chattering Phenomena", International Journal of Electronics, Circuits and Systems Volume 1 Number 3,

[4].Mohammed GolamSarwer, Md. AbdurRafiq and B.C. Ghosh," Sliding Mode Speed Controller of a D.C Motor Drive", Journal of Electrical Engineering, The Institution of Engineers, Bangladesh ,Vol.EE 31, No. I & II, December 2004

[5]. X. Wang, A Course in Fuzzy Systems and Control. Englewood Cliffs, NJ: Prentice-Hall, 1997.

[6].L. K. Wong, F. H. F. Leung, and P. K. S. Tam, “Lyapunov-function-based design of fuzzy logic controllers and its application on combining controllers,” IEEE Trans. Ind. Electron., vol. 45, pp. 502–509,Jun. 1998.

[7].L. Zadeh, “A fuzzy sliding controller for nonlinear systems,” IEEE Trans. Ind. Electron., vol. 48, pp. 32–37, Feb. 2001.

[8].Q. P. Ha, “Robust sliding mode controller with fuzzy tuning,” Electron. Lett., vol. 32, no. 17, pp. 1626–1628, Aug. 1996.

[9]. L. Zadeh, “Sliding performance enhancement with fuzzy tuning,” Electron. Lett., vol. 33, no. 16, pp. 1421–1423, Jul. 1997.

[10].Walter G.Jung, IC Op-Amp Cookbook, third edition, SAMS publications, pp. 7 – 17, (1999).

[11].MICROPROSSORS Family, Reference Manual, pp. (9-1)-(9-14). (2007), Microchip Technology Incorporation reference books, PIC12F683 Data Sheet with Nano-Watt Technology), (2004)

[12]. Christophe P. Basso, Switch Mode Power Supply Spice Cookbook, McGraw Hill, pp. 118 –132. (2001)

[13].Bart Kosko, Fuzzy Thinking: The new Science of Fuzzy Logic, University of Southern California, (1996)