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Artificial Intelligence-Based Control for Reactive Power of Electric Drive System for Pump

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Abstract: ***This paper affords an impression device implementation found out for the electrical force device of a pump station supported analysis, this country of the control approach for the electrical force device of a pump station, and present challenges. The operation's findings display that this type of control plan is feasible , which with the help of using incorporating computing , it'll successfully keep guide diligence while conjointly sleuthing pump station failures, thence growing the voltage pleasant of the power provide device. A nonlinear proportional operation approaches the transmission sign of the pumping station's electric force device, and additionally the sign enters the nonlinear perform reckoner of the neural community controller, anyplace the neural community's nonlinear mapping capacity is hired to understand computing control via the perform. Design questioning gives a framework that allows us. to spice up the proper query on the proper time while constructing partner AI solution. Moreover, it promotes a mind-set that accepts uncertainty, an massive component for varied superior AI comes***
Keywords: Electric force, Pump station, AI, Power supply system

I. INTRODUCTION

Traditional control technology has been unable to meet the control needs as science and technology have progressed. Artificial intelligence's rapid advancement offers a fresh solution to this dilemma. Artificial intelligence (AI) is a branch of science and technology that aims to improve human intelligence. Artificial intelligence-driven scientific and technological objects could act as a "container" for intellect in the future. Robots, language recognition, picture recognition, natural language processing, and expert systems are all part of this field's research. Artificial intelligence has progressed in theory and technology since its inception, and its application field has grown. Artificial intelligence-driven scientific and technological objects could act as a "container" for human intelligence in the future.. Artificial intelligence is capable of simulating human awareness and thought. Artificial intelligence is not the same as human intellect, but it can think like one and may even outperform it. Artificial intelligence control does not develop a systematic framework based on a typical mathematical model, but rather on the real effect of control. The artificial intelligence control system also has a nonlinear control function that allows it to keep making judgments and processing data based on the current situation. The pump station's electric transmission system is a prime mover mechanical system that uses a motor to transform electric energy into mechanical energy. The electrical power required to generate alternating and induced magnetic fields is known as reactive power. The motor, distribution transformer, and other components of the pump station's electrical transmission system provide reactive power. Only an alternating magnetic field can be used to transform and convey information. Design thinking only works if it is iterative.

II. LITERATURE SURVEY

Yu Honhshai, Shao Guoqiang. [1] "Artificial Intelligence Control for Reactive Power of Electric Drive System of Pump".
Sun qiuye, Yang lingxiao, zhang huaguang. [2] "Intelligent energy application and prospect of artificial intelligence technology in power system".
Zhou feng. [3]" Big Data and AI Enabling Professional Service, SW AAP system architecture and application introduction".
Li Bohu, Chai Xudong, Zhang Lin. [4] "Preliminary research on modeling and simulation technology for new artificial intelligence systems". Yang Baohai, Wen Xiuhai, Sui Liming. [5] "Torsional vibration control method analysis of main drive system of cold continuous rolling mill". Wen Boxuan, Wang Weida, Xiang Changle. [6] "Robust coordinated control of electromechanical compound drive system based on synthesis method".
Wang Weigang, Ding Tuanjie and Chu Xiaodong. [7] "Development of intelligent aviation flight control technology ".
Yang Xinmin. [8] "Application Status and Prospect of Intelligent Control Technology in Thermal Power Plants"
Dahhaghchi, I.,Christie, R.D. [9] "AI application areas in power systems".

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III. EXISTING SYSTEM

To ensure the non-linear characteristics of the synthetic intelligence control method for reactive power of the pump station electrical drive system, the fuzzy PID algorithm was selected, and therefore the transmission signal was processed through a two-dimensional fuzzy algorithm structure. Fuzzy PID algorithm may be a excellent nonlinear intelligent control algorithm. The fuzzy PID controller can keep it up the real-time on-line correction and therefore the automatic adjustment to the proportion, the integral and therefore the differential three parameters, it's the fuzzy control fast adjustment, the adaptability strong advantage, also has the normal characteristic which the PID control precision is high. Therefore, the fuzzy PID controller can adjust the PID parameters of the electrical drive system of the pump station online, in order that the electrode regulating system can adjust the present rapidly and stably, reduce the electrode oscillation and improve the robustness. It shows that the fuzzy PID controller performs fuzzy inference by virtue of the if then model of expert knowledge and optimizes the output value in real time and online, to regulate the parameters and acquire the optimal reactive power AI control of the pump station electrical drives system. at the present , although there are many sorts of fuzzy controllers, their working principles are basically an equivalent . Mainly by means of fuzzy mathematical principles and methods and fuzzy rules expressed by fuzzy sets of conditions and operations, and its storage within the knowledge domain , finally full use of computer fuzzy reasoning, self-tuning PID parameters. to spotlight the convenience and response rapidity of fuzzy output, two-dimensional fuzzy control structure is that the most generally utilized in production and life.

A. Disadvantage

1) It follows traditional methods like noting the defect occurring at the machine through notes.
2) The main disadvantage is that manual work is required all of the time.

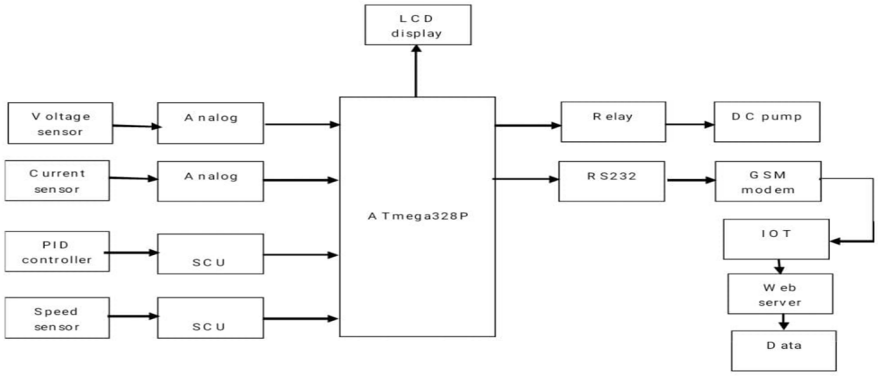
IV. PROPOSED SYSTEM

The fuzzy PID algorithm was chosen because the AI control method for reactive power of the pump station electrical adrive system, and therefore the transmission signal was processed through a two-dimensional fuzzy algorithm structure. The fuzzy PID controller can change the PID settings of the pump station's electrical drive system. The fuzzy PID controller adjusts the parameters and obtains the optimal reactive power AI control of the pump station electrical drives system in real time and online, using the model of expert knowledge to perform fuzzy inference and optimise the output value. Online adjustments are made to the PID controller supported specific control requirements or objective functions. If there's a drag with the pump, it'll be discovered and reported. The user then recognises the matter and fixes it properly. These records are kept on the server for future use. within the subject of AI control, there are numerous algorithms.Through fuzzy PID and neural network algorithm controllers, a replacement reactive power management approach for the electrical transmission of pump stations is proposed in these projects. The results reveal that the control approach utilized in these projects is superior to the normal control method in terms of reducing the electrical drive system's reactive power, increasing its working efficiency, and monitoring faults via IOT.

A. Advantage

1) The datas are stored in IOT cloud in order that the datas are going to be and that we can view for future analysis.
2) There is not any need for manual labor .
3) By monitoring voltage and current, so we will reduce the fault in motor. The motor’s lifespan are going to be increased.

V. BLOCK DIAGRAM



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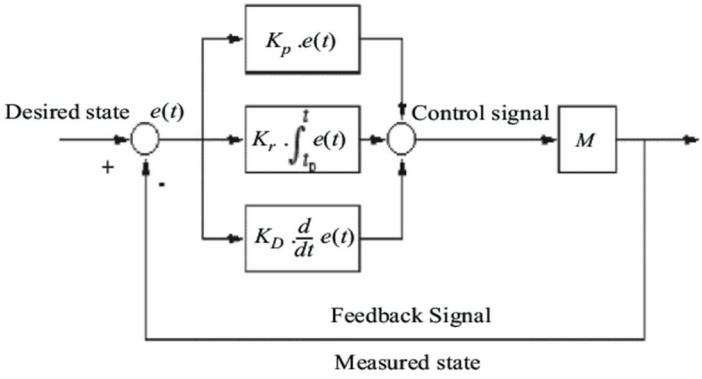
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VI. MODULES DESCRIPTION

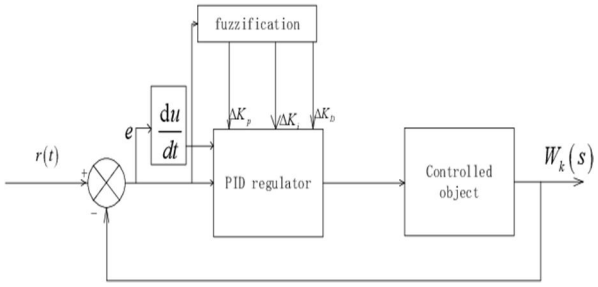
The hardware components used in the system is PID controller, Speed sensor, Current sensor, Voltage sensor, ATmega328P, Power supply, Electric motor, LCD.

A. PID Controller

A PID controller could also be a tool that regulates temperature, flow, pressure, speed, and other process variables in industrial control applications. PID (proportional integral derivative) controllers are the foremost precise and stable controllers because they use an impression loop feedback mechanism to manage process variables. PID control employs closed-loop control feedback to require care of a process's real output as close as feasible to the target or setpoint output.



As the second input to the FIS, the fuzzy PID controller employs the change in output -(y(k)-y(k-1) rather than the change in error e(k)-e(k-1). This avoids the derivative action from being triggered directly by a step change within the reference signal.



B. Speed Sensor

The shaft speed and rotational direction are detected by the speed detector. The detector is attached to the absolute stylish cover of a motor and detects the rotational speed of a attraction inside the motor. Controlling the speed of an electrical or thermal motor also necessitates the operation of a speed detector.

C. Current Sensor

A current detector is a device that detects electric current in a line and generates a signal commensurable to that current. The generated signal could be analog voltage or current or a digital affair. The generated signal can be also used to display the measured current in an ammeter or can be stored for farther analysis in a data accession system or can be used for the purpose of control.

D. Voltage Sensor

A voltage detector is a device that measures and calculates the quantum of voltage in an object. Voltage detectors can tell whether the voltage is AC or DC. The voltage is the detector's input, while the switches, analogue voltage signal, current signal, or audible signal are the detector's affair. Detectors are electronic or optic bias that can descry, fete, and reply to certain electrical or optic impulses. Voltage detector and current detector approaches have shown to be an excellent volition to traditional current and voltage monitoring styles.

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E. Electric Motor

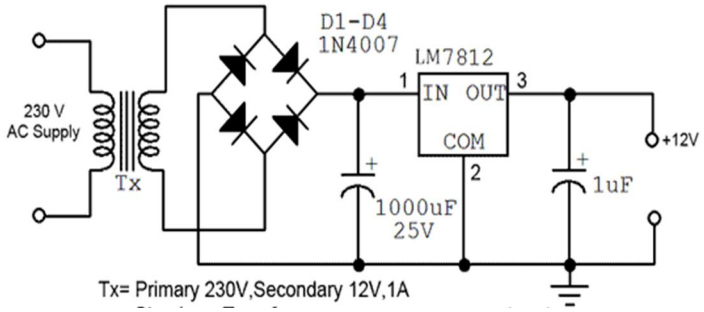
An electric motor may be a machine that turns electricity into energy . Utmost electric motors work by generating force within the sort of choker communicated to the motor's axis by interacting between the glamorous field of the motor and therefore the current during a line wrapping. an electrical al creator is physically original to an electric motor, but it converts energy into electricity employing a reversed flux of power.

F. LCD

Liquid crystal material is placed between two sheets of glass a liquid display (LCD). liquid molecules align in parallel with the glass surface even when no voltage is provided between clear electrodes.

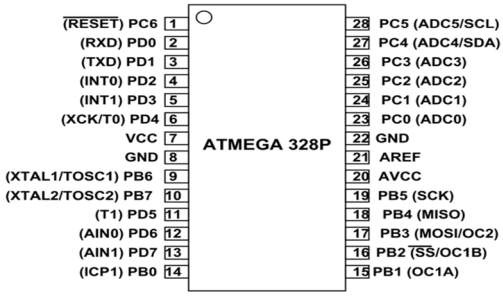
G. Power Supply

The power supply should be +5V, with transients of no quite 10mV. The voltage (VL) at pin 3 should be adjusted properly to urge a better / adequate contrast for the display. A live circuit shouldn't have a module installed or removed. the facility supply's ground terminal must be appropriately separated in order that no voltage is induced in it. The module should be isolated from the remainder of the circuitry to stop stray voltages from causing a flickering display.



H. ATmega328P

The ATmega328P is a RISC microcontroller with an 8-bit address space. 8-bit means the processor uses an 8-bit register that can handle 256 data values, which may appear insignificant by today's standards; however, the higher the bit count and processing speed, the more power the processor consumes, which is why microcontrollers are a good choice for low-power applications.



Because of its advanced RISC design, the ATmega328P is a high-performance, low-power 8-bit AVR microcontroller that can execute 131 strong instructions in a single clock cycle. It's a CPU that's typically seen in Arduino boards like the Arduino Fio and Arduino Uno.

VII. WORKING

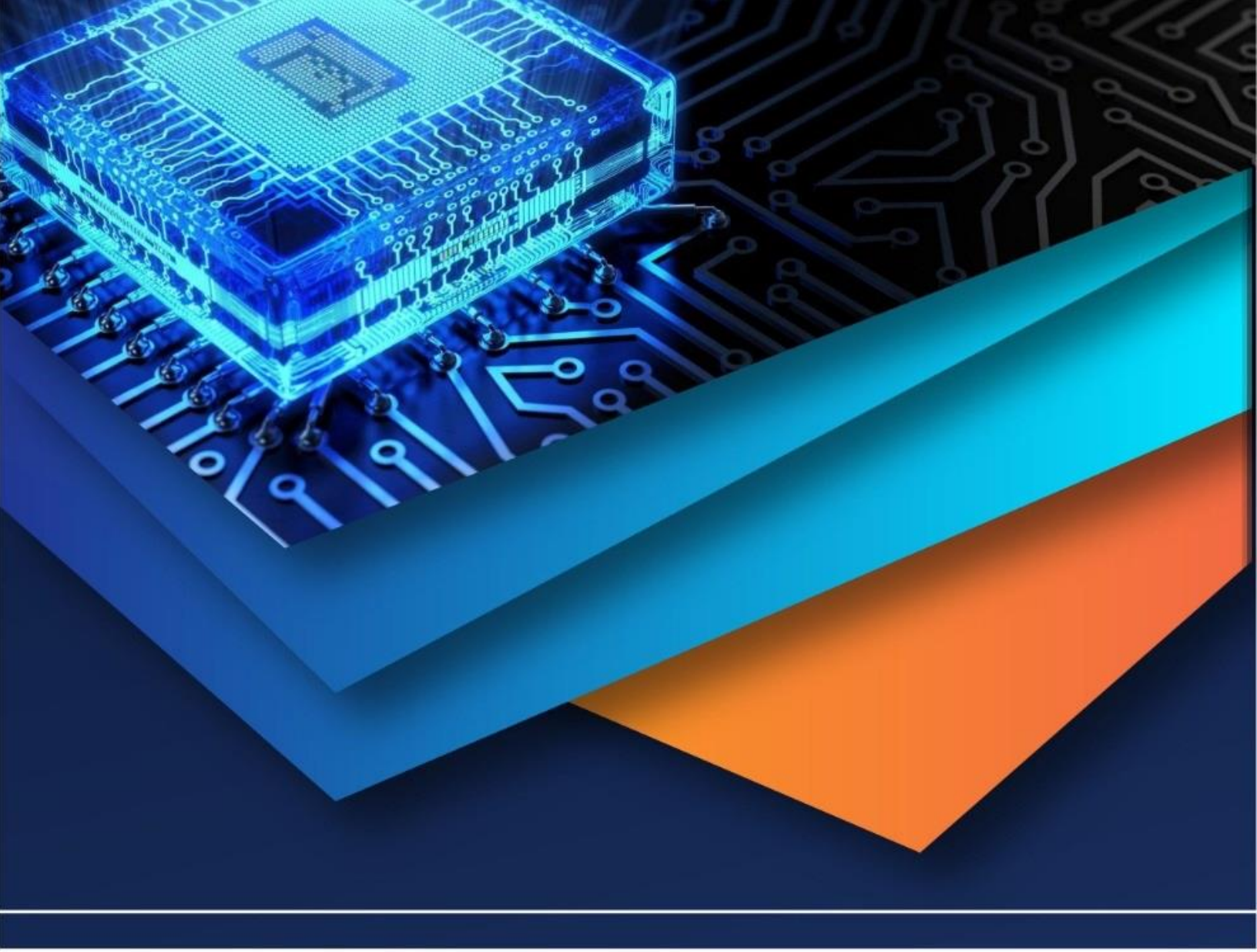
We will change the PID controller module to a keypad-based arrangement that is directly connected to the microcontroller in order to lower the cost and size of the product. We can use switches to control the motor's RPM. Once we've set the limit, the motor will operate in accordance with it. The motor's speed is measured by a proximity sensor, resulting in a closed loop system. If the motor crosses the limit, the microcontroller will detect it and switch the motor to the predetermined limit. According to the programming, errors can be detected inside the microcontroller.

VIII.CONCLUSION

Artificial intelligence is to pretend the mortal brain's allowing way of allowing in work, and its literacy is compared to traditional technology, as the substance and rapid-fire development of mortal society, traditional technology and styles gradationally can not meet the conditions of artificial development becomes more and more complex, high- end, artificial intelligence is to pretend the mortal brain's allowing way of allowing in work, and its literacy is compared to traditional technology, more and more assiduity will pay attention to the development of artificial intelligence, making it the mainstream. In the subject of artificial intelligence control, there are multitudinous algorithms. In this paper, a fuzzy PID and neural network algorithm regulator is used to make a new reactive power control approach for the electrical transmission system of a pump system. The results of the trials suggest that the control approach proposed in this paper is effective.

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