NONLINEAR MODEL-PREDICTIVE CONTROL FOR INDUSTRIAL PROCESSES: AN APPLICATION TO WASTE WATER TREATMENT PROCESS

ABSTRACT

Embedded system has hardware and software which forms a component of some larger system and which is expected to function without human intervention. A typical embedded system consists of a single-board microcomputer with software in ROM, which starts running some special purpose application program as soon as it is turned on and will not stop until it is turned off (if ever). An embedded system may include some kind of operating system but often it will be simple enough to be written as a single program. It will not usually have any of the normal peripherals such as a keyboard, monitor, serial connections, mass storage, etc. or any kind of user interface software unless these are required by the overall system of which it is a part. Often it must provide real-time response.

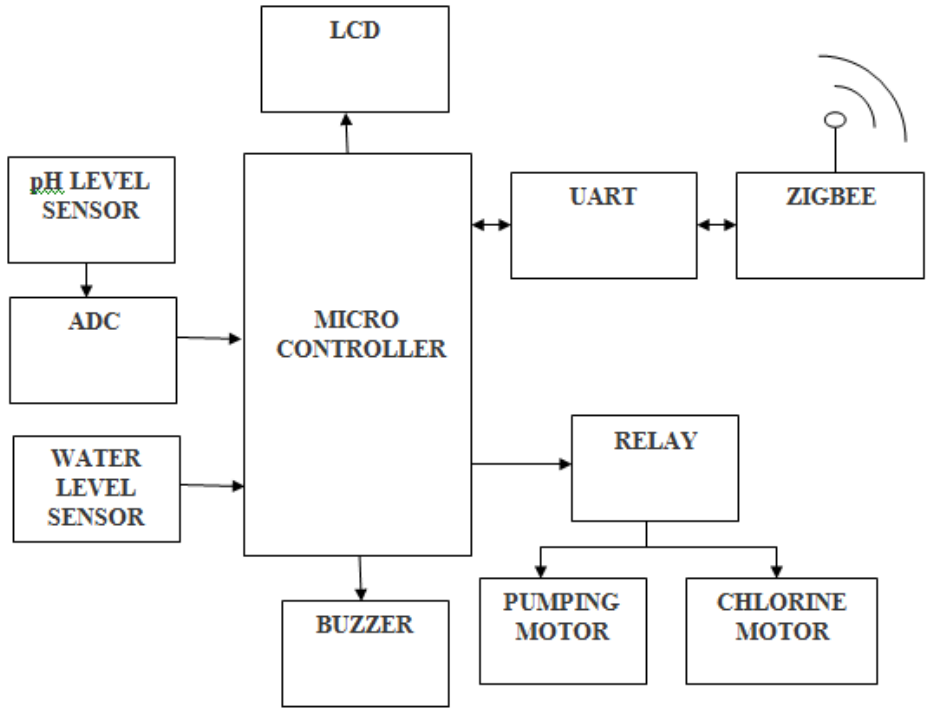
Because of their complex behavior, wastewater treatment processes (WWTPs) are very difficult to control. In this paper, the design and implementation of a nonlinear model-predictive control (NMPC) system are discussed. The proposed NMPC comprises a self-organizing radial basis function neural network (SORBFNN) identifier and a multi objective optimization method. The SORBFNN with concurrent structure and parameter learning is developed as a model identifier for approximating the online states of dynamic systems. Then, the solution of the multi objective optimization is obtained by a gradient method which can shorten the solution time of optimal control problems. Moreover, the conditions for the stability analysis of NMPC are presented.

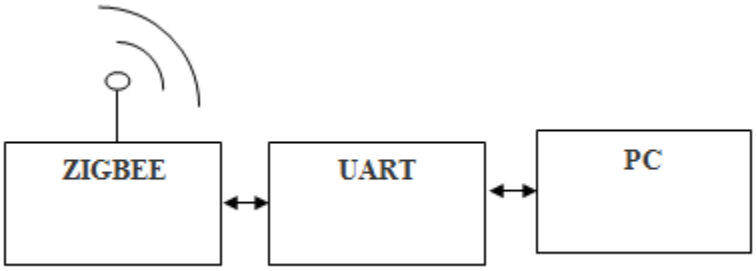
Experiments reveal that the proposed control technique gives satisfactory tracking and disturbance rejection performance for WWTPs. Experimental results on a real WWTP show the efficacy of the proposed NMPC for industrial processes in many applications.

PROPOSED SYSTEM

Here we are going to see Waste water treatment Process using microcontroller, sensors and ZIGBEE. With the help of pH sensor it sense the contamination of water, so if Ph level is equal to pH level of water, than Pumping motor starts. If pH level is more than pH level of water than chlorine motor starts and pumping motor stops. And when pH level again comes to pH level of water, than again pumping motor starts and chlorine motor stops. This can be indicated using buzzer and can be viewed in PC via ZIGBEE.

BLOCK DIAGRAM:





HARDWARE REQUIREMENTS:

- MICROCONTROLLER
- ADC
- ZIGBEE
- UART
- BUZZER
- LCD
- pH SENSOR
- WATER LEVEL SENSOR
- RELAY
- PUMPING MOTOR
- CHLORINE MOTOR

SOFTWARE REQUIREMENTS:

- MCU COMPILER
- PROTEUS SOFTWARE

MICROCONTROLLER may ATMEGA,8051,PIC,Arduino

2nd Floor, B-Block, Rohit Bhawan, Sapru Marg Hazratganj Lucknow
0522-4000204, +91-8090039028