Dedication

To those who have enlightened our lives in all aspects, father and mother. to those whom whatever I say or do I still owe them, my wife and son to those who paved the path for my career , my education march and to those whom even I can't find the words to say how I am so grateful, I proudly dedicate this humble .

Acknowledgment

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ABBREVIATIONS

A/D	Analog to Digital Converter
AI	Analog Input
AO	Analog Output
MPI	Multi Point Interface
Bar	barometer unit of atmospheric pressure measurement
Bps	Bits per second
CAN	Control Area Network or Control and Automation Network
CIP	Common Industrial Protocol
CPU	Central Processing Unit
D/A	Digital to Analog Converter
DC or dc	Direct current
DI	Digital Input
DO	Digital Output
DP	Distributed peripheral
FBD	Function Block Diagram
HMI	Human Machine Interface
IEC	International Electro technical Commission
IEEE	Institute of Electrical and Electronic Engineers (US)
IL	Instruction List
IP	Internet Protocol
ISO	International Organization for Standardization

IT	Information Technology (as in IT manager or IT department)
LAD	Ladder Diagram
LED	Light Emitting Diode
mA or ma	mill amperes
MB	mega-Byte
Mbs, mbps	Mega Bits per Second
MOV	Motor Operated Valve
MSB	Most Significant Bit
MV	Manipulated variable
PC	Personal Computer
PID	Proportional Integral and Derivative
PL	Program list
PLC	Programmable Logic Controller
SCADA	Supervisory Control and Data Acquisition
TIA	Totally integrated package
PS	Power Supply
PS	Process Station
PV	Process variable
OPC	Open Platform Communications
OS	Operator Station
RAM	Random access memory
ROM	Read only memory

SFC	Sequential Function Chart
ST	Structured Text
TCP/IP	Transmission control Protocol / Internet Protocol
TON	Timer on Delay
WINCC	Windows Control Center
KSWC	Khartoum State Water Cooperation

Abstract

This research presents the simulation of an automation system of ALSAHAFA pumping station to control of the parameters in a plant such as: level-pump pressure-flow in and out of the tank and the operation of the pumps. The research addresses the problems of conventional control for such parameter since the autonomous control helps and participates in improvement of the level of efficiency. The software code is developed using both SIMATIC MANAGER S7-300 for PLC while WINCC flexible_2008 (SCADA) is used as simulator of the system. The purpose of the research is to replace the manual system being used in the station, compare the time, and manpower requirement for both the existing system with the proposed automated system and also the operator can monitor the functionality of the entire building on the SCADA screen, and alarm reports assist in location faults, which contributes to a significant increase in maintenance efficiency.

المستخلص

هذا البحث يناقش ويتناول عملية محاكاة لنظام تحكم ألي للمتغيرات المتعلقة بمحطة مياه الصحافة للضخ التابعة لهيئة مياه ولاية الخرطوم مثل (مستوي الماء في الخزان – ضغظ الطلمبات- التدفق الداخل والخارج وتشغيل الطلمبات).. ويعالج هذا البحث مشكلة التحكم التقليدي المستخدم للتحكم في هذه المتغيرات حيث ان التحكم الالي يساعد ويساهم في رفع مستوي الكفاءة. في البداية تم تطوير البرمجيات باستخدام برامج SIMATIC MANAGER S7-300 للمتحكم المنطقي القابل للبرمجة PLC بينما استخدم WINCC Flexible 2008 كبرنامج للاسكادا للعرض والمحاكاة. وكان الغرض من هذا البحث استبدال النظام اليدوي الذي يستخدم في المحطة بالمقارنة مع النظام الاتوماتيكي من حيث الزمن والحاجة الي الايدي العاملة, وايضا يستطيع المشغل استعراض الوظائف الداخلية المضمنة في شاشة الاسكادا, وتقارير الانذارات التي تساعدفي تحديد مكان العطل والذي بدوره يساهم بقدر كبير في رفع كفاءة الصيانة.