

# Verse

قال الله تعالى :

أَعُوذُ بِاللَّهِ مِنَ الشَّيْطَانِ الرَّجِيمِ

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ  
الْحَمْدُ لِلَّهِ الَّذِي هَدَانَا لِهَذَا وَمَا كُنَّا لِنَشْكُرَهُ إِلَّا بِحَمْدِهِ  
الَّذِي هَدَانَا لِهَذَا وَمَا كُنَّا لِنَشْكُرَهُ إِلَّا بِحَمْدِهِ

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صدق الله العظيم

سورة البقرة الآية 282

# Dedication

هذا البحث أهديه إلى عين تقوم الليل ترعاني

و أهديه إلى أذن تصم عند بهتاني

و أهديه إلى ثغر تبسم حين يلقاني

و أهديه إلى كف يصافحني بتحناني

و أهديه إلى قدم يواصلني إذا ما انقطع خلاني

و أهديه إلى قلب يؤانسني بعيدا كنت أو داني

و أهديه إلى دمع محى بالماء أحزاني

و أهديه إلى يوم يلازمني إذا ما الدهر جافاني

و أهديه إلى مرض بقدر الضعف قواني

و أهديه إلى فقر بقدر الفقر أغناني

و أهديه إلى سجن بقدر السجن أواني

و أهديه إلى سم ترصدني ليقتلني فداواني

و أهديه إلى ورق ضغطت عليه بقلمني

فسامحني ..... وهذا البحث أهداني

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## **ABSTRACT**

As for the accelerated scientific development in all fields, whether medical, engineering or administrative, we had to keep up with it as much as possible. Logical programmable controllers are among the latest developments worthy of attention. They quickly became apparent and soon spread because of their remarkable advantages. Monitor them closely and try to tame them to help them complete their engineering tasks with high efficiency. In this research, we highlighted the governance of mechanical systems using programmable logic controllers, which increased their efficiency and ease of handling. It also raised safety and security standards, which in recent decades has received great attention and interest. There is no doubt that we cannot We turn a blind eye to the value of this research when it worked to solve one of the issues that concern the field of drinking water in terms of the quality of production and reduce the cost of production, which may open the door for the future of many research in this area, which may help to lift some suffering to countries as well as citizens. To reduce human intervention in unloading containers of chemicals system (poly aluminum chloride) inside the buffer tanks before starting to be used in the water purification process. Using an electric motor, a screw shaft, centrifugal pumps and some sensors that were then connected with programmable logic controllers to enable the desired governance process according to the ladder program written to control the process of discharging aluminum chloride. This system works to remove the pumps inside the chemical package (poly aluminum chloride) to be emptied and then all the fluid inside the packaging is withdrawn and unloaded inside the tank efficiently, which ensures that we can accomplish the task in the least time possible with the least number of labor. Where the fork lift and a number of workers, which reflected positively on the cost of operation.

## المستخلص

نسبة للتطور العلمي المتسارع في كافة المجالات سواء كانت طبية او هندسية او ادارية فكان لزاما علينا مجاراته بقدر الامكان, وتعتبر المتحكمات المنطقية القابلة للبرمجة من بين التطورات الحديثة الجديرة بالاهتمام فسرعان ما ظهرت وسرعان ما انتشرت لما تتمتع به من مميزات لافتة للانتباه تجبر جل المنتمين للمجال الهندسي مراقبتها عن كثب و محاولة ترويضها لمساعدتهم على اتمام مهامهم الهندسية بكفاءة عالية. في هذا البحث تم تسليط الضوء على كيفية حوكمة الانظمة الميكانيكية باستخدام (المتحكمات المنطقية القابلة للبرمجة ) مما رفع من كفاءتها وسهولة التعامل معها و رفعت ايضا من معايير السلامة والامان والذي ظل في العقود الاخيرة يحظى باهتمام و حرص كبيرين. و مما لاشك فيه اننا لايمكن ان نغض الطرف او نتعافل عن القيمة التي اكتسبها هذا البحث عندما عمل على حل احد القضايا التي تعنى بمجال مياه الشرب من حيث جودة انتاجها وتقليل التكاليف الانتاجية لها مما قد يفتح الباب مستقبلا للعديد من البحوث في هذا المجال مما قد يساعد على رفع بعض المعاناة على الدول وكذا المواطنين. هذا النظام عمل على تقليل التدخل البشري في عملية تفريغ عبوات المواد الكيميائية (سلسلة كلوريد الألمونيوم) داخل خزانات ضخمة قبل الشروع في استخدامها في عملية تنقية المياه. باستخدام موتور كهربائي, عمود مسنن, مضخات طرد مركزي و بعض الحساسات التي بدورها تم توصيلها مع (المتحكمات المنطقية القابلة للبرمجة) لتمكنها من عملية الحوكمة المطلوبة وفق البرنامج السلمي الذي تمت كتابته بغرض التحكم في عملية تفريغ كلوريد الالمونيوم. يعمل هذا النظام على انزال المضخات داخل عبوة المواد الكيميائية (سلسلة كلوريد الألمونيوم) المراد تفريغها ومن ثم يتم سحب كل المائع الموجود داخل العبوة وتفريغها داخل الخزان بكفاءة عالية مما يضمن لنا انجاز المهمة في اقل زمن ممكن باقل عدد من العمالة. حيث تم التخلص من الرافعة الشوكية و عدد من العمال مما ينعكس ايجابا على تكلفة التشغيل.

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## List of abbreviations

PLC	Programmable Logic Controller
PACL	poly aluminum chloride
CPU	central processing unit
ISO:	international organization for standardization
JIS	Japanese industrial standards
Gpm	gram per meter
TDH	total dynamic head
TRB	Tapered Roller Bearing
PVC	polyvinyl chloride
PF	power factor
HP	horse power
S.F	service factor
PTO	Power Take-Off
RPM	revolution per minute
TEFC	totally enclosed-fan cooled
TEAO	totally enclosed air over
TENV	totally enclosed non ventilated
AC	alternative current
DC	direct current
PSC	permanent split- capacitor
NO	normally open
NC	normally closed
ESD	electrostatic discharge
RFI	radio frequency interference
EMI	electromagnetic interference
(I/O)	input/output
IC	integration circuit

## List of symbols

V300	largest variation in lead errors over 300-mm interval with in the effective travel length
Q	flow rate
A	cross section area
V	velocity
L	liter
$h_d$	Delivery head
$h_s$	suction head
$h_{friction}$	Friction loss head
$Re$	Reynold number
$h_{fitting}$	fitting loss head
$H_L$	Loss head
$H_{Total}$	Total head
$P_{hydarulic}$	Hydraulic power
$d_r$	Diameter root
$f_s$	Static allowable load
$P_o$	Allowable load rating
$C_{Oa}$	Static basic load rating
$C_a$	Basic dynamic load rating
$F_m$	Mean effective load
$d_m$	Ball circle diameter
$F_a$	Permissible load
G	gravity acceleration
Z	Height.
D	internal pipe diameter
K	fitting loss factor
M	mass
N	rotational speed
f	friction factor
$\eta$	efficiency
$f$	factor depend on supporting condition
$\nu$	viscosity
$\alpha$	acceleration
t	period of time