

**BSCE (Telecom Engineering)  
Final Project  
Industrial Automation**



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**Project Advisors:**

Mr. Aamir Manzoor Ali  
Mr. Kamil Nisar

**Project Team Members:**

Fahd Sattar	010425 - 022
Ayman	010325 - 001
Atif Shahid	010425 - 002
Sibt-ul-Hassan	010425 - 018

*School of Science & Technology*  
**University of Management & Technology**

**Project Title:**  
*Industrial Automation*

**Submitted By:**

Fahd Sattar	010425 - 022
Ayman	010325 - 001
Atif Shahid	010425 - 002
Sibt-ul-Hassan	010425 - 018

**Submitted To:**

*School of Science & Technology*  
**University of Management &  
Technology**

In Partial fulfill of the requirement for the degree of **BSCE (Telecom Engineering)**

**Approved By**

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**Internal Advisor**

---

**External Advisor**

---

**Associate Dean**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

**SUBMITTED TO**

Dr. Khalid H. Qamar

**Address:** School of Science and Technology, Annexes, First Floor

**E-Mail:** [qamar@umt.edu.pk](mailto:qamar@umt.edu.pk)

**Phone:** 586 4172, 588 6166, 585 6605-6

**Ext. 302**

Associated Dean  
School Of Science and Technology

## SUBMITTED BY

1. Department of School of Science and Technology (SST)  
University of Management and Technology, Lahore  
**Fahad Sattar**, BSCE Batch 4th  
Major: **Telecom Engineer**  
TEL: (042)-5412438  
E-Mail: fahads@excite.com
  
2. Department of School of Science and Technology (SST)  
University of Management and Technology, Lahore  
**Ayman**, BSCE Batch 3rd  
Major: **Telecom Engineer**  
TEL: (042)-5835695  
Mobile: 0333-4430313  
<http://www.ayman.net.ms>  
E-Mail: ayman35@hotmail.com
  
3. Department of School of Science and Technology (SST)  
University of Management and Technology, Lahore  
**Atif Shahid**, BSCE Batch 4th  
Major: **Telecom Engineer**  
TEL: (042)-7592774  
Mobile:0300-9411642  
E-Mail: umt786@excite.com
  
4. Department of School of Science and Technology (SST)  
University of Management and Technology, Lahore  
**Sibt-ul-Hassan**, BSCE Batch 4th  
Major: **Telecom Engineer**  
TEL: (042)-6650108  
Mobile: 0333-4298844  
E-Mail: sibt\_786@hotmail.com

## DEDICATION

Dedicate to Mom, Dad, and Providence,  
without whom we—and ultimately this project—would not be possible

## ACKNOWLEDGMENT

This report against any individual effort is a reflection of groups endeavor, shared knowledge, uniform approach and manifest of group synergy. Every member of the group was committed to the task assigned to him and he put in best of his abilities to complete his part of the report. These individual efforts were later integrated in a unified whole which did not reflect any of the individual but a share knowledge, combined efforts and the will to resolve each others problems. However this could not have been possible if we were not motivated and encouraged by our able, knowledgeable and kind teacher's specialty Mr. Kamil Nisar who remained for us a source of inspiration and help which can be counted at any time and at any place.

We would especially like to express our sincere appreciation to our teachers who are responsible of taking us to the level that we were able to perform such a task as this. We were molded into Engineers by some of the finest teachers in the business. Thank you Mr. Aamir Manzoor Ali and our special thanks goes to Mr. Kamil Nisar whom we chose as our project co-coordinator for there supervision of this project and their invaluable help and guidance throughout this project.

Last but not least we would appreciate Engg. Saleem Qurashi who is responsible of putting this robotic arm into Physical shape. Mr. Kamil Nisar gave us invaluable tips using his mechanical genius when we were out of ideas.

## FOREWORD

Nothing deserves worship Almighty Allah, the most merciful, compassionate and graceful. All praises for Him because He is the creator of His mysterious universe and Guides me with the Holy Prophet Muhammad (Peace be Upon Him) and Holy Quran to explore it. We supplicate that Allah grant us serenity to accept the things we cannot change, courage to change the things we can, and wisdom to know the difference. ALLAH grants us power to do this project.

Countless thanks to Almighty ALLAH that with his Blessings we have been able to do such a Project.

## TEAM MEMBERS

**Fahad Sattar**  
010425-022

[fahads@excite.com](mailto:fahads@excite.com)

**Ayman**  
010325-001

[ayman35@hotmail.com](mailto:ayman35@hotmail.com)

**Atif Shahid**  
010425-002

[umt786@excite.com](mailto:umt786@excite.com)

**Sibt-ul-Hassan**  
010425-018

[sibt\\_786@hotmail.com](mailto:sibt_786@hotmail.com)

## INTERNAL ADVISOR

Mr. Aamir Manzoor Ali

Bsc Electronics Engineer

University Of Management and Technology  
Lahore

**Address:** School of Science and Technology, campus

**E-Mail:** [amrengineers@yahoo.com](mailto:amrengineers@yahoo.com)  
[aamer.mahmood@umt.edu.pk](mailto:aamer.mahmood@umt.edu.pk)

**Phone:** 586 4172, 588 6166, 585 6605-6

**Ext. 341**

## EXTERNAL ADVISOR

Mr. Kamil Nisar

BS Electrical Engineering

Engineer PCSIR Company

Telephone # 9230688 Exchange 343

## ABSTRACT

This Project has been chosen to quench our desires of control something through the personal computer. It utilizes the knowledge of interfacing and the ISA slot that we chose to interface the computer through using C Language.

Furthermore we feel there is not enough practical work being done in the field of automation on a large scale. It is time that our country takes up this field seriously and to a mass scale. This will, if done properly, help the industry by cutting out a large number of labor forces and make way for the mechanization process and catalyzing industrial growth. We will then require a large number of qualified people to handle these jobs. Though the initial investment will be more than the current, the output and the profit will be maximized.

It must be understood by the reader that a lot of effort has been put in the project. We are not mechanical Engineers so the mechanical design of the project is not by any means perfect but adequate to the best of our abilities. The theme of the project however is worthwhile and a lot of work lies ahead in terms of enhancements and ideas.

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# CHAPTER

## ONE

1

### INTRODUCTION

# INTRODUCTION

## 1. INTRODUCTION

### 1.1 The Project

Automation is the use of machines to perform tasks that require decision making. Automation is used for a wide variety of jobs that are too boring, complex, or dangerous for people to do. Industrial robots on assembly lines perform a variety of repetitive tasks that many people would find boring. In some homes, thermostats control the temperature in automated heating and air-conditioning systems, in refrigerators, and in water heaters, in medicine, cardiac pacemakers regulate the heart rate of people with heart disorders. Supermarkets, department stores, and warehouses use computerized automated systems that handle record keeping, ordering, and stock control. In manufacturing, automated machines make certain products more quickly, accurately, and cheaply than human workers can. Automated equipment is used in sections of nuclear reactors where high levels of radioactivity would harm workers.

An automated system has devices called sensors, which provide information about the results of the machine's operation and about certain environmental conditions that affect its performance. This information is fed directly back to the system, allowing the machine to adjust its operation if necessary. Such a system of self-regulation is called feedback. The use of feedback to regulate machines distinguishes automation from mechanization. Mechanization is the use of mechanical power in place of the physical power of people or animals. An automated industrial robot uses feedback to recognize the particular model of car on which it is

working. The robot can then decide how and where to weld different car parts. A mechanized robot has no feedback system and so cannot adjust its operation to changing conditions. Such a robot blindly welds each part in exactly the same place and can be used on only one model of car at a time.

Automated devices have been used for hundreds of years. Since the late 1970's, however, the availability of inexpensive computers to run machines has greatly stimulated the development of automated systems. Many people expect the growth of automation to cause increased unemployment as more workers are replaced by machines. Others believe that increased automation will stimulate industrial growth and create new jobs. Growing numbers of technical workers may be needed to build and maintain automated systems.

## 1.2 Why Did We Choose This Project

Before we go on to describe why we chose this project we would like to state that we are the students of bachelor of Engineering and not a part of a booming industrial environment thus the theme might seem like a much too big a task to swallow. Neither are we in a financially sponsored project to take up a big task of automation of the industry. But we are students eager to start a trend of automation of the industries.

This robotic arm is just a show of how we can control the movement of an arm to perform tasks. Further if given a chance in the industry we can take up a challenge of automating a running industry without the constraints of having to pay for all the equipment of the mechanical structures involved.

Once an industry has automated there are many uses one can find;

- **Uses of automation**

Automated systems can perform tasks involving decisions that are too complex for people to make in a limited amount of time. Automation also is used for jobs that are so routine boring, or degrading that people are not able to perform them effectively over long periods of time. Some automated machines are designed to operate in environments that are unsafe for people. In addition, many companies use automated equipment because it is more economical than using people or non-automated machinery.

**In making complex decisions:** Automated systems can make decisions that are beyond the capacity of people to make. For example, since the 1960's, many cities have used automated systems to control their traffic lights in order to smooth the flow of traffic. Sensors in the pavement determine the number of vehicles on the street and their speed and send the data to a central computer. The computer uses the data and much other information to decide how to time each traffic light in the area. It then sends the necessary signals to the lights. In busy office buildings, computers control the movement of the lifts to minimize and equalize the time people off each floor must wait for the lift to arrive.

Automated systems also can make decisions more quickly than people can. High-speed military aircraft sometimes fly at very low altitudes in order to avoid detection by enemy radar. To avoid hitting obstacles, these aircraft use radar-operated, automated guidance systems, which can react much faster than a pilot can.

**In routine, boring jobs:** Many people find repetitive, simple jobs, such as working on a factory assembly line, dull and degrading. They have difficulty maintaining the level of concentration necessary to do this type of work effectively over long periods of time. Automated machinery, however, is well suited to such routine tasks as assembling, inspecting, and packaging manufactured products.

**In unsafe environments:** Automated machinery can operate in environments that are unsafe for people. Automated systems have been developed for repairing underwater pipelines at extremely high pressures and for exploring other planets. Cars are painted by robots in spray booths containing high concentrations of airborne paint particles that are harmful to people. These robots measure the car's position, determine which color to use, and repeat spraying patterns with great consistency. They work faster and more accurately at the job than people do and they waste much less paint.

**In cost saving:** Automated systems often can do a particular job more cheaply than a person can. For many industrial operations, a simple robot costs about as much as one year's wages and benefits for the three shift workers it can replace. After the first year, a manufacturer should save money by using such a robot. The use of automation also allows companies to save money they otherwise would have to spend to make hazardous work areas safe for human workers.

Many supermarkets and department stores use automated systems to perform several functions previously carried out by managers. Electronic

cash registers ring up each item as it is sold. This sales information is fed automatically to a computer that keeps a record of how much of each item remains in stock. The computer predicts when the store will run out of an item and can place orders to restock items before they are sold out.

The computer can also evaluate the effect of advertising campaigns on sales. Such automation helps stores cut costs and operate more efficiently.

Manufacturers may also save money by replacing older machines with automated equipment. Many robots can be made to perform different tasks merely by changing their computer program. This capability enables manufacturers to use one robot to do the work of several single-task machines. The versatility of computerized robots allows producers to make small amounts of specialized items more economically. It also enables them to change styles, models, or types of products more cheaply and easily.

### 1.3 Plan Of The Project

- **How automation works**

All automated systems depend on feedback to control their performance. However, our arm does not currently have a feedback system. As mentioned before we don't have the available funds to take up an industrial project but still after mechanization, automation is the next step.

An automated system needs sensors to measure its output. There are many types of sensors. Thermometers in a home may measure room temperature

— a heating system's actual output. Sensors in other systems measure such variables as chemical composition, color, pressure, size, and weight.

Automated systems compare the actual output with the desired output. Devices that make such comparisons are called comparators. For example in a heating system, the thermostat functions as the comparator. It compares the thermometer reading with the temperature for which the thermostat has been set.

The part of any automated system that is controlled by feedback and changes the output is referred to as the process. The controller directs the process in order to correct the output. In a home heating system, the process is the boiler. The thermostat switches the boiler onto raise the room temperature.

Not all feedback systems operate by automation. In some systems, the comparator brings many errors to the attention of a human operative who functions as the controller. True automation exists when the system makes decisions without relying on a human controller. Some fully automated systems, however, are designed to be taken over by a human controller during emergencies.

Some automated systems can be taught by a person who supervises their performance. Such a person indicates to the computer controlling the system when it has made an especially desirable decision. In this way, the computer "learns" to make the same decision whenever a particular situation occurs. Automated systems can also be designed to learn from

their experience by trial and error. A computer acting as the controller experiments by slightly altering its correcting signals. It observes the effects of these decisions and favors those corrections that produce the best performance of the system.

## 1.4 Objectives Of The Project

- **Automation and jobs**

A few decades ago, large numbers of workers were employed in manufacturing. By the early 1990's manufacturing workers in industrial countries accounted for a small part of the labor force. Many manufacturing jobs have been lost in the traditionally industrialized countries as companies moved their factories to other countries where wages were lower. Many people believe that industry in industrialized countries must automate further to increase productivity and decrease labor costs and thereby compete more effectively with industry in other countries. But such an increase in automation may cause many more workers to lose their jobs.

Economists disagree over how many people might lose their jobs because of an increase in automation. Planners expect that many jobs lost to automation would involve low levels of skill. The elimination of large numbers of low-skill jobs would put great pressure on government, industry, and the schools to retrain displaced workers. Some labor unions have bargained for contracts in which employers promise to retrain workers who lose their jobs because of automation. At the same time that automation eliminates low-skill jobs, it increases the demand for highly

skilled workers. Many people are needed to design, build, and maintain automated systems.

Some economists believe that the transition to a more highly automated society will not cause much disruption of the work force. They point out that a declining birth rate and longer life expectancy in many countries are contributing to an increase in the percentage of older people in the population. Although there may be fewer jobs because of automation, there also will be fewer people entering the work force.

Automation may reduce the number of workers needed to manufacture a certain amount of a product. But it need not lead to a total decline in the number of employees in a particular industry. If the demand for an industry's products increases fast enough, employment may rise even as the industry automates. The increased efficiency and lower labor costs made possible by automation may help an industry compete in the international marketplace. Automation may enable manufacturers to lower prices and increase the volume of their sales. In this way, the industry may grow and create more jobs.

- **Automation in Pakistan**

Pakistan is a developing country with a high illiteracy rate and ascending unemployment, especially in the field of technical professions. From the above review we can see how the developed countries took their step towards progress. A lot of people lost there jobs at which they were experts

at. These machine took over there work and these people had to resort to other things. Who says progress comes without a price.

If Pakistan is to develop, automation should be considered as an integral part of development. This would mean more jobs for skilled professionals. Although the literacy rate is not high and automation would require educated people that this country is not currently producing enough of. Need is the mother of all inventions. The need to survive will urge people to polish the common people up to a certain minimum level.

Our emphasis is to encourage automation as a need of time and success. Industries need to be first set up either by the help of foreign investors or by the industrialists already residing in Pakistan. A point must be made clear is that the only reason we have foreign investors is our cheap labor force so we cannot expect them to automate our industries, however we can urge our government to promote industries and technical education as it is an essential part of the countries development.

**C H A P T E R**

**T W O**

**2**

**F E A S I B I L I T Y**  
**R E P O R T**