Chapter (One)

Introduction

1.Introduction

1.1 TelemedicineDefined:

Telemedicine (also referred to as "telehealth" or "e-health") allows health care professionals to evaluate, diagnose and treat patients in remote locations using telecommunications technology.

Telemedicine allows patients in remote locations to access medical expertise quickly, efficiently and without travel, with Telemedicine provides more efficient use of limited expert resources that can "see" patients in multiple locations wherever they are needed without leaving their facility.

In developed and developing countries telemedicine offers a reduced cost solution to delivering remote care when and where it is needed without the building and staffing added facilities.

Telemedicine also reduces isolation that clinicians can experience in small medical facilities in distant locations and allows local practitioners to consult with their peers and clinical experts when needed, it further allows them to participate in grand rounds and education opportunities they would not normally have access to without travel and time away from their patients.

Formally defined, telemedicine is the use of medical information exchanged from one site to another via electronic communications to improve a patient's clinical health status, it includes growing variety of applications and services using two-way video, email, smart phone,wireless tools and other forms of telecommunications technology.

Starting out over forty years ago with demonstrations of hospitals extending care to patients in remote areas, the use of telemedicine has spread rapidly and is now becoming integrated into the ongoing operations of hospitals, specialty departments, home health agencies, private physician offices as well as consumer's homes and workplaces.

It is not a separate medical specialty, Products and services related to telemedicine are often part of a larger investment by health care institutions in either information technology or the delivery of clinical care.

Even in the reimbursement fee structure, there is usually no distinction made between services provided on site and those provided through telemedicine and often no separate coding required for billing of remote services, ATA has historically considered telemedicine and telehealth to be interchangeable terms, encompassing a wide definition of remote healthcare.

Patient consultations via video conferencing, transmission of still images, e-health including patient portals, remote monitoring of vital signs, continuing medical education, consumer-focused wireless applications and nursing call centers, among other applications, are all considered part of telemedicine and telehealth.

While the term telehealth is sometimes used to refer to a broader definition of remote healthcare that does not always involve clinical services, ATA uses the terms in the same way one would refer to medicine or health in the common vernacular, telemedicine is closely allied with the term health information technology (HIT), However, HIT more commonly refers to electronic medical records and related information systems while telemedicine refers to the actual delivery of remote clinical services using .

1.1.1 ServicesCan Be Provided By Telemedicine:

Sometimes telemedicine is best understood in terms of the services provided and the mechanisms used to provide those services.

Here are some examples:

- Primary care and specialist referral services may involve a primary care or allied health professional providing a consultation with a patient or a specialist assisting the primary care physician in rendering a diagnosis. This may involve the use of live interactive video or the use of store and forward transmission of diagnostic images, vital signs and/or video clips along with patient data for later review.
- Remote patient monitoring, including home telehealth, uses devices to remotely collect and send data to a home health agency or a remote diagnostic testing facility (RDTF) for interpretation. Such applications might include a specific vital sign, such as blood glucose or heart ECG or a variety of indicators for homebound patients. Such services can be used to supplement the use of visiting nurses.
- Consumer medical and health information includes the use of the Internet and wireless devices for consumers to obtain specialized health information and on-line discussion groups to provide peer-to-peer support.
- Medical education provides continuing medical education credits for health professionals and special medical education seminars for targeted groups in remote locations.

1.1.2 Delivery Mechanisms Can Be Used:

- Networked programs link tertiary care hospitals and clinics with outlying clinics and community health centers in rural or suburban areas, the links may use dedicated high-speed lines or the internet for telecommunication links between sites., ATA estimates the number of existing telemedicine networks in the United States at roughly 200 providing connectivity to over 3,000 sites.
- Point-to-point connections using private high speed networks are used by hospitals and clinics that deliver services directly or outsource specialty services to independent medical service providers. Such outsourced services include radiology, stroke assessment, mental health and intensive care services.
- Monitoring center links are used for cardiac, pulmonary or fetal monitoring; home care and related services that provide care to patients in the home and often normal land-line or wireless connections are used to communicate directly between the patient and the center although some systems use the internet.

Web-based e-health patient service sites provide direct consumer outreach and services over the Internet, under telemedicine; these include those sites that provide direct patient care technology.

1.1.3 The Benefits of Telemedicine:

Telemedicine has been growing rapidly because it offers four fundamental benefits:

- Improved Access – For over 40 years, telemedicine has been used to bring healthcare services to patients in distant locations and not only does telemedicine improve access to patients but it also allows physicians and health facilities to expand their reach, beyond their own offices and given the provider shortages throughout the world--in both rural and urban areas--telemedicine has a unique capacity to increase service to millions of new patients.
- Cost Efficiencies – Reducing or containing the cost of healthcare is one of the most important reasons for funding and adopting telehealthtechnologies, telemedicine has been shown to reduce the cost of healthcare and increase efficiency through better management of chronic diseases, shared health professional staffing, reduced travel times, and fewer or shorter hospital stays.
- Improved Quality – Studies have consistently shown that the quality of healthcare services delivered via telemedicine are as good those given in traditional in-person consultations, in some specialties, particularly in mental health and ICU care, telemedicine delivers a superior product, with greater outcomes and patient satisfaction.
- Patient Demand – Consumers want telemedicine, the greatest impact of telemedicine is on the patient, their family and their community, using telemedicine technologies reduces travel time and related stresses for the patient.

Over the past 15 years study after study has documented patient satisfaction and support for telemedical services, such services offer patients the access to providers that might not be available otherwise, as well as medical services without the need to travel long distances.

1.2Problem Statement:

- Healthcare facilities need to observe patients at risk for falls, in other personal harm situations, and those who are confused or agitated.
- Unlike private-duty personal care assistants, the observer's sole responsibility is to notify staff when the patient engages in potentially self-injurious behavior, such as getting out of bed without assistance or pulling out tubes.
- nurses cannot physically located at the centralized nursing station to view patient vital signs and the status of medical equipment in the patient's room — from ECG machines to respirators and more.
- Without a remote patient monitoring the nursing staff has not the ability to monitor patient in ICU and even not make needed adjustments to medical equipment, it requires moving throughout the healthcare facility..
- More time spent constantly traveling to either the central nursing station or the patient's room to perform critical tasks in the hospital**.**
- The need for travel by patient or care provider.
- Difficulty Seen medical specialist in remote areas to follow the conditions of his patients

1.3Objectives:-

1.3.1General Objectives

- Design and implementation of programming logic control based remote monitoring system of patient, remote patient monitoring delivers patient observation to health providers without displacing either the health professional or the patient, resulting in more effective and efficient patient care.
- With remote patient monitoring system can allows the patient to be monitored remotely from their hospital itself and decrease the moving into the home and medical facilities?
- The system described here allows to the patients monitoring via wireless camera that can enable to the doctors and nurses to see and talk on video with their patients.
- Withpatient observation trained staff in central operations can observe multiple high-risk patients over the existing network at the facility, communicating to caregivers just as if they were physically present, for patient privacy, the system transmits live video only, and does not record.
- Remote patient observation by observation has shown itself as available option and it could even become a standard clinical pathway, helping healthcare providers promote more organized and efficient care.

1.3.2The Specific objectives are as follows:

Though successfully achieving these goals will require much greater effort than simply implementing remote patient monitoring programs at healthcare organizations nationwide, RPM can help providers get one step closer to reaching the Triple Aim objective. Here's how:

1.3.2.1 Improve the patient experience.

Meaningful use guidelines are pushing for greater patient engagement and, as it turns out, remote patient monitoring services can help do just that, along with other telehealth technologies, RPM allows patients to become more involved in the treatment of their medical conditions by giving them more responsibilities and supervised medical guidance.

Aside from having a greater awareness of their condition, patients also benefit from a continued connection with their medical team.

In fact,with RPM, patients are usually required to report regularly with answers to relevant medical questions.

1.3.2.2 Improve the health of populations.

Elderly patients, as well as those in rural areas, often do not receive the care they need and this can be due to a lack of specialist care in the community, transportation issues, or difficulties traveling, with the help of RPM services, the overall health of both populations could improve significantly, patients in outlying areas could receive the treatment they need without having to travel long distances, meanwhile, elderly patients could be monitored at a distance so as to eliminate unnecessary trips to the doctor, this is important, seeing as

patients that do not have easy access to health care often choose go without receiving necessary medical treatment.

1.3.2.3 Reduce the per capita cost of health care:

Remote patient monitoring could reduce healthcare spending ,though it's difficult to tell how accurate that estimate is now, recent telehealth programs have actually seen reductions in hospital admissions and reduced costs overall. The Veterans Hospital system, for example, saw a 19 percent reduction in hospital admissions since implementing their remote monitoring program and this means that fewer patients are putting unnecessary strain on their healthcare system.

1.4Methodology:-

This system describe the method for remote patient observation firstly programmed the micro PLC SIMATIC S7-200 by logic diagram ladder language to control and operate the stepper motor then proved on it camera wireless that mounted in rooms and rotated round the patients to capture live video for patients and it connected to computer via access point then used internet protocol (IP) technology to enable the doctors and nurse in the center manager to see and talk with their patients on video

Hospitals use their own discretion to decide how many video feeds each trained operator can safely watch.

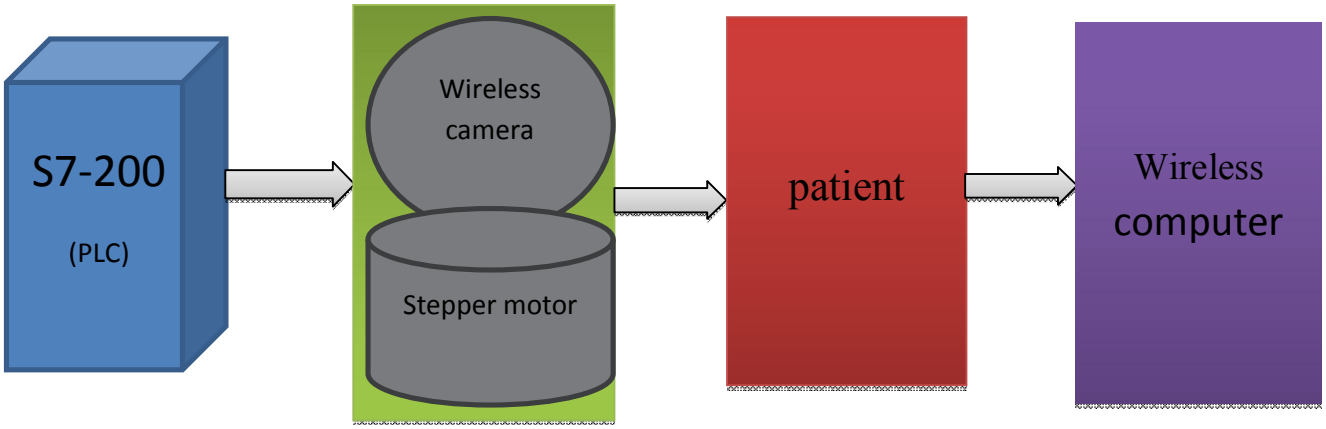

Fig 1-1 Block diagram of the system

1.4.1SIMATIC S7-200(PLC):

The Micro PLC SIMATIC S7-200 is truly in a class of its own: it's both compact and highly powerful – especially considering its real-time response – it's fast, features great communication options and comes with easy-to-operate software and hardware, but there's more; the Micro PLC SIMATIC S7-200 has a compact modular design – for customized solutions which aren't too large, but flexible enough to be expanded anytime in the future.

All this makes the SIMATIC S7-200 a great choice for open-loop control in the lower performance range, become one of the thousands of S7-200 customers that constantly benefits from Siemens PLC innovation and lower cost of ownership.

SIMATIC S7-200 delivers consistently economical solutions.

- The entire system family features.
- Powerful performance.
- Optimum modularity.
- Open communications.

1.4.2Camera wireless:

The Secure View Wireless N Day/Night Pan/Tilt/Zoom Internet Camera, model TV-IP422WN, provides day and night security over a large area. Pan the camera side-to-side a remarkable 330° and tilt up-and-down 105°.

Wireless n technology provides unsurpassed wireless coverage and improved streaming video quality.

Add this camera to your wireless network at the touch of a button with Wi-Fi Protected Setup (WPS).

Infrared bulbs provide night vision for distances of up to five meters (16 feet) in complete darkness. A built-in microphone and optional speakers accommodate 2-way audio communications.

Manage up to 32 Secure View cameras with the included complimentary camera management software.

Advanced features include motion detection recording, email alerts, scheduled recording sessions, MPEG-4 / MJPEG image compression, 3GPP support, an optional USB port, preset Auto-Patrol, Input/ Output ports, and digital zoom.

A wall/ceiling mounting kit is included and the off-white camera housing blends into most environments.

1.4.3Stepper Motors and Drives:

A stepper motor is a brushless, synchronous electric motor that converts digital pulses into mechanical shaft rotation. Every revolution of the stepper

motor is divided into a discrete number of steps, in many cases 200 steps, and the motor must be sent a separate pulse for each step, the stepper motor can only take one step at a time and each step is the same size. Since each pulse causes the motor to rotate a precise angle, typically 1.8°, the motor's position can be controlled without any feedback mechanism, as the digital pulses increase in frequency, the step movement changes into continuous rotation, with the speed of rotation directly proportional to the frequency of the pulses, step motors are used every day in both industrial and commercial applications because of their low cost, high reliability, high torque at low speeds and a simple, rugged construction that operates in almost any environment.

1-5Research plan:

Remote patient monitoring by wireless can be achieve observations the patients in hospital wards and ICU in near and far area.

Chapter 1: introduction to telemedicine and its benefits and services like remote patient monitoring and how to help the health care.

Chapter 2: literature reviews that done in the field of remote monitoring for patient before this design.

Chapter 3: the electronic circuit design anddefinition of all component of the system that used in this circuit.

Chapter 4: contain introduction to program logic control language and of the software of the design.

Chapter 5: result and discussions.

Chapter 6: conclusion and recommendation.

And finally the references: Havard standard and Appendix.

Chapter (Two)

Literature Review

2- Literature Review:

Developedand developing world nowadays. A brief review of the past and current research work related toour project is given below.

2.1A wireless PDA

In my thesis I refer to remote monitoring for patient by observation and we find in [7]proposes a mobile patient monitoring system, which integrates personal digital assistant (PDA) technology and wireless local area network (WLAN) technology, at the patient's location, a wireless PDA-based monitor is used to acquire continuously the patient's vital signs, including heart rate (HR), three-lead electrocardiography (ECG), and blood oxygen saturation (SpO2). Through the WLAN, the patient's bio-signals can be transmitted in real-time to a remote central management unit, and authorized medical staff can access the data and the case history of the patient, either through the central management unit or the wireless devices.

In general the telemedicine system consists mainly of twoparts:-

- The mobile unit, which is set up around the patient to acquire the patient's physiological data, and.
- The management unit, which enables the medical staff to monitorthe patient's condition in real-time.

The management unit is from either a fixed computer within an existing hospital network or a mobile laptop via WLAN.

The mobile unit in this project is comprised of a designed vital-sign signals acquisition module and a Pocket PC, multiple vital-sign parameters, which

include the three-lead Electro-Cardiograph (ECG), blood oxygen saturation (SpO2), and heart rate, can be measured by this unit.

The management unit consists mainly of a fixed personal computer or a laptop, and the management program; the management unit can be installed in different systems depending on different applications of tele-monitoring. It is normally located in the nurse's station and provides a user-friendly interface for tele-monitoring a patient's vital-sign signals, the management terminal can receive patients' physiological data from the remote mobile units via the WLAN or the Internet.

Therefore, the remote monitoring during transport would be beneficial for a better quality care of the patient.

2.2 Mobile Phones for Mother and Child Care

In[8]evaluates the strategy of using mobile phones as a tool for promoting maternal newborn and child health (MNCH) in developing countries, using Egypt as a case study.

The author suggests that Information and Communication Technology (ICT) can play a strategic role in providing child and maternal health care in developing countries like Egypt.

ICT can be the impetus to meet the millennium development goals planned by UNDP, the author goes on to suggest that the country's (Egypt) citation by the World Health Organization (WHO)'s World Health Report 2005 as having made significant progress in addressing maternal and child health is mainly due to the increased availability and use of mobile phone services in the country.

The author concludes that "the impact of mobile phones on maternal, newborn, and child health in poor countries depends on whether it is achieved as a by-product of its general integration into society or through direct engagement."

2.3 Remote Patient Monitoring in China

And In**[9]**a low cost real-time patient monitoring platform designed to improve the current medical services in China's community healthcare system for the (Bottom of the Pyramid) BOP population is basically implemented through community and village doctors (C/VDs) .

In this project data is gathered by the sensor unit and transmitted to the server through a medical hub. The data is then stored in the server and displayed in the medical assistant's (MA) system. C/VDs analyze the data with available functions and make the preliminary diagnosis while requesting assistance for remote consulting with specialists located in higher-tier hospitals

These doctors, who have been given a basic medical training by the Chinese government, often offer people simple medical diagnosis and treatment. Due to their limited knowledge, they are not able to provide complete medical assistance to patients.

The objective of the project is to design an affordable patient monitoring system for C/VDs that can gather real-time biosignals store, display, and analyze data and communicate information between servers and terminals, the C/VDs can use the system for on-the spot diagnosis as well as remote specialist consultations in higher-tier hospitals for further medication.

This system consists of three units:

- As mart sensor unit, which is worn on the patient's body to register the required bio data.
- The server unit, which enables medical staff to remotely monitor a patient's conditioning real time through a computer within an existing network.
- The MA unit, which allows C/VDs to access and query the medical bio-data, recorded in the server as well as for remote consultation by specialists.

According to the initial estimation, even though the system is free for patients but it is expensive to operate. Apart from this, technical improvements which are necessary before a product is made according to the designspecifications include the following:

- User-friendly interface for data communication.
- Medical information management.
- Medical information security.

2.4Remote Non-Intrusive Patient Monitoring

In[10]Proceedings of the 4th International Conference on Smart Homes and Health Telemetric (ICOST **2006**),the Tyndall-DMS-Mote is a wireless sensor device that can monitor patients' vital signs nonintrusively within and outside their home. A patient's real-time vital sign readings (dynamic data) and archived records (static data) need to be managed, correlated and analyzed in a cohesive manner to produce effective results.

The Data Management System (DMS) has been developed to intelligently manage this data. Limited computation is available to clients executing on the sensor node, a Mobile-DMS-Client executes on a Nokia9500 Communicator. This client complements the Tyndall-DMS-Mote in its ability to locally process large amounts of data thus reducing the need to communicate data to a remote server for computation. When external interaction is required e.g. to a knowledge base or a staff PDA, the DMS can supply information via a context aware agent middleware, agents effectively encapsulate, extract and interpret real world context aware information ensuring that physicians get the "correct" data in real time round the clock. Patient vital sign readings are taken by Tyndall-DMS-Motes in a noninvasive non-intrusive manner.

2.5 Code Blue

[11]Code Blue is a wireless infrastructure intended for deployment in emergency medical care that integrates low-power wireless vital signs sensors, PDAs, and PC-class systems.

Code Blue is intended to enhance first responders' ability to assess the patients in the field, ensures seamless transfer of data among caregivers, and facilitates efficient allocation of hospital resources. The system is intended to scale to very dense networks with thousands of devices and it shall operate in extremely volatile network conditions. Therefore, the system demands an ad hoc but reliable data delivery, a flexible naming and discovery scheme, and a decentralized security model.

Code Blue is a wireless communication infrastructure for critical care environments, Code Blue, as mentioned before, is designed to provide routing, naming, discovery, and security for wireless medical sensors, PDAs, PCs, and

other devices that may be used to monitor and treat patients in a number of health care environments. It is designed to scale across a wide range of network densities, ranging from sparse clinic and hospital deployments to very dense, ad hoc deployments at a mass casualty site. Code Blue utilizes a publish/subscribe model for data delivery, which allows sensing nodes to publish streams of vital signs, locations, and identities to those PDAs or PCs accessed by physicians and nurses can subscribe to.

To avoid network congestion and information overload, CodeBlue supports filtration and aggregation of events as they flow through the network. For example,physicians may specify that they should receive a full stream of data from a particular patient, but only critical changes in the status for other patients under their treatment.

Theuse of ADHOC networking allows the “Mesh” of connectivity to extend across an entire building or between multiple, adjacent facilities. Additional coverage, if necessary, is possible by placing the fixed nodes in hallways, rooms, or other areas.

2.6 An Advanced Wireless Sensor Network

[12]the authors propose new system architecture for smart healthcare on the basis of Wireless Sensor Network (WSN) topology. It specifically targets aging assisted-living residents and others who may benefit from continuous, remote health monitoring. The project shows the advantages, objectives, and status of the design. An experimental living space has been constructed at the Department of Computer Science at UVA for evaluation of this project.

And the project is acquiring data through some motion sensors, some wearable sensors like accelerometers and GPS and the GPS data is used to reconstruct past activities and movement locations, there are temperature and humidity sensors for measuring habitat conditions, while a bed sensor and a pulse oximetry and EKG gives different parameters like breathing rate, heart rate, agitation, heart beat events, oxygen saturation and electrocardiogram.

2.7Internet Based Monitoring

Internet monitoring is one of the common approaches for remote monitoring. Many researchers have worked in field of Internet based remote monitoring. .

And[13]developed java based home automation system via World Wide Web,the home appliances were controlled from ports of embedded system board connected to PC based server at home.

in[14]implemented Internet based wireless flexible solution where home appliances are connected to slave node, the slave nodes communicate with master node through RF and master node has serial RS232 link with PC server. The nodes are based on PIC 16F877 μc, PC server is formed of a user interface component, the database and the web server component s. an Internet page has been setup running on a web server,the user interface and the Internet front end are connected to a backend data base server, the control of devices is established and their condition is monitored through the Internet.

The author in[15]used X10 controller interfaced through serial port to PC server for control of devices, the Common gateway interface (CGI) is used to interface between the browser and the X10 protocol via http connection, the server

executes CGI programs in order to satisfy a particular request from the browser, which expresses its request using the http.

And maintained[20]developed model of web services based email extension for remote monitoring of embedded systems which integrates web services into emails. It uses a general purpose email messaging framework to connect devices and manipulators, this low cost model fits for systems with low connection bandwidth, small data transportation volume and non-real- time control, e.g., monitoring of home appliances and remote meter-reading.

[17]developed a remote wireless monitoring system for off grid wind turbine based on the GPRS and the internet, the remote monitoring system is made up of three parts: -

- Controlling terminal central monitoring computer and
- communication network.

Controlling terminal consists of microcontroller ARM7 LM3S1138, data acquisition module and GPRS communication module WAVECOM Q2406B connected to ARM7 system using serial port. GPRS module sends parameters relating wind turbine to central monitoring computer, the client can access central monitoring computer server through Internet and know parameters of different wind turbines.

[24]developed real time based equipment condition monitoring and controlling system using embedded web based technology which directly connects the equipment to network as a node, the embedded system consists of ARM7 based LPC 2148 microcontroller board, A/D, signal conditioning, sensors, and communications interface, the function of web based system is to collect the real

time data information of the on-site equipment and remotely send the data in the form of user defined data transmission style, the remote Computer collects the data and running status through the network and provides the comparison on the historical data, if the parameter value is different from the original set value, the corrected signal is sent to the control unit, the embedded remote monitoring system completes the data collection in the embedded platform and provides the data to remote host through the TCP/IP protocol from Web server, it creates condition to realize unattended management through providing Web-based graphical management interface for the internet or LAN users.

[16]introduced Key Press Markup Language (KPML) and SIP Event Package to control devices in the home environment remotely without the need for specialized hardware in the home devices, KPML provides an efficient, reliable protocol for the remote control of consumer devices using plain old telephones with 12-digit keypads using Internet transport technologies.

[18]proposed the architecture of embedded remote monitoring system based on Internet, the system adopts embedded web server as a central monitoring node and results in improvement in stability and reliability of system, moreover, utilization of dynamic monitoring web based on java applet improves the response capability and brings convenience for complex monitoring web design.

[26]developed remote intelligent monitoring system based on embedded internet technology for device-room monitoring of the campus network, the Intelligent Monitoring Terminal (IMT) is provided with the functions of embedded internet node unit and local MSD (Monitoring System Devices).

IMT can give alarm of theft or fire according to detection analysis of temperature, sound and smog, and it also can connect to Internet for carrying out

remote data communication, the MCU S3C44B0, which utilize 32-bit ARM kernel, is adopted in intelligent monitoring terminal, μClinux operating system is chosen as the software core of embedded system., it offers self-contained TCP/IP network protocol module and provides strong support for embedded internet technology.

[19]designed wireless remote monitoring system based on the GPRS (General Packet Radio Service) and the MCU (Micro programmed Control Unit), system is based on 89C58 microcontroller and PIML GPRS-MODEM as the core, can collect data from WEB server (fixed IP address or fixed domain name website) through the GPRS channel, the system also accepts commands from remote monitoring center, eight sensors, control two-way data acquisition, in the local real-time display and support remote internet monitoring, the data from sensors are encoded, sent to the to the WEB server (fixed IP address or fixed domain name website) through the GPRS channel, the system also accepts commands from remote monitoring Centre.

[22]developed application on remote monitoring system of reservoir based on GPRS, GPRS data terminal hardware includes the intelligent processing module, remote communication module, serial interface module and display module. intelligent processing module contains two chips AT89C55 microcontroller and serial E2PROM X25045. AT89C55 is used to transmit data between remote communication module, A/D conversion module and display module, to ensure that data will not be lost because of power outages, serial device is adopted for data storage, remote communication module includes GPRS wireless module, SIM card and serial module , database mainly stores various parameters of the flood accommodation procedures for the user and reservoir historical hydrological data, such as electric power generated, relation curve of water level

flows, the water storage capacity curve, discharge curve, unit's efficiency curve of different conditions, historical flood data and flood information.

[24]developed a system composed of server which interfaces several video surveillance cameras including several microphones for audio surveillance, this server captures video and audio streams from the video cameras and microphones and operates on these streams according to the configuration of the local control software module, this module can store the video and audio streams on local hard-disks, index video and audio captures by time and place, retrieve images and sound based on user specified time intervals and deliver them to the user via internet, or deliver (streaming) live images and sounds from a predefined camera.

The system is connected to the building power supply and can be connected to the Internet via several communication solutions based on their availability grid failure the system is provided with a secondary power supply based on rechargeable batteries which can keep the system functional for several hours.

[23]developed wireless home automation system by merging communication technologies of GSM, Internet and speech recognition, GSM and Internet methods were used for remote access of devices of house whereas speech recognition was designed for users inside the house, the communication between the user and the home is established by the SMS (Short Message Service) protocol, a GSM modem is connected to the home automation server.

The communication between the home automation server and the GSM modem is carried out by the AT (Attention) commands, to accomplish internet

connectivity, a web server is built to take requests from remote clients, the clients can send requests to the home appliances

[21]developed a system to transmit a patient's biomedical signals directly to a hospital for monitoring or diagnosis, using mobile telephone, the system consists of mobile telemedicine processor, which samples signals from sensors on the patient, it then transmits digital data over a Bluetooth link to a mobile telephone that uses the General Packet Radio Service, the mobile processor consists of signal conditioning module, a peripheral control module.

The mobile telemedicine processor is first configured with the hospital server IP address and establishes a Bluetooth link with the mobile telephone at power-up, the mobile telephone is then configured with a mobile-to-host GPRS connection (GPRS attachment and PDP context activation), patient data are recorded and stored in the processor's memory module, typically for 10 min, then the processor transmits an AT-command to the mobile phone to initiate data transmission via the GPRS network.

Chapter (Three)

Electronic Circuit Design

3. Electronic Circuit Design:

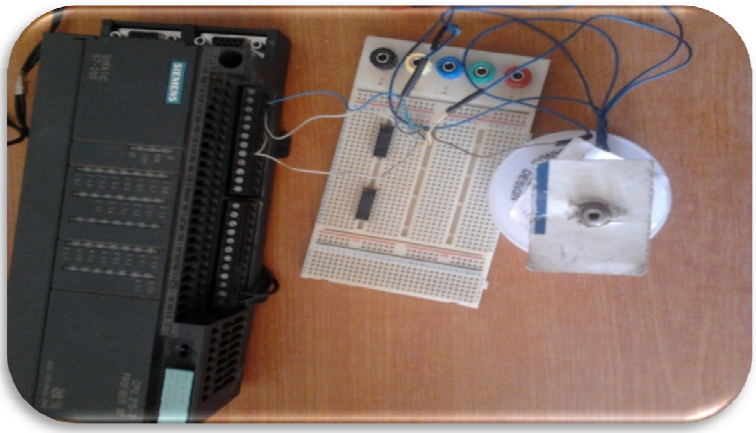

Figure 3.1 Circuit design of PLC based remote patient monitoring

This system consists mainly of two parts:-

- The mobile unit, which is set up around the patient to capture the patient‘s video.
- The management unit, which enables the medical staff to monitor the patient‘s conditions in real-time.

The management unit is from either a fixed computer within an existing hospital network or a mobile laptop via WLAN.

The mobile unit in this project is comprised of a designed PLC S7-200 to operated and control the stepper motor and wireless camera module proved on it to capture live video and audio for patient.

The management unit consists mainly of a fixed personal computer or a laptop, and the wireless; the management unit can be installed in different systems depending on different applications of tele-monitoring. It is normally located in the nurse‘s station and provides a user-friendly interface for tele-monitoring a patient‘s vital-video, the management terminal can receive patients conditions from the remote mobile units via the wireless.

A prototype of this system has been designed and tested, see Fig 3-1, experienced senior staff can be found surveillance the patients and advise for unexpected condition, and thus, may prevent further deterioration of the patient condition, under such circumstances, online monitoring or consultation is helpful.

3.1 SIMATIC S7-200(PLC):

The Micro PLC SIMATIC S7-200 is truly in a class of its own: it's both compact and highly powerful – especially considering its real-time response – it's fast, features great communication options and comes with easy-to-operate software and hardware, but there's more; the Micro PLC SIMATIC S7-200 has a compact modular design – for customized solutions which aren't too large, but flexible enough to be expanded anytime in the future, all this makes the SIMATIC S7-200 a great choice for open-loop control in the lower performance range.

Become one of the thousands of S7-200 customers that constantly benefit from Siemens PLC innovation and lower cost of ownership, SIMATIC S7-200 delivers consistently economical solutions.

The entire system family features:

- Powerful performance,
- Optimum modularity and
- Open communications.

In addition, the SIMATIC S7-200 programming tools make your job even easier: this micro PLC is easy to program allowing fast and easy realization of applications – and the add-on software libraries accelerate special function

configuration even more, this Micro PLC has been in successful use in millions of applications around the world – in both stand-alone and networked solutions.

The communications possibilities of the micro PLC SIMATIC S7-200 are unique, the built-in RS 485 interfaces can operate at data transmission rates up to 187.5 kbit/s functioning as follows:

- As a system bus with a maximum of 126 stations, in this capacity, it is possible to network programming devices, SIMATIC HMI products and SIMATIC CPUs without a problem.
- The integrated PPI protocol is used for pure S7-200 networks supporting multiple masters from a single port.
- In a network consisting of other Siemens components (SIMATIC S7-300/400 and SIMATIC HMI, etc.), the S7-200 CPUs are integrated as MPI slaves.
- This means the SIMATIC S7-200 is open for any connected device; for example, it enables connection of a modem, barcode scanner, PC, non-Siemens PLC and much more, by means of the USS protocol for drives, as many as 32 Siemens frequency converters can be controlled without additional hardware.

3.1.1 Driver with PC Access

PC Access is the ideal basis for data exchange between S7-200 and a connected PC – regardless of the communication link selected (PPI, modem, Ethernet/IT CP), as an OPC Server, PC Access offers you the option of writing or reading S7-200 data with Microsoft Excel, or any other OPC client application, as an OPC Client, it can be used for ProToolPro,WinCC flexible RT, Win CC, etc.

With capability up to 8 connections, the configuration, programming and monitoring can be implemented from a central location, saving both time and money.

The internet technology module CP 243-1 IT also offers you fast access by permitting a simple universal connection of the PLC to different computers by means of FTP, HTTP, JAVA, and e-mail, the Ethernet module CP 243-1 allows you to access S7-200 process data quickly over ethernet for archiving or further processing., the configuration support from STEP 7-Micro/WIN ensures simple commissioning and convenient diagnostic options .

3.2 SecurView Wireless N Day/Night Internet Camera :

Fig 3-2 Wireless N Day/Night Internet Camera

- Up to 4x greater coverage as compared to wireless g IP cameras
- Night vision of up to 5 m (16 ft.) and one-way audio
- Program motion detection recording, email* alerts and more with complimentary software
- One touch Wi-Fi Protected Setup (WPS) wireless connection.

3.2.1 Overview

- The SecurView Wireless N Day/Night Internet Camera (model TV-IP121WN) transmits real-time high quality video over the Internet

- Manage your camera from any Internet connection.
- Wireless n technology provides unsurpassed wireless coverage and improved streaming video quality, and you can add this camera to your wireless network at the touch of a button with Wi-Fi Protected Setup (WPS).
- See and hear people in your camera's viewing field in complete darkness for distances up to 5 meters (16 feet) from any internet connection.
- Manage up to 32 TREND net cameras with the included complimentary camera management software. Advanced features include motion detection recording, email alerts, scheduled recording sessions, MJPEG image compression, and digital zoom.
- A wall/ceiling mounting kit is included and the off-white IP camera housing blends into most environments.

3.3 Stepper motor:

Fig 3-3 stepper motor

3.3.1 Introduction to Stepper Motors and Drives:

A stepper motor is a brushless, synchronous electric motor that converts digital pulses into mechanical shaft rotation, every revolution of the stepper motor is

divided into a discrete number of steps, in many cases 200 steps, and the motor must be sent a separate pulse for each step, the stepper motor can only take one step at a time and each step is the same size. Since each pulse causes the motor to rotate a precise angle, typically 1.8°, the motor's position can be controlled without any feedback mechanism.

As the digital pulses increase in frequency, the step movement changes into continuous rotation, with the speed of rotation directly proportional to the frequency of the pulses. Step motors are used every day in both industrial and commercial applications because of their low cost, high reliability, high torque at low speeds and a simple, rugged construction that operates in almost any environment.

3.3.2 Stepper Motor Advantages

1. The rotation angle of the motor is proportional to the input pulse.
2. The motor has full torque at standstill (if the windings are energized).
3. Precise positioning and repeatability of movement since good stepper motors have an accuracy of 3 to 5% of a step and this error is non-cumulative from one step to the next.
4. Excellent response to starting/stopping/reversing.
5. Very reliable since there are no contact brushes in the motor, therefore the life of the step motor is simply dependent on the life of the bearing.
6. The stepper motors response to digital input pulses provides open-loop control, making the motor simpler and less costly to control.
7. It is possible to achieve very low speed synchronous rotation with a load that is directly coupled to the shaft.
8. A wide range of rotational speeds can be realized as the speed is proportional to the frequency of the input pulses.

3.3.3 Types of Step Motors

There are three basic types of step motors: variable reluctance, permanent magnet, and hybrid, this discussion will concentrate on the hybrid motor, since these step motors combine the best characteristics of the variable reluctance and permanent magnet motors. they are constructed with multi-toothed stator poles and a permanent magnet rotor , (Standard hybrid motors (such as the models offered by OmegamationTM) have 200 rotor teeth and rotate at 1.8º step angles. Because they exhibit high static and dynamic torque and run at very high step rates, hybrid step motors are used in a wide variety of commercial applications including computer disk drives, printers/plotters, and CD players, some industrial and scientific applications of stepper motors include robotics, machine tools, pick and place machines, automated wire cutting and wire bonding machines, and even precise fluid control devices.

3.3.4 Step Modes

Stepper motor "step modes" include full, half and micro step. the type of step mode output of any stepper motor is dependent on the design of the driver.

Omegamation offers stepper motor drives with switch selectable full and half step modes, as well as micro stepping drives with either switch-selectable or software-selectable resolutions.

3.3.4.1FULL STEP

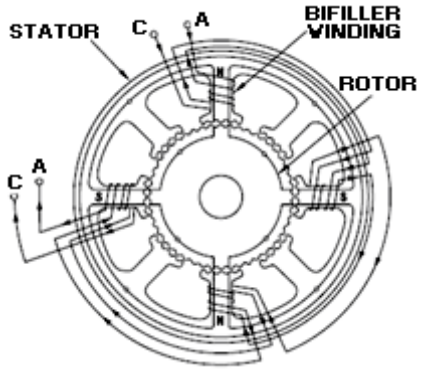

Fig 3-4: 1.8° Hybrid Motor

Standard hybrid stepping motors have 200 rotor teeth, or 200 full steps per revolution of the motor shaft, dividing the 200 steps into the 360º of rotation equals a 1.8º full step angle, normally, full step mode is achieved by energizing both windings while reversing the current alternately, essentially one digital pulse from the driver is equivalent to one step.

3.3.4.2 HALF STEP

Half step simply means that the step motor is rotating at 400 steps per revolution, in this mode, one winding is energized and then two windings are energized alternately, causing the rotor to rotate at half the distance, or 0.9º,although it provides approximately 30% less torque, half-step mode produces a smoother motion than full-step mode.

3.3.4.3MICROSTEP

Micro stepping is a relatively new stepper motor technology that controls the current in the motor winding to a degree that further subdivides the number of positions between poles.

Micro ping drives are capable of dividing a full step (1.8º) into 256 micro steps, resulting in 51,200 steps per revolution (.007º/step) ,micro stepping is typically used in applications that require accurate positioning and smoother motion over a wide range of speeds, like the half-step mode, micro stepping provides approximately 30% less torque than full-step mode.

3.3.5 Linear Motion Control:

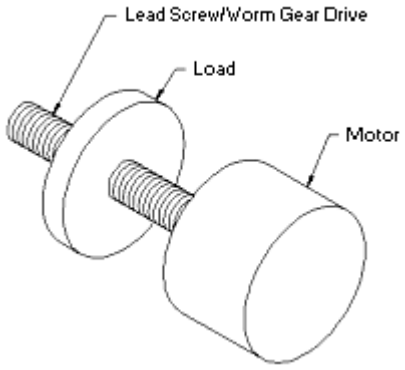

Fig 3-5: Linear Motion Control

The rotary motion of a stepper motor can be converted to linear motion using a lead screw/worm gear drive system (See figure 3.3), the lead, or pitch, of the lead screw is the linear distance traveled for one revolution of the screw, if the lead is equal to one inch per revolution, and there are 200 full steps per revolution, then the resolution of the lead screw system is 0.005 inches per step, even finer resolution is possible by using the step motor/drive system in micro stepping mode.

3.3.6 Series vs. Parallel Connection:

There are two ways to connect a stepper motor, in series or in parallel. A series connection provides a high inductance and therefore greater torque at low speeds. A parallel connection will lower the inductance which results in increased torque at faster speeds.

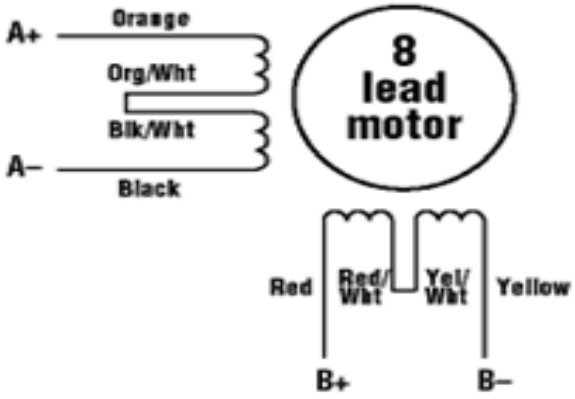

Fig 3-6

Series connection of motor

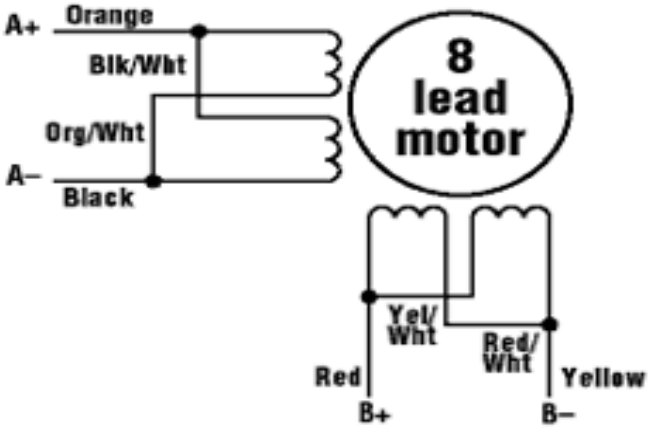

Fig 3-7

parallel connection of motor

3.3.7 Driver Technology Overview

The stepper motor driver receives step and direction signals from the indexer or control system and converts them into electrical signals to run the step motor.

One pulse is required for every step of the motor shaft. In full step mode, with a standard 200-step motor, 200 step pulses are required to complete one revolution; the speed of rotation is directly proportional to the pulse frequency,

some drivers have an on-board oscillator which allows the use of an external analog signal or joystick to set the motor speed.

Speed and torque performance of the step motor is based on the flow of current from the driver to the motor winding, the factor that inhibits the flow, or limits the time it takes for the current to energize the winding, is known as inductance, the effects of inductance, most types of driver circuits are designed to supply a greater amount of voltage than the motor's rated voltage.

The higher the output voltage from the driver, the higher the level of torque vs. speed, generally, the driver output voltage (bus voltage) should be rated at 5 to 20 times higher than the motor voltage rating.

In order to protect the motor from being damaged, the step motor drive should be current-limited to the step motor current rating.

Chapter (Four)

Introduction to Programmable Logic Controller

4. Introduction to Programmable Logic Controller

A Programmable Logic Controller, PLC or Programmable Controller is a digital computer used for automation of electromechanical processes, such ascontrol of machinery on factory assembly lines, amusement rides, or light fixtures, PLCs are used in many industries and machines, unlike general-purpose computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact, programs to control machine operation are typically stored in battery-backed-up or non-volatile memory.

4.1 Application of PLC

Originally hardwired arrays of relays were used to control the operation of heavy machines that contain motors and other high power devices show Fig 4-1 PLCs were originally used to substitute the switching relay networks used in industrial applications, but now they can also be used implement other tasks such as timing, delaying counting, calculating, comparing and processing of analog signals for that used in :

- Manufacturing / Machining
- Food / Beverage
- Metals
- Power
- Mining
- Petrochemical / Chemical

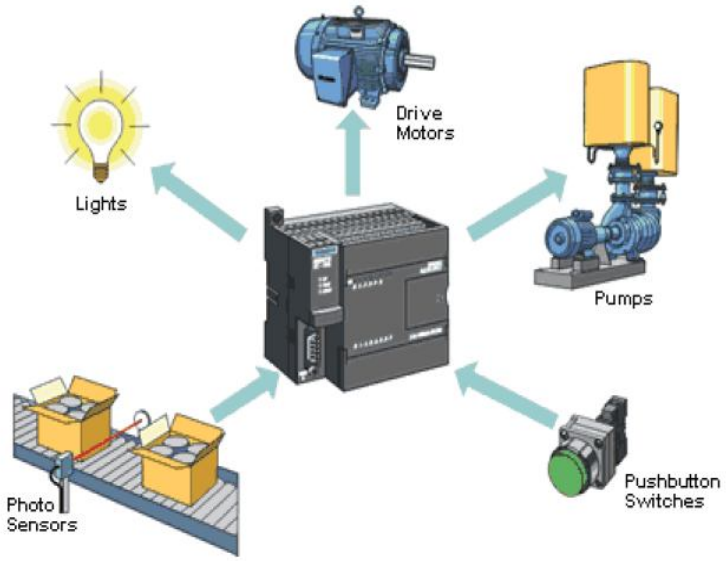

Fig 4-1 The Application Of PLC

4.2 PLC Component:

Programmable controllers have grown throughout industrial control applications because of the ease they bring to creating a controller: ease of programming, ease of wiring, ease of installation, and ease of changing, PLCs span a wide range of sizes, but all contain five basic components Fig 4-5 explains its:

4.2.1 Power supply unit

The power supply provides power for the PLC system. The power supply provides internal DC current to operate the processor logic circuitry and input/output assemblies. Common power levels used are 24V DC or 120 VAC.

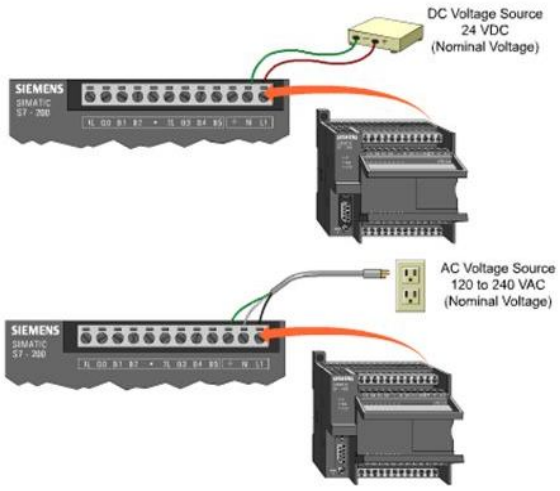

Fig4-2 how to connect power supply unit

4.2.2 Input unit

Inputs carry signals from the process into the controller; they can be input switches, pressure sensors, operator inputs, etc.

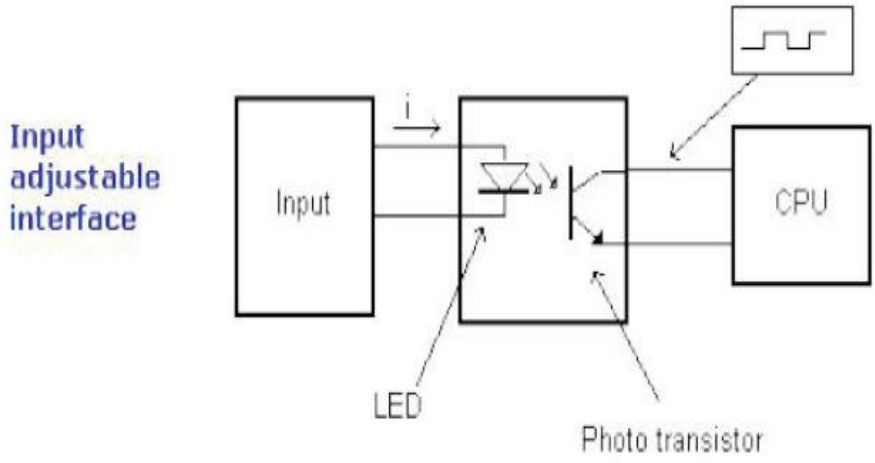

Fig4-3 the optical isolation in input unit

4.2.3Output unit

Outputs are the devices that the PLC uses to send changes out to the world. These are the actuator the PLC can change to adjust or control the process – motors, lights, relays, pumps, etc.

Many types of inputs and outputs can be connected to a PLC, and they can all be divided into two large groups – analog and digital, digital inputs and outputs are those that operate due to a discrete or binary change – on/off, yes/no. Analog inputs and outputs change continuously over a variable range – pressure, temperature, and potentiometer.

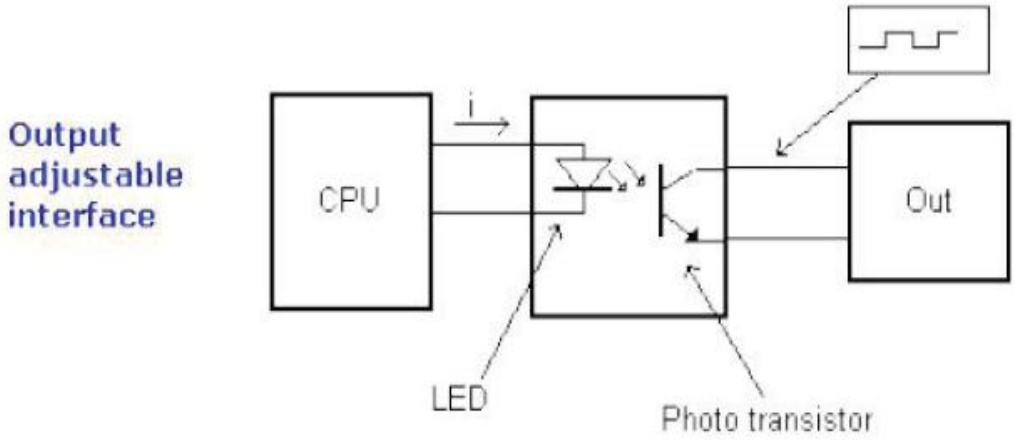

Fig4-4the optical isolation in output unit

4.2.4Central prosses unit

The processor, central processing unit, or CPU is the “brain” of the PLC. The size and type of CPU will determine things like: the programming functions available, size of the application logic available, amount of memory available, and processing speed.

4.2.5Programmable device

The PLC is programmed using a specialty programmer or software on a computer that can load and change the logic inside , most modern PLCs are programmed using software on a PC or laptop computer, older systems used a custom programming device.

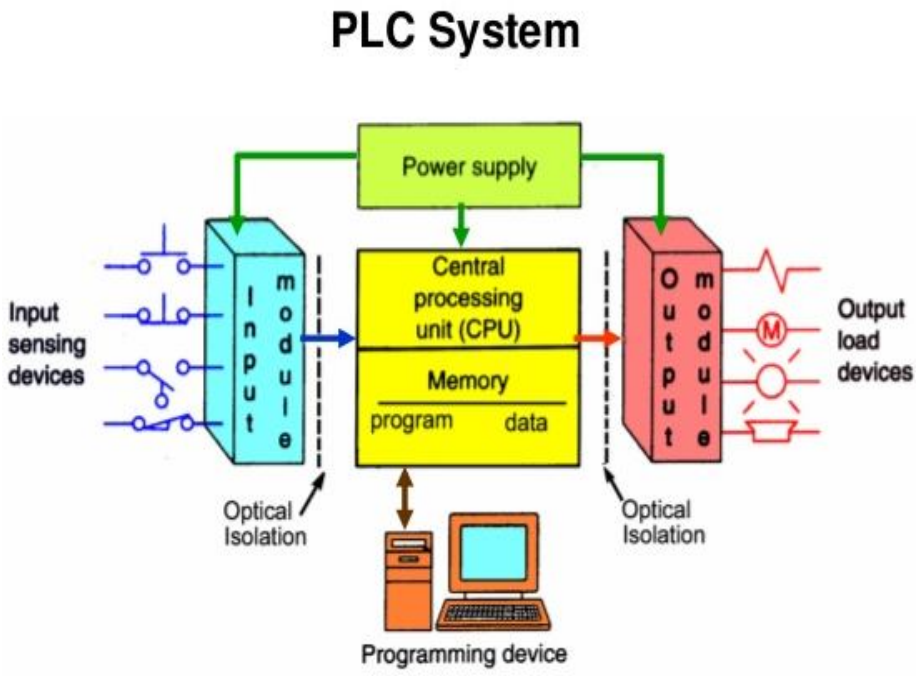

Fig4-5 PLC system component

4.3 PLC Scan Life:

It executes the program in PLC device through iterative process and this process called scan cycle and this process passed through several stage see fig 4-6:

- Read input
- Execute program
- Diagnostic communication
- Update output

The PLC program is executed as part of a repetitive process referred to as a scan, a PLC scan starts with the CPU reading the status of inputs, the application program is executed using the status of the inputs, once the program is completed, the CPU performs internal diagnostics and communication tasks, the scan cycle ends by updating the outputs, then starts over.

Fig 4-6 explain the operation cycle of PLC

4.4 The Cycle Time Depends On

- The size of the program,
- The number of I/Os, and
- The amount of communication required.

4.5 Advantage of PLC

- Increased Reliability
- More Flexibility

- Lower Cost
- Faster Response
- Easier to troubleshoot
- Remote control capability
- Communication Capability

4.6 Disadvantage of PLC

- Too much work required in connecting wires.
- Difficulty with changes or replacements.
- Difficulty in finding errors; requiring skillful work force.

4.7 PLC Size

Manufacturers offer five sizes of PLCs :

- Nano (up to 16 I/O points)
- Micro (more than16 I/O points, up to 64 I/O points)
- Small (up to 960 I/O points)
- Medium (multitasking control of several process) Large (control management of several PLCs).

4.8 Programming of PLC :

In order to create or change a program, the following items are needed show Fig 4-7 below:

- PLC
- Programming Device
- Programming Software
- Connector Cable

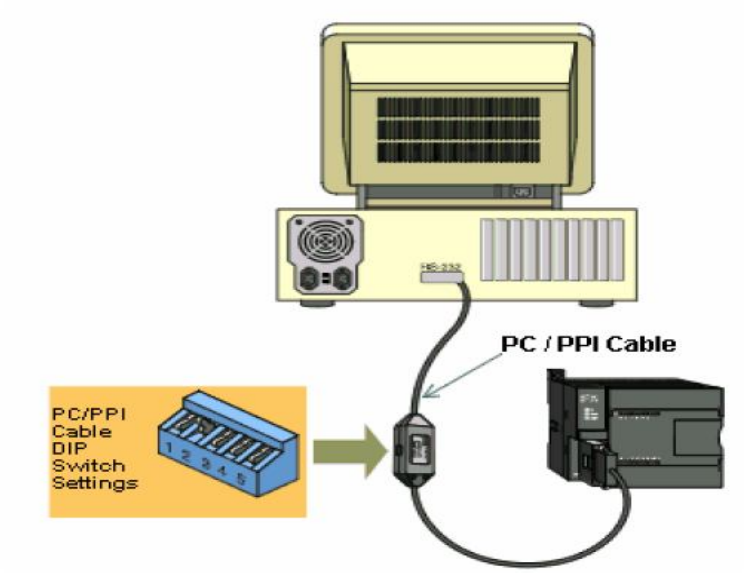

Fig 4-7 items for programming PLC

4.9 PLC Company:

- SIEMENS
- ALLEN BRADLEY
- MITSUBISH

Etc…

4.10SIMATIC families

- S7-200 - microsystems
- S7-300 - middle class
- C7 (S7-300+OP=OPLC)
- S7-400 - high performance control system

4.11S7-200 Micro PLCs

The S7-200 Micro PLC is the smallest member of the SIMATIC S7 family of programmable controllers, the central processing unit (CPU) is internal to the PLC, inputs and outputs (I/O) are the system control points, inputs monitor field devices, such as switches and sensors, outputs control other devices, such as motors and pumps, the programming port is the connection to the programming device.

4.11.1 S7-200 Models:

There are four S7-200 CPU types:

S7-221, S7-222, S7-224, and S7-226 and three power supply configurations for each type mentioned in table 4.1 below.

Table 4-1 S7-200 model specification

Model Description	Power Supply	Power Supply	Output Types
221 DC/DC/DC 221 AC/DC/Relay	20.4-28.8 VDC 85-264 VAC 47-63 Hz	6 DC Inputs 6 DC Inputs	4 DC Outputs 4 Relay Outputs
222 DC/DC/DC 222 AC/DC/Relay	20.4-28.8 VDC 85-264 VAC 47-63 Hz	8 DC Inputs 8 DC Inputs	6 DC Outputs 6 Relay Outputs
224 DC/DC/DC 224 AC/DC/Relay	20.4-28.8 VDC 85-264 VAC 47-63 Hz	14 DC Inputs 14 DC Inputs	10 DC Outputs 10 Relay Outputs

For more information see the SIMATIC S7-200 programmable controller system manual provides complete information on installing and programming the S7-200 PLCs.

4.11.2 Available Expansion for S7-200:

The S7-221 comes with 6 digital inputs and 4 digital outputs, these are not expandable, the S7-222 comes with 8 digital inputs and 6 digital outputs. The 222 will accept up to 2 expansion modules, the S7-224 comes with 14 digital inputs and 10 digital outputs, the 224 will accept up to 7 expansionModules, the S7-226 comes with 24 digital inputs and 16 digital outputs. The 226 will accept up to 7 expansion modules.

4.11.3I/O Numbering

S7-200 inputs and outputs are labeled at the wiring terminations and next to the status indicators, these alphanumeric symbols identify the I/O address to which a device is connected, this address is used by the CPU to determine which input is present and which output needs to be turned on or off, designates a discrete input and **Q** designates a discrete output, the first number identifies the byte, the second number identifies the bit.

Input I0.0, for example, is byte 0, bit 0.

I0.0 = Byte 0, Bit 0

I0.1 = Byte 0, Bit 1

I1.0 = Byte 1, Bit 0

I1.1 = Byte 1, Bit 1 And

I0.0 1st Input	I1.0 9th Input	Q0.0 1st Output	Q1.0 9th Output
I0.1 2nd Input	I1.1 10th Input	Q0.1 2nd Output	Q1.1 10th Output
I0.2 3rd Input	I1.2 11th Input	Q0.2 3rd Output	
I0.3 4th Input	I1.3 12th Input	Q0.3 4th Output	
I0.4 5th Input	I1.4 13th Input	Q0.4 5th Output	
I0.5 6th Input	I1.5 14th Input	Q0.5 6th Output	
I0.6 7th Input		Q0.6 7th Output	
I0.7 8th Input		Q0.7 8th Output	

4.12Programming language of PLC:

International Electro technicalCommission(IEC) 1131-3 is the international standard for programmable controller programming languages.

The following is a list of programming languages specified by this standard:

- Ladder diagram (LD)
- Sequential Function Charts (SFC)
- Function Block Diagram (FBD)
- Structured Text (ST)
- Instruction List (IL)

One of the primary benefits of the standard is that it allows multiple languages to be used within the same programmable controller, this allows the program developer to select the language best suited to each particular task.

4.12.1nemonic Instruction

There are other methods to program PLCs. One of the earliest techniques involved mnemonic instructions; these instructions can be derived directly from the ladder logic diagrams and entered into the PLC through a simple programming terminal.

4.12.2 Sequential Function Charts (SFC)

SFC have been developed to accommodate the programming of more advanced systems, these are similar to flowcharts, but much more powerful, this method is much different from flowcharts because it does not have to follow a single path through the flowchart.

4.12.3 Structured Text (ST)

Programming has been developed as a more modern programming language and it is quite similar to languages such as BASIC and Pascal.

Structured text (ST) is a high level textual language that is a Pascal like language and it is very flexible and intuitive for writing control algorithms.

4.12.4 Function Block Diagram (FBD)

FBD is another graphical programming language, the main concept is the data flow that start from inputs and passes in block(s) and generate the output.

Programmers may choose from among five PLC languages, ladder diagram (LD) is best for programs controlled by multiple files, subroutines and code sectioning, sequential function charts (SFCs) are used to program systems that are more advanced than those run by LD, function block diagram (FBD) is a graphical language that drives data from inputs to outputs by sending through blocks of nested data, structured text (ST) resembles Basic or Pascal programming languages, in that it uses statements such as "If-Then-Else," "While" and "Repeat." Instruction list (IL) uses mnemonic instructions from the ladder diagrams and sends the instructions to the PLC via a programming terminal.

4.12.5 Ladder Logic

Ladder logic is the main programming method used for PLC's, ladder logic has been developed to mimic relay logic; the decision to use the relay logic diagrams was a strategic one, by selecting ladder logic as the main programming method, the amount of retraining needed for engineers and trades people was greatly reduced.

The first PLC was programmed with a technique that was based on relay logic wiring schematics, this eliminated the need to teach the electricians, technicians and engineers how to program - so this programming method has stuck and it is the most common technique for programming in today's PLC.

4.12.5.1Ladder Logic Programming:

Ladder logic programming is a special programming language which represents a program by a graphical diagram and it is based on the circuit diagrams of relay-based logic hardware, the primary use of ladder logic programming is to develop software for programmable logic controllers (PLC's) that are used in industrial control applications, the program name "ladder logic" is based on the observation that programs in this language resemble ladders, as it consists of two vertical rails and a series of horizontal rungs between them.

4.12.5.2 Ladder Logic Programming applied:

Ladder logic is used widely in the programming of programmable logic controllers due to PLC's requirement for sequential control of a manufacturing or process operation and ladder logic programming is useful for reworking old hardwired relay circuits, as well as simple but critical control systems, as

programmable logic controllers became more sophisticated over time, ladder logic programming has also been applied in very complex automation systems.

4.12.5.3Ladder Logic Programming varies according to Programmable Logic Controllers

The manufacturers of programmable logic controllers also provide associated ladder logic programming systems, it is interesting to note that the ladder logic languages from two different manufacturers are not completely compatible; ladder logic programming is thus a set of closely related programming languages rather than one language,the same principle applies to programmable logic controllers; programmable logic controllers within the same family may have a different ladder notation to prevent programs from being interchanged seamlessly between models.

4.12.5.4 Ladder Logic Programming work:

Ladder logic programming is seen as a rule-based language, rather than a procedural language, this is because each “rung” in the ladder represents a rule, when the various rules are implemented with relays and other electromechanical devices, they “execute” immediately and simultaneously ,when the rules are implemented in a programmable logic controller, the rules are being executed sequentially by software in a continuous loop or scan, when this loop or scan is executed fast enough (many times per second), the effect of immediate and simultaneous execution is achieved to within the tolerance of the time required to execute every rung in the loop, this is also known as the “scan time”, the working of ladder logic programming is thus similar to other rule-based languages which include SQL or spreadsheets.

4.3.1 The Program in ladder logic diagram language is shown in figure (4.2).

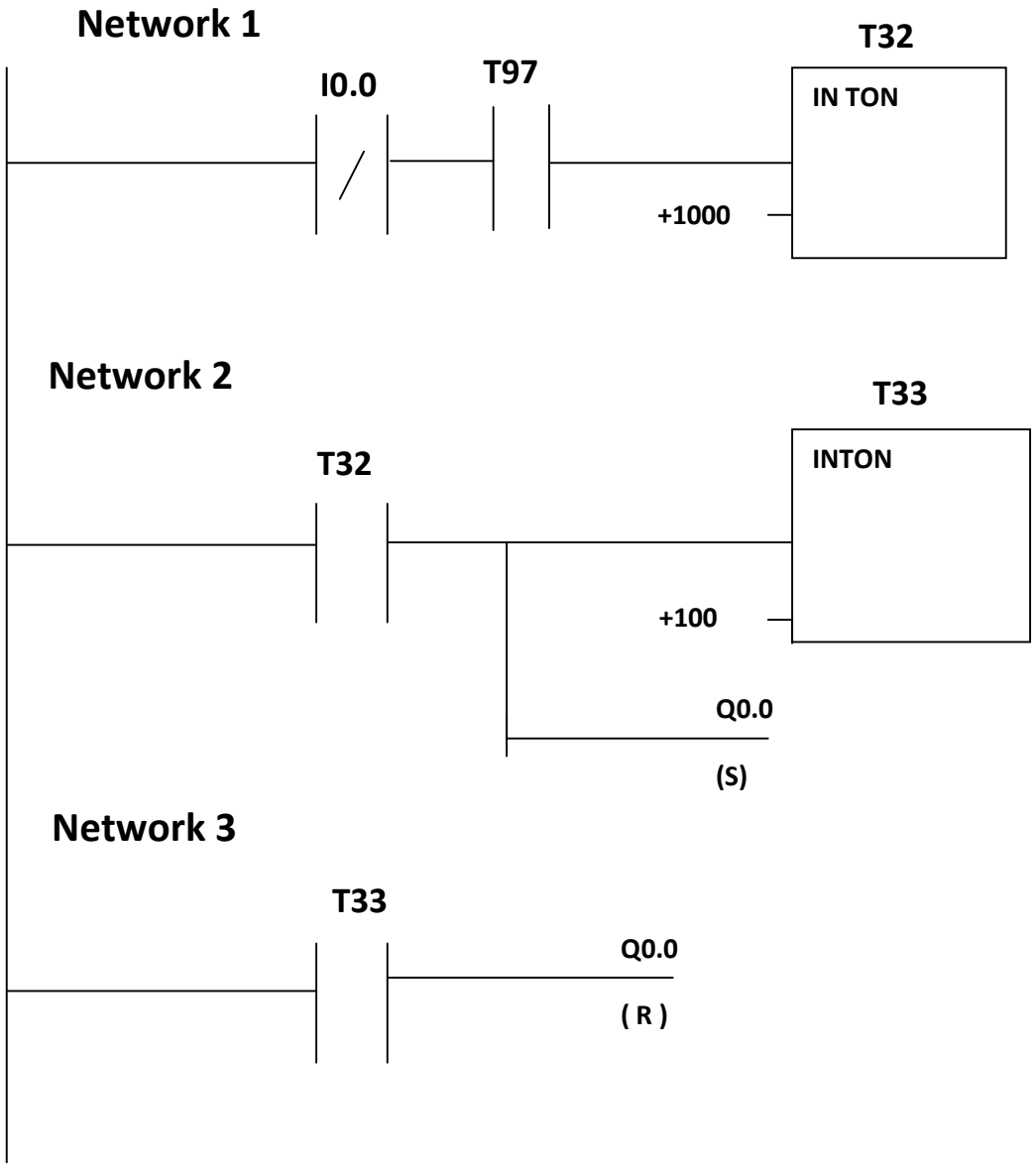

Fig 4-2 Circuit Program by Ladder Logic

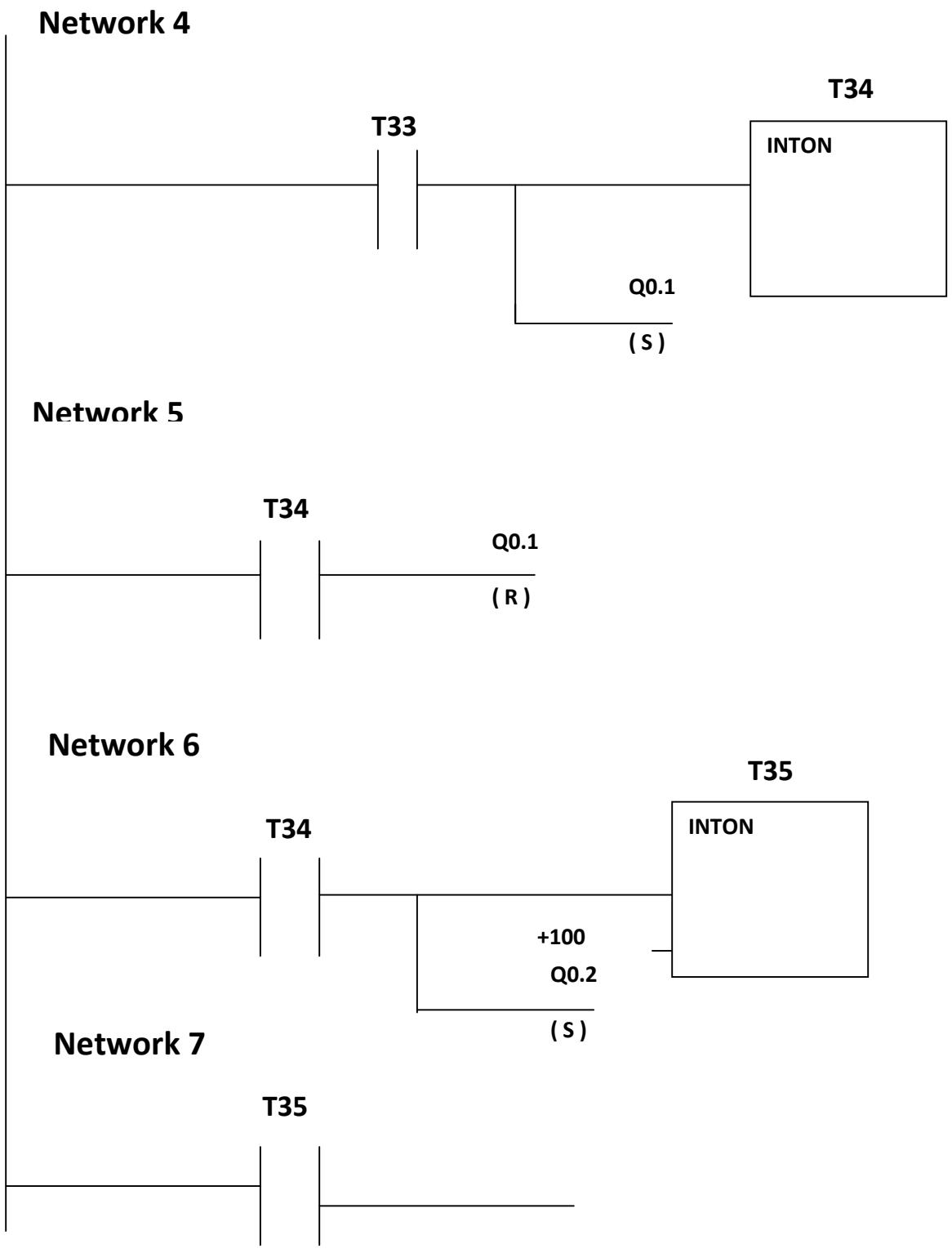

Fig 4.2 Continued

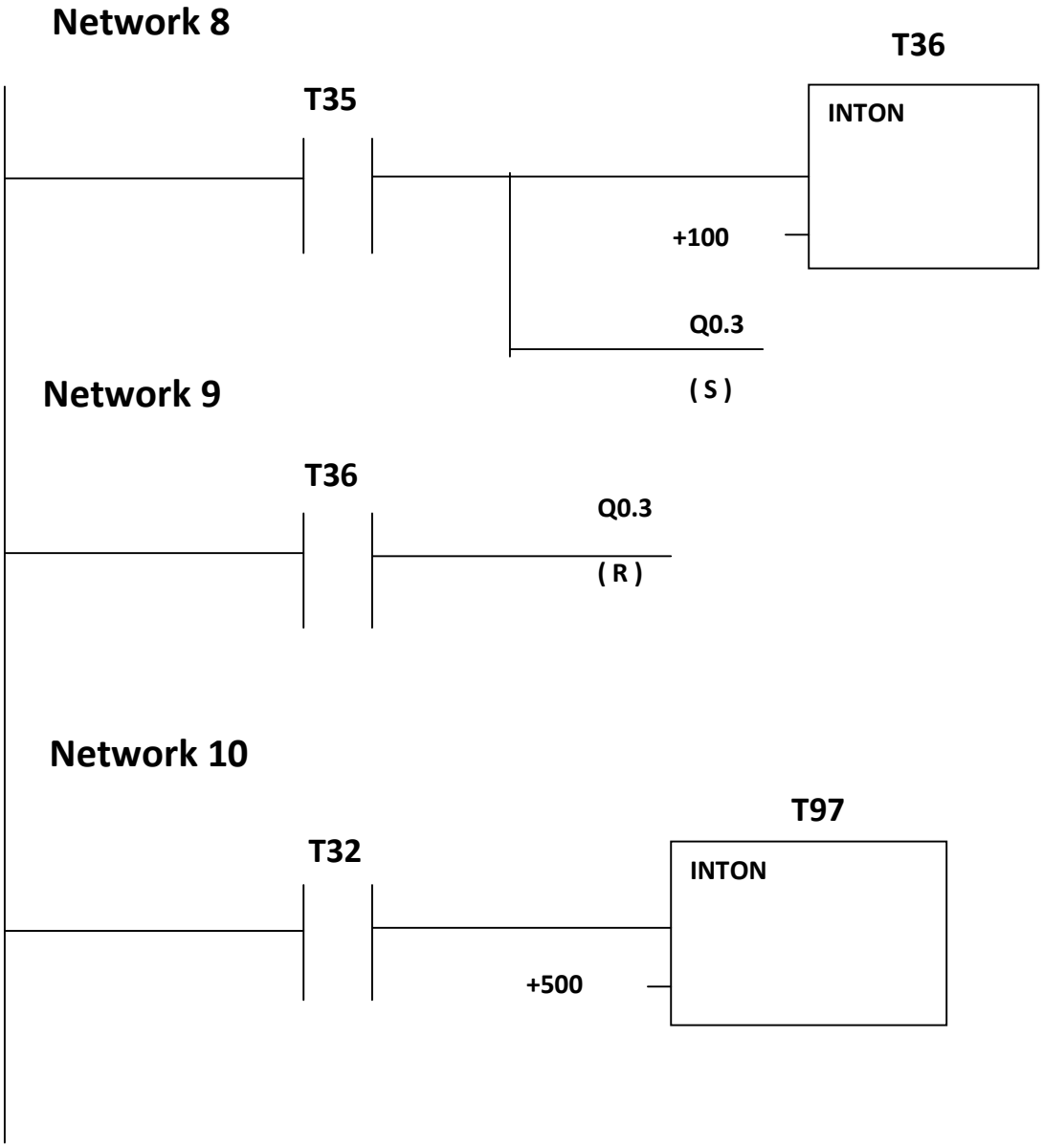

Fig 4.2 Continued

```
TITLE=PROGRAM COMMENTS

Network 1 // Network Title

// Network Comment

LDN    I0.0

AN     T97

TON    T32, +1000

Network 2

LD     T32

TON    T33, +100

S      Q0.0, 1

Network 3

LD     T33

R      Q0.0, 1

Network 4

LD     T33

TON    T34, +100

S      Q0.1, 1

Network 5

LD     T34

R      Q0.1, 1

Network 6

LD     T34

TON    T35, 100
```

```
S     Q0.2, 1

Network 7

LD    T35

R     Q0.2, 1

Network 8

LD    T35

TON   T36, 100

S     Q0.3, 1

Network 9

LD    T36

R     Q0.3, 1

Network 10

LD    T32

TON   T97, 500

Network 11

Network 12

Network 13

Network 14

Network 15

Network 16

Network 17

Network 18

Network 19
```

Network 20

Network 21

Network 22

Network 23

Network 24

Network 25

Chapter (Five)

Result&Discussion

5.Result & Discussion

5.1 Result:

The remote patient surveillance system has been designed, implemented, and tested.

Designed programmable logic controller based remote patient observation system, by programmed the micro PLC SIMATIC S7-200 by logic diagram ladder language that control and operated the stepper motor whose half step and then proved on it camera wireless that rotated round the patients to surveillance their conditions and it connected to computer via access point and used internet protocol (IP) technology then enable to doctors and nurse to seeandtalk with their patients on video.

This technology used for patient from any remote area ,that delivers live patient video to health providers without require finding either the health professional or the patient in one place.

Healthcare facilities observed patients at risk for falls, in other personal harm situations, and those who are confused or agitated and the system has been to assign the task to staff that have other core responsibilities.

Resulting in more effective and efficient patient care, and remote patient observation system can complement the role of nurses in monitoring patients' vital video, they will be able to focus on holistic needs of patients thereby providing better personal care.

5.2 Discussion:

I used PLC because the PLC have many input and output that allow to connected to other cameras in the hospital and flexibility, it is possible to use just one model of a PLCto run any one of the more motors,andlow costand have expansions units that allow to add another inputs or outputs and available for me.

And I select ladder logic as the main programming method and suitable for simple program.

And I used wireless camera because I can manage it from any net connection and see and hear people from in complete darkness for distances up to 5 meters, anda wall/ceiling mounting kit is included and the off-white IP camera housing blends into most environments and advanced features include motion detection recording, email alerts, scheduled recording sessions, MJPEG image compression, and digital zoom.

I select halve step although it provides approximately 30% less torque, half-step mode produces a smoother motion than full-step mode and I want to let the surveillance system in the beginning of the ward of hospital.

Chapter (six)

Conclusion&Recommendation

6.Conclusion & Recommendation

6.1 Conclusion:

Remote patient monitoringobservationallows you to keep an eye on stable patients while caring for others with more urgent needs and the technology available from Medical facilities makes it all possible.

With integrates personal digital assistant (PDA) technology in 2004 and wireless local area network (WLAN) technology. At the patient's location, a wireless PDA-based monitor is used to acquire continuously the patient's vital signs, including heart rate (HR), three-lead electrocardiography (ECG), and blood oxygen saturation (SpO2).

And in other literature in 2007 the objective of the project is to design an affordable patient monitoring system for C/VDs that can gather real-time biosignalsstore, display, and analyze data and communicate information between servers and terminals and the C/VDs can use the system for on-the spot diagnosis as well as remote specialist consultations in higher-tier hospitals for further medication.

In this system I used microprogramming Logic Control(PLC) SIMATIC S7-200 that control and operate the stepper motor then proved on it camera wireless that rotated round the patients that monitored their conditions and it connected to computer via access point and used internet protocol (IP) technology to enable the doctors and nurse to see and talk with their patients on video**.**

Hospitals generally can pay back the investment by lowering staffing requirements.

6.2 Recommendation:

There is always chance to improve any system as research & development is an endless process, our system is no exception to this phenomenon.

So introducing different type of networks topology will make the life easier for hospital management, the new research on Peer-to-Peer network is gaining popularity in hospital environment. in future the doctors and other paramedical staff will able to more mobility, especially in monitoring point of view and will receive all physiological measurement sign of patient on his personal tablet computer or in other communication devices like cell phone etc.

The following measurements can be done in future:

Using GPS the position of the patient can be detected so that help accurate and timely measurement of vital signs is vitally important in RPM.

Relevant sensors that can be used to measure vital signs were discussed and evaluated and these sensors can be used to measure patients' heart rate, oxygen saturation, blood pressure, respiration rate and body temperature be provided in case of emergency from nearest hospital.

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6.4Appendix

Appendix A: