

## **PLC based remote surveillance monitoring system**

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**Abstract:** - Remote surveillance monitoring have a wide variety of applications. Security is one of these applications .Different design technologies are implemented. This paper adopts the use of the programmable logic controller (PLC) as a device for performing the surveillance of the IP address wireless camera. Remote monitoring is performed through the identification of the IP address of IP wireless camera by the personnel computer. An access Point is used to connect the IP address wireless camera . A stepper motor is controlled by the PLC . The IP address wireless camera is mounted on the rotating shaft of the stepper motor.

**Keywords:** - control system , PC , PLC ,Access point ,IP address camera, stepper motor

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### **I. INTRODUCTION**

Tele-monitoring allows to monitor and evaluate remote locations using telecommunications technology. It also allows users to access expertise quickly, efficiently and without travel. Tele-monitoring offers a reduced cost solution to delivering remote services when and where it is needed .

Tele-monitoring can be used in many fields such as , medical field, security, industry, education ,and so on.

For example telemedicine offers 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.

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.

Tele-monitoring faces many demand in security applications. It offers a real time monitoring of remote locations. Hence remote monitoring can provide high security to the vital locations.

Tele-conferencing is an important application in tele-monitoring .It offers remote education and follow up for the students.

In industrial applications, an electronic control facilities should be added to the tele-monitoring in order to achieve remote industry.

### **II. APPROACH**

The paper covers the area of the programmable logic controller , interfacing to stepper motor, and wireless data exchange .

The system design method will be divided into three steps as follows :

Step one : programming the programmable logic controller (PLC).

Step two : interfacing the programmable logic controller to the stepper motor.

Step three : mounting the IP address wireless camera on the rotating shaft of the stepper motor.

The figure (1) below shows the block diagram for the system.

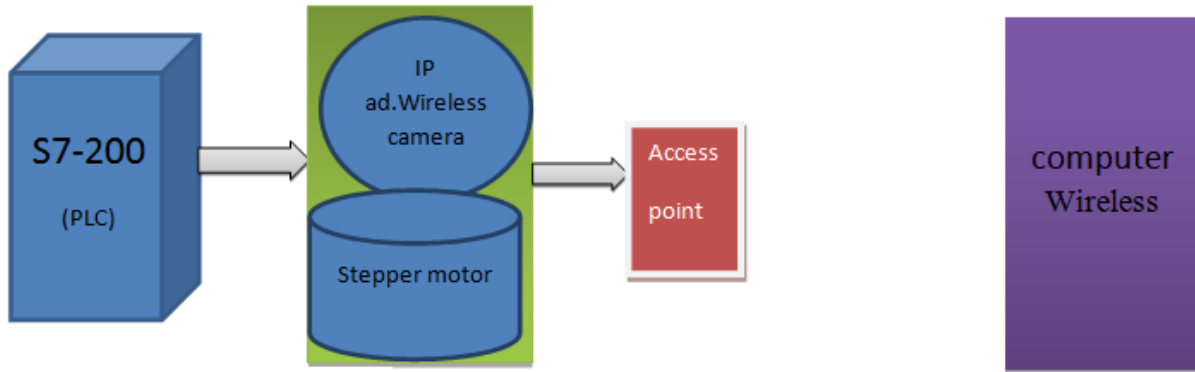


Figure (1) Block diagram of the system

The programmable logic controller (PLC) is programmed in ladder diagram language. The function of the program is to rotate the stepper motor in the desired angle. The angle of rotation of the stepper motor should cover the remote area of interest. The role of the IP address wireless camera is to convey the images to the personnel computer.

### III. SYSTEM COMPONENTS

#### 1. SIMATIC S7-200 (PLC):

The Micro PLC SIMATIC S7-200 is used. It's fast, features great communication options and comes with easy-to-operate software and hardware. Moreover, 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. Figure (2) shows the PLC system.

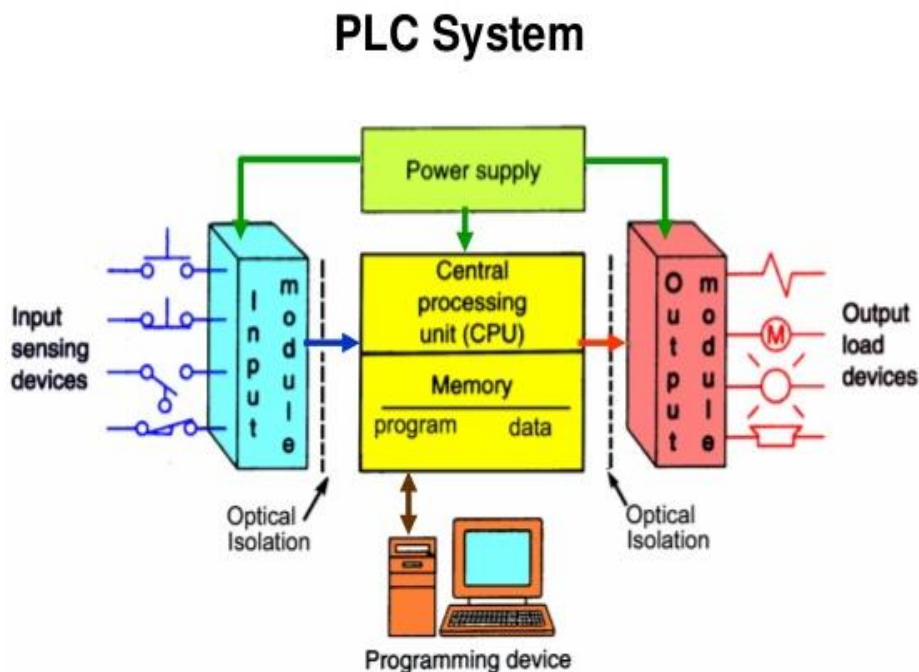


Figure (2) The PLC system

2. SecurView Wireless N Day/Night Internet Camera :The Secure View Wireless N Day/Night Pan/Tilt/Zoom Internet Camera, model TV-IP422WN, provides day and night security over a large area.

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

Adding the camera to the 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.

### 3. 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 . Figure (3) shows the stepper motor.

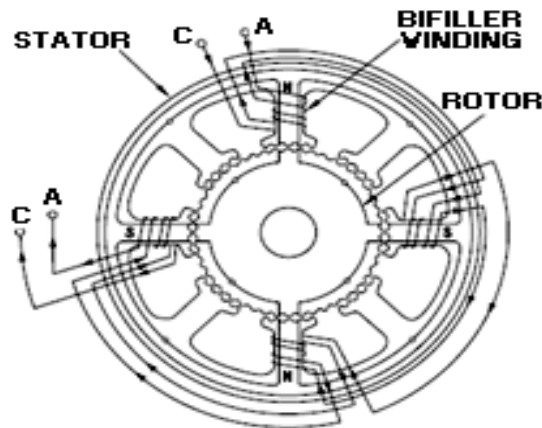


Figure (3) Stepper Motor

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, the motor's position can be controlled without any feedback mechanism. The speed of rotation is directly proportional to the frequency of the pulses. Equation (1) shows the step angel calculation.

$$\text{Step angel} = \frac{\text{full revolution (360 degrees)}}{200} \text{ ----- (1)}$$

From equation (1) , the step angel will be equal to (1.8°) .

4. Access point : Wi-Fi principle.

### IV. ALGORITHM

The programmable logic controller algorithm includes a sequence of steps for the operation of the stepper motor . The algorithm is ;

Start

--- Initialization: Here the stepper motor is put in the initial position .Usually the heading of the stepper motor is zero degrees.

--- Specify the rotation right and left angles in degrees .

Operation :

--- Rotate the stepper motor right .

- If the angel equals the preset angel, then revert the stepper motor rotation to the left.

--- Rotate the stepper motor left .

- If the angel equals the preset angel, then revert the stepper motor rotation to the right.

- If force ending command comes , then the system reverts to end.

--- Loop to the operation.

End.

### V. RESULTS

Following are the results for the system operation.

Table (1) below shows the resulted stepper motor rotation.

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Angel in degrees	Direction of rotation	No. of steps in stepper
36	Right	20
72	Left	40
72	Right	40

## VI. CONCLUSION

Remote monitoring observation allows to keep an eye on any thing.. At the monitored location, a wireless IP-based monitor is used to acquire continuously the images.

The design of the monitoring system can gather real-time images , display them , and communicate it to a remote personnel computer .In this system a programming Logic Control( PLC) SIMATIC S7-200 is used to control and operate the stepper motor .The wireless camera is connected to computer via an access point using internet protocol (IP) technology.

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