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Automated Security System Based on Programmable Logic Controller

Md. Saidur Rahman[1], Sairatun Nesa Soheli[2,] Arnob Rahman[3]
[1]*Senior Lecturer of Computer Science and Engineering, IUBAT–International University of Business Agriculture and Technology, Uttara, Dhaka, Bangladesh*
[2]*Lecturer of Electrical and Electronics Engineering, IUBAT–International University of Business Agriculture and Technology, Uttara, Dhaka, Bangladesh*
[3]*Graduate of Electrical and Electronics Engineering, IUBAT–International University of Business Agriculture and Technology, Uttara, Dhaka, Bangladesh*

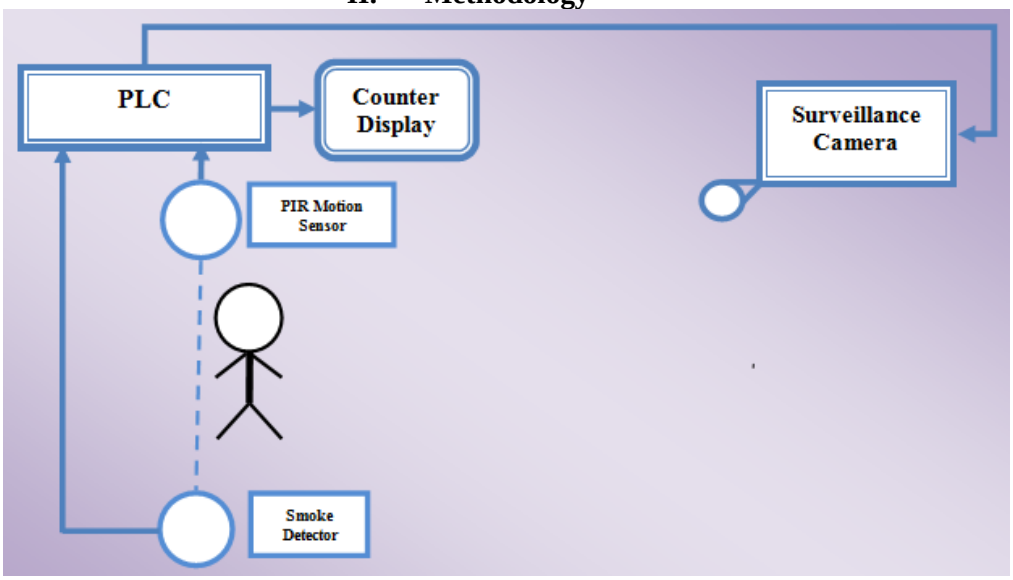
Abstract: *This paper presents a fully automated security system for industrial and household areas using advance PLC based automation systems along with surveillance camera which focuses on saving energy as well as memory. It can also be reprogrammed for strengthening the existing performance.*
Keywords*: Introduction, Methodology, Block Diagram, Program Procedure.*

I. Introduction

Surveillance cameras are commonly used for monitoring scenarios and activities, deterring crime, gathering evidence by monitoring records. It basically works on unidirectional methods: captures and make records. This article shows the advanced way of surveillance cameras using a programmed system more like an Artificial Intelligence.

For more advancement of the system, we are using a single motion sensor and a smoke detector along with a timer and a counter programmed at the very beginning in the system. Whenever motion detector or smoke detector detects any activities the sensors will automatically trigger the input, which allows the output to be triggered also refers as turning on the camera.

II. Methodology

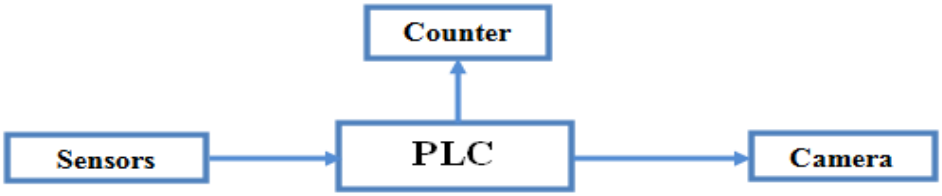


- When two sensors or any of the sensors detect, system will operate.
- Inputs will trigger the output allow camera to start recording.
- When nothing detect on the sensors the camera will be turned off after 10 seconds.

In addition, a counter is used and its output is shown in a digital display to count how many times the camera turned on, this will help to keep the records of the activities. Main purpose behind using the smoke detector was to detect the increment of smokes from fire in a particular room.

III. Block Diagram

The block diagram of PLC Based Security System shown in below:



IV. Working Principle

- If anything detects on any of or both of the sensors the surveillance camera will be turned on.
- Sensors will trigger the input and previously programmed Programmable Logic Controller will trigger the output which is the camera and the camera will automatically starts the recording and storing in its internal memory.
- Finally when the sensors will no longer receive any signal the system will give 10 seconds to stop the camera to get back on its initial form. However the timer can be customized and can be given any desired time.
- Meanwhile, if the input again sense another input during its shutdown timer will automatically going to stop and start the camera to start recording.
- Counter will store data in a special memory bit SM0.1 programmed in PLC.

V. Component Used

- AC power supply (100-240V, 50/60Hz): For power supply in PLC module.
- PLC main unit: SIMENS SIMATIC S7-200 CPU 224.
- PIR motion sensor (HC-SR501 PIR, Model: SEN 00059: The PIR sensor senses the motion of any sort of activities by the change in surrounding ambient temperature when a warm body like a human or animal passes by, then it intercepts motion.
- Smoke Detector: Analog smoke sensor MQ2;
- Surveillance Camera (Reolink @RLC- 411WS with built in 16 GB micro SD): It includes 2.8~12mm 4X Optical Motorized Zoom lens and 36pcs LED with a night vision range of 80-120ft, depends on the environment. The camera also comes with waterproof housing.

VI. Program Procedure

- When input I0.0 or I0.1 or both are turned ON, the output Q0.0 will be ON
- When both inputs will be turned OFF the output or the camera will start its shut down procedure.
- The TOFF timer programmed in PLC will be activated which allows the system to be shut down after 10 seconds.
- CTU or the Counter Up system with a digital display will show the number of times the camera was turned ON.

VII. Conclusion

This highly advanced security system is a transformed, fully operational surveillance system. The main purpose was to come up with such a program based surveillance system that will operate more independently as well as more intelligently. We believe that this indicates a great deal of opportunity in the sector of automated surveillance system.

For more advancement we can reprogram the system for handling numerous cameras using just a single program. Though the price of an advanced PLC module is comparatively higher than only sensor based or Microcontroller based system, it can be used in multitasking purposes. Also it is easy to develop program by offline simulations and it takes less maintenance as well.

VIII. Future Scope

- The program installed deals with only two sensors or input and a single output. This same method can be used to make more developed and highly secured automated system not only in the sector of surveillance cameras but also in automated door access as well.
- Programmable Logic Controller based security system expands the horizon of control system engineering. The world wide use of this system can take the security system to a whole new level.

Acknowledgement

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References

[1]. https://www.techtransfer.com/blog/basics-plc-operation/
[2]. https://en.wikipedia.org/wiki/Programmable_logic_controller
[3]. http://www1.siemens.cz/ad/current/content/data_files/automatizacni_systemy/mikrosystemy/simatic_s7200/manual_s7_200_2005_en.pdf
[4]. http://www.plcmanual.com/plc-programming
[5]. http://www.makeuseof.com/tag/world-plc-programming/
[6]. http://library.automationdirect.com/understanding-ladder-logic/
[7]. http://www.triplc.com/TRiLOGI/Help/laddertutorial.htm
[8]. http://www.ladder-logic.com/
[9]. https://www.allaboutcircuits.com/textbook/digital/chpt-6/programmable-logic-controllers-plc/
[10]. http://www.safewise.com/resources/motion-sensor-guide
[11]. https://www.adafruit.com/product/189
[12]. https://www.techshopbd.com/product-categories/motion/1336/hc-sr501-pir-sensor-module-techshop-bangladesh
[13]. http://wiki.seeed.cc/Grove-Gas_Sensor-MQ2/
[14]. https://www.elecrow.com/wiki/index.php?title=Analog_Smoke/LPG/CO_Gas_Sensor(MQ2)
[15]. http://www.instructables.com/id/How-to-use-MQ2-Gas-Sensor-Arduino-Tutorial/