

DESIGN AND IMPLEMENTATION OF A MICROCONTROLLER BASED
PERIMETER MONITORING SYSTEM.

USER MANUAL.

PRESENTED TO COVENANT UNIVERSITY LABORATORY, IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD
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COMPILED BY: NWOSU AMARACHI PROSPER

17CK022610

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WORKING PRINCIPLE

The system comprises of various block of interconnection systems. The system is controlled by microcontrollers (Arduino pro mini and ESP 32 CAM).

The input power to the system is a 5 volts DC power, a universal serial bus (USB) is used to transmit the DC power from its external source to the system. Power is sent to the microcontrollers which is connected to other component in parallel making every component have an input voltage of 5 volts. When power is sent to the Arduino pro mini (microcontroller board) it sends signal to the servo motor and its make a 180 degree turn forward and back to its initial position and its await the next signal or command to be sent. At this point the system is fully in operation and next action is dependent of the input transducers (sensors).

Furthermore, when there is a change in temperature of the immediate environment within the sensors, the passive infrared sensors send a high signal of 1 volt to the Arduino pro mini microcontroller. The sensors are placed at right angles of the environment, the sensors are positioned at the left and right side the entrance and one at the right side behind the object to be secured (house). The human body radiate heat and once detected by the sensor a signal is sent to the Arduino pro mini microcontroller and the Arduino pro mini send a signal to the servo motor and tells it what position to turn the camera module to. A connection is made between the two microcontrollers, the Arduino pro mini is used to controller sensors, servo motor and ESP 32 CAM, while the ESP 32 CAM is used for the camera and data transmission.

However, before that a mobile hotspot network is has to be created having; user name: Amara and the password: 1234567890. This network is made in order not to make the system prone to unauthorized entry for data collection, can be seen as a security measure. Once the network is

established and the system is powered on, the device connects to the network and a green light emitting diode comes on.

When the servo motor has reached the position required, the camera takes a picture of its immediate environment and the ESP 32 CAM immediately send the picture via a wifi module on the board to a specified email address, for the project presentation amarachi.nwosu@stu.cu.edu.ng was used.

Pictures can be accessed by login into the email address. Once a different sensor senses a change in temperature (motion) the same process continues, this is done to monitor the perimeter of a given system or area for knowledge of intrusion.

Device Used for this Project

1. RESISTOR: A resistor is a passive electrical component used to generate resistance in the current flow. The resistance of a resistor is measured in ohms, which is the resistance that arises when a current of one ampere flows through a resistor with a one volt drop across its terminals. The ballast resistor is used to limit the current going to the LED and to prevent excess current that can burn out the LED.

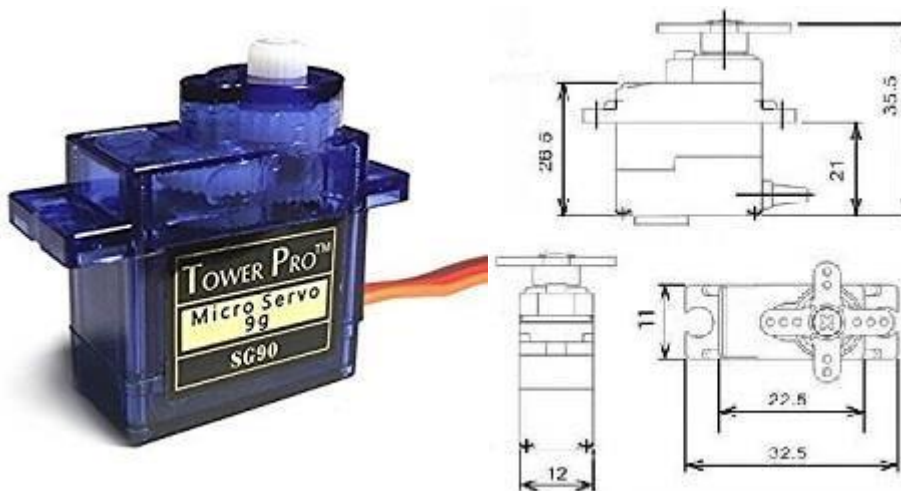


2. LED: A light-emitting diode (LED) is a semiconductor device that discharges light energy whenever an electric current pass through it. The red LED is used as an

indicator for the power supply, while the green LED indicates the high state of the solenoid door lock.



3. SERVO MOTOR: A servomotor is a rotary machine (small in size for this project) that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. The servo motor is specialized for high-response, high-precision positioning. As a motor capable of rotation at 180 degrees both forward and backward direction.



4. MEMORY CARD: A memory card, memory cartridge is an electronic flash memory data storage device used for storing digital information. These are commonly used in portable electronic devices, such as digital cameras, mobile phones, laptop computers, tablets, PDAs, video game consoles, synthesizers, electronic keyboards, and digital pianos. J MicroSD is a type of removable flash memory card used for storing information.

SD is an abbreviation of Secure Digital, and microSD cards are sometimes referred to as μ SD or uSD. The cards are used in mobile phones and other mobile devices.



5. ESP32 CAM: This camera captures intruders in real-time and sends live stream events to the user via a Wi-Fi module. It comes with an SD card for storing faces of residents.



6. PIR SENSOR: A passive infrared (PIR) sensor is a sensor that uses electricity to measure infrared (IR) light-emitting from objects in its field of view. These sensors are primarily used in motion detectors that are PIR-based. PIR sensors are usually called "PIR," otherwise "PID," which refers to as Passive Infrared Detector [25]. They are centered on detecting infrared radiation that is emitted by moving objects.



7. ARDUINO PRO MINI: The micro controller chip ATmega328p consists of 14 digital pins, six analog pins, two ground pins, 2 VCC pins, two crystal inputs 16MHZ, reset pin, and 28 analog referencing pins. The chip is mounted on the Arduino pro mini board and programmed with the open-source Arduino (Arduino IDE) environment and a platform for compiling, uploading, and simulating codes using the Arduino pro mini Universal Serial Bus connector to implement the core functionality. The Arduino one needs an Alternating Current to Direct Current adapter or battery, a reset button in the board that allows the program uploaded onto the micro controller to restart again. The Arduino pro mini is designed to control the

transfer of sensor data from the sensing circuit to the control board by the ATmega328p micro controller.

