



Surveillance Monitoring Using ESP32-CAM Module

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ABSTRACT

The theme of this project is intelligent visual surveillance systems. In recent times, we used surveillance cameras for monitoring and recording moments, but manual surveillance and real-time monitoring is one of the most important and challenging branches of computer vision, which has been widely applied in peoples' life, such as monitoring security. The presence of surveillance sign indicating that the area is under monitoring can serve as a significant deterrent to criminals and thieves, as the recorded footage can be used to identify people and trace their activities. It can be more advanced with Wi-Fi, which is a local area network running in a local environment or in a distributed setting. Wi-Fi, network protocol is one of the leading communication technologies used in the IoT world which supports low transmit power along with low cost. ESP32 is the second generation of Express if corporation IoT solution and it includes Wi-Fi. ESP32 reduces high network traffic and computing load.

Keywords: Surveillance, Security, Intrusion, Wi-Fi, User, Notification.

1. Introduction

An embedded system is special-purpose computer system that is designed to execute one or few specific functions, often under time limitations. It's frequently found as part of a larger gadget that includes both hardware and mechanical components. A general-purpose computer, such as a personal computer, on the other hand, can do a wide range of functions depending on the programming. Embedded systems have become increasingly significant in today's world, as they manage many of the items we use on a daily basis.

An embedded system is set of computer hardware and software that is either fixed in capabilities or programmable and is built for a certain type of application device. An embedded systems can be found in a verity of places, including industrial machines, automobiles, medical equipment, cameras, house hold appliances, aero planes, vending machines and toys(in addition to the more visible cellular phone and PDA).Embedded Java and Windows XP Embedded, for example, are operating systems and language platforms specifically designed for the embedded market.

The security paradigm has shifted from "investigation of occurrences" to "prevention of potentially catastrophic incidents" as a result of recent global events. Specifically, vigilance, or the ability to pay attention and react to unusual events, is exceedingly difficult and prone to inaccuracy due to attention lapses.

2. Literature Review

[1] This paper presents about utilizing Wi-Fi this is a specification for wireless personal area network in with the device connection is wireless. They had used Atmega 32 microcontrollers as it has advantage over 8086 microcontrollers.

[2] In this project, control of robotic unit is form remote end with the use of internet & also we are able to get the videos from robot end for surveillance purpose. Using this purposed technology, it gives a helping hand to our security forces in detection of intruders.

[3] This paper presents that one can control the robot from remote end. So that live streaming of video can be obtained. Limitations of range of operation does not arise.

[4] In this project, they used different kinds of standard protocols and machine-human interface. This system interface sensors with Arduino, interface with motor.

3. Application with Scope

More home appliances will be controlled by incorporating various sorts of sensors in the next years. Sensor fusion, low-power digital components, and Smartphone cellular capabilities can all be used to extend the life of such devices. Physically handicapped persons will benefit greatly from this equipment in the future.

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4. Methodology

1. GSM Module:

GSM stands for global system for mobile communication and is a mobile communication modem (GSM). In 1970, Bell Laboratories came up with the idea for GSM. It is the world's most commonly utilized mobile communication system. GSM is an open and digital cellular system that uses the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands to provide mobile voice and data services. A GSM network consists of the following components:

- A Mobile Station is a mobile phone that includes a transceiver, display, and CPU and is controlled by a SIM card that operates over the network.
- Base Station Subsystem: This system connects the mobile station to the network subsystem. It is made up of the Base Transceiver Station, which houses the radio transceivers and manages the protocols for mobile phone communication. The Base Station Controller, which manages the Base Transceiver station and serves as a link between the mobile station and the mobile switching centre, is also included.

2. ARDUINO UNO:

The ATmega328-based Uno with Cable is a microcontroller board. It contains 14 digital input/output pins (including 6 PWM outputs), 6 analogue inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It comes with everything you'll need to get started with the microcontroller; simply plug it into a computer via USB or power it with an AC-to-DC adapter or battery. In Italian, "uno" means "one," and it is the name given to the future Arduino 1.0 release. Moving forward, the Uno and version 1.0 will be the reference versions of Arduino. The Uno is the most recent in a series of USB Arduino boards and the platform's reference model; see the index of Arduino boards for a comparison with previous versions.

3. ESP-32 CAM MODULE:

The ESP32-CAM development board includes an ESP32-S processor, an OV2640 camera, a microSD card slot, and various GPIOs for connecting peripherals. The ESP32-CAM is a small camera module that runs on the ESP32-S microcontroller and costs around \$10. Aside from the OV2640 camera and many GPIOs for connecting peripherals, it also has a microSD slot for storing photographs. the AI-Thinker ESP32-CAM.

4. IR SENSOR:

An infrared sensor is an electrical device that emits infrared light in order to detect certain features of its surroundings. An infrared sensor can detect motion as well as measure the heat of an item. This sort of sensor, also known as a passive IR sensor, measures solely infrared radiation rather than emitting it.

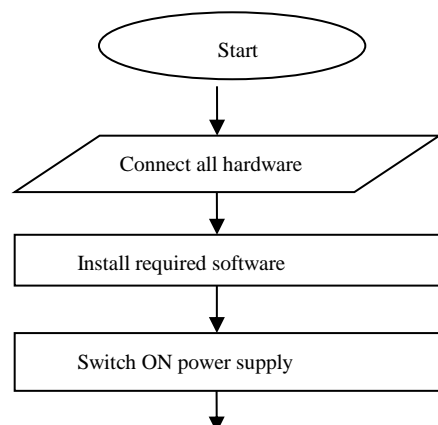
5. Power Supply:

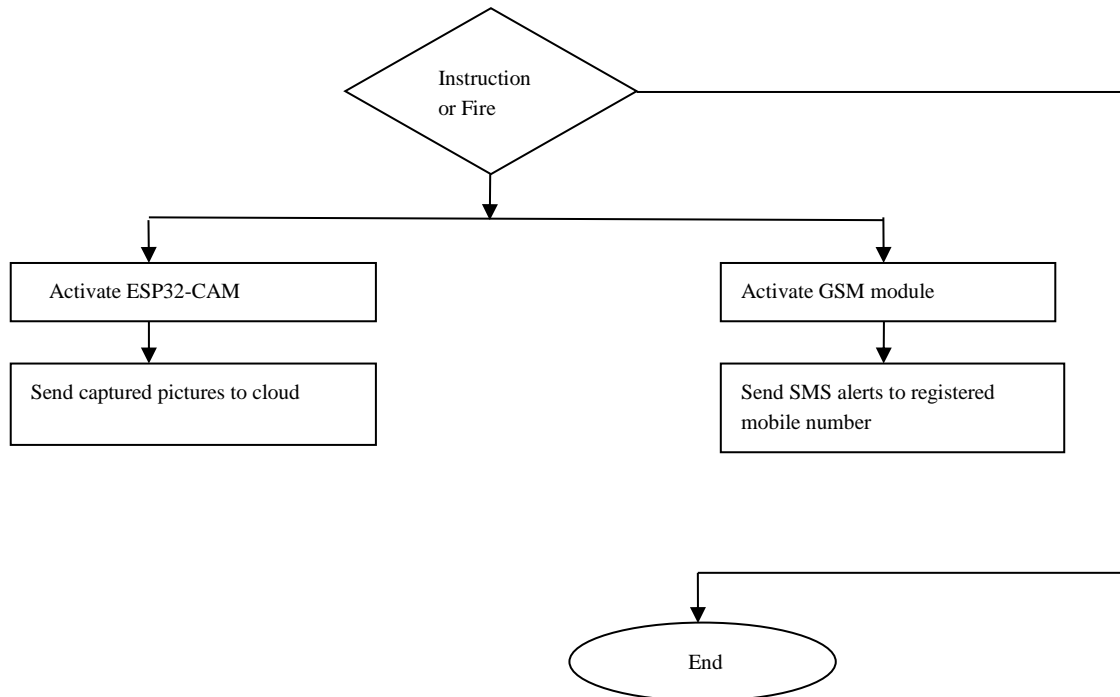
A power supply is a device that supplies power to at least one electrical charge. It usually transforms one type of electrical power to another, although it can also convert energy forms other than electrical energy, such as solar, mechanical, or chemical. Most computer power supplies also contain an input voltage switch that may be changed to 110v/115v or 220v/240v, depending on your location. This switch position is critical due to the varying power voltages supplied by power outlets in different nations.

6. Buzzer:

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric audio signalling device. Alarm clocks, timers, and confirmation of human input such as a mouse click or keyboard are all common uses for buzzers and beepers. Buzzers are electronic transducers with a DC power source that are commonly used in sound devices such as computers, printers, copiers, alarms, electronic toys, automobile electronic equipment, telephones, timers, and other electronic products.

5. Flowchart





6. System Configuration

Module Model : ESP 32-CAM

Package : DIP-16

Size : 27*40.5*4.5 (+-0.2) mm

SPI Flash : Default 32Mbit

RAM : 520KB SRAM +4M PSRAM

Bluetooth : Bluetooth 4.2 BR/EDR and BLE Standrads

Wi-Fi : 802.11 b/g/n/

Support interface : UART, SPI, I2C, PWM

Support TF card : Maximum support 4G

IO port : 9

UART Baudrate : Default 115200 bps

Image Output Formate : JPEG (OV2640 support only), BMP, GRAYSCALE

Spectrum Range : 2412 ~ 2484 MHz

Antenna : OnBoard PCB antenna, gain 2dBi

Transmit Power : 802.11b: 17+-2 dBm (@11Mbps)

802.11g: 14+-dBm (@54Mbps)

802.11n: 13+-2dBm (@MCS7)

7. Advantages and Disadvantages

- **Advantages:**

1. Cost Effectiveness
2. Improved Quality Assurance
3. Increased Productivity

4. Work In Hazardous Environments

- **Disadvantages:**

1. Potential Job Losses
2. Initial Investment

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