



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 3, March 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

9940 572 462

6381 907 438

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Electronic Eye-Controlled Security System through Android using MSP430

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ABSTRACT: In contemporary society, security systems are indispensable for safeguarding homes, offices, and establishments. With ongoing technological advancements, electronic security systems have evolved into highly sophisticated and customizable solutions. One such innovation is the development of an electronic eye-controlled security system via an Android application using the MSP430 microcontroller. The primary aim of this system is to enable real-time monitoring and control of security parameters like intrusion detection, access control, and environmental monitoring. At the heart of this system lies the MSP430 microcontroller unit, functioning as the core processing unit. It is tasked with collecting data from sensors, processing information, and executing predefined logic to ensure effective operation. Acting as the interface for users, the Android application allows remote monitoring of the security system's status and control of its functionalities. Users can receive timely notifications regarding security breaches and accessible sensor data via the application.

Communication between the Android device and the MSP430 MCU is established through Bluetooth or Wi-Fi, offering deployment flexibility and accessibility. The utilization of the MSP430 guarantees efficient operation and minimal power consumption, rendering it suitable for deployment in both residential and commercial settings. In summary, this system offers a versatile and user-friendly solution to modern security challenges, addressing the evolving needs of users across various environments

KEYWORDS: Electronic eye, MSP430, Wireless communication, Android, sensor integration, User Authentication.

I. INTRODUCTION

In the ever-evolving technological landscape, security systems are paramount for safeguarding both residential and commercial properties. Traditional security systems are adapting to incorporate smart features, offering users greater convenience and control over their security measures. The integration of smartphones into these systems has further elevated accessibility and functionality. This paper presents an electronic eye-controlled security system via an Android application, leveraging the MSP430 microcontroller platform. Smart technology has revolutionized various facets of our lives, including security systems. This paper introduces an innovative electronic eye-controlled security system through Android, utilizing a microcontroller to enhance security functionalities. It enables real-time access and control from anywhere with an internet connection, marking a significant advancement in the realm of security systems.

Objective:

The main objective of this project is to design a user-friendly and robust security system that can be controlled through android application. The system aims to provide real time monitoring and control of access points, enhancing the security system.

II. COMPONENTS USED

1. Eye blink sensor:

The Eye Blink sensor senses utilizes infrared to detect variation across the eye, with high output indicating closed eyes and low output indicating open eyes.



Fig1: Eye blink sensor

2.HC-05 Bluetooth module:

The HC-05 is a class 2 Bluetooth module designed for wireless serial communication, configured as a slave device, with an operating voltage range of 3.3-5V and Communication range of up to 30m

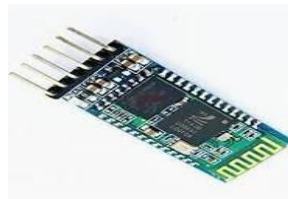


Fig2: HC-05 Bluetooth

3. ESP32 CAM:

The ESP32-CAM finds application in intelligent IOT tasks like QR identification, wireless video making.



Fig3: ESP32-CAM

4. Buzzer:

A buzzer produces an audible tone under the influence of an applied external voltage to it.



Fig4: Buzzer

5.MSP430 Microcontroller:

The MSP430 is a unique 16-bit microcontroller known for its special features not commonly found in others microcontroller.



Fig5: MSP430 microcontroller

III.EXISTING METHODS

The existing model of the electronic security system with light-dependent resistors (LDRs) focuses on detecting changes in light intensity to trigger security responses. In this configuration, an interconnected network of LDR-based sensors is strategically placed to monitor changes in the surrounding light environment. The collected data is then transmitted to a microcontroller, with the MSP430 often assuming this role, responsible for processing the sensor data and coordinating the system's security protocols. Typically, the system comprises an LDR-based sensor network linked to a microcontroller, such as the MSP430, for processing sensor data and managing security mechanisms in response to detected changes. While effective in local detection, this model has limitations, notably in terms of remote accessibility and user-friendly controls. The absence of these features hinders the system's adaptability to modern security needs, prompting the development of enhanced models that address these shortcomings and offer improved functionality.

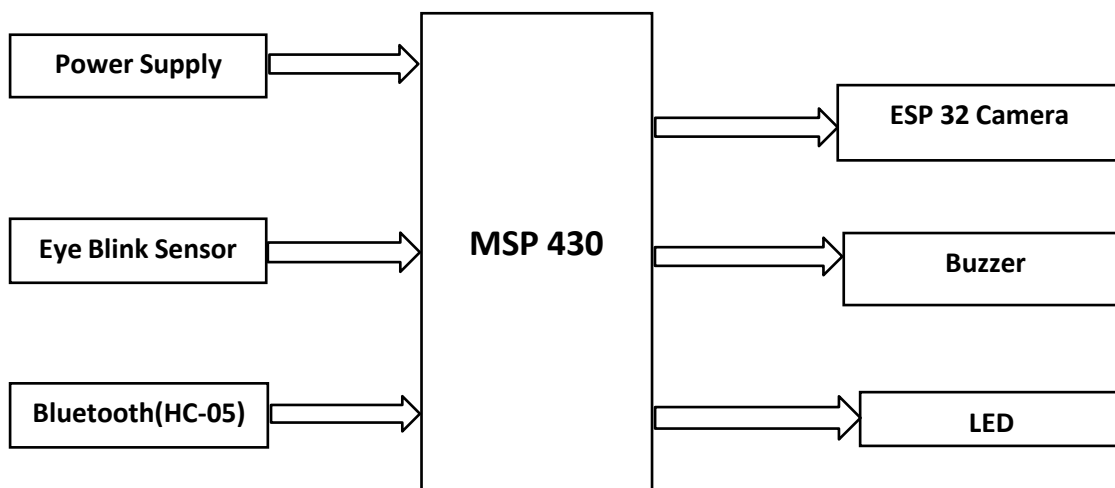
IV.PROPOSED METHOD

The proposed method introduces several advanced features to significantly enhance the functionality and user experience of the electronic security system. A key enhancement is the integration of a high-resolution camera for capturing images of detected individuals, addressing limitations of the existing model. Remote accessibility is also integrated, facilitated by communication modules like the HC-05 Bluetooth or Wi-Fi connectivity. This enables seamless communication with an Android control app, empowering users to remotely monitor, control, and make real-time access decisions through a user-friendly interface. The app offers a visual dashboard for live video feeds, image analysis, and access decision-making, enhancing user experience. Users have hands-on decision-making capabilities, viewing captured images and deciding on access permissions via the Android app. The system triggers alarms through an integrated buzzer for immediate awareness of potential security breaches. LED indicators provide visual feedback, with distinct color or patterns indicating access status. Customization options allow users to define security protocols, adjust alarm sensitivity, and configure LED behavior based on specific requirements.

V.WORKING PRINCIPLE

The working principle of electronic eye security system, the process begins with the utilization of an IR sensor, designed to detect the presence of individuals within its monitored vicinity. Upon detecting a person, the IR sensor generates a signal, signalling the initiation of the access control system. Simultaneously, a camera incorporated into the system captures an image of the detected individual.

Block Diagram:



The MSP430 microcontroller assumes a pivotal role in the system's operation, serving as the central processing unit. Responsible for processing signals from the IR sensor and managing the captured image data. To facilitate communication and data exchange, the processed information from the MSP430 is transmitted to the Android control app. This communication is established through the chosen connectivity method, whether it be the HC-05 Bluetooth module or Wi-Fi, depending on the specific system requirements. The Android control app, functioning as the user interface, plays a crucial role in access decision-making. It receives and processes data from the MSP430. This interface empowers the user to make informed decisions regarding access. To provide immediate notifications of the access status, the system incorporates feedback mechanisms such as buzzer activation or visual alerts. For instance, a denied access decision may trigger a buzzer, while an authorized access decision may prompt a visual indicator, such as a coloured LED, providing users with immediate awareness of the system's response. This comprehensive working principle underscores the collaborative operation of the IR sensor, camera, MSP430 microcontroller, and Android app, culminating in a responsive and secure electronic security system tailored for access control.

VII.LITERATURE SURVEY

1. Kuc et al. (2017) presented prior research on using acoustic and vibration sensor data for object detection in surveillance wireless sensor networks. This provides background on using sensors for security monitoring.
2. Net al. (2016) proposed techniques for recognizing human identity from motion patterns. This relates to using computer vision and pattern recognition for surveillance applications.
3. Buriro et al. (2016) developed a behavioral biometric system for smartphone user authentication using motion gestures. This is also relevant to using motion analysis for security.

VII.RESULT

To implement an electronic eye-controlled security system using MSP430 and Android, the process typically includes interfacing sensors such as ESP32 cam or IR sensors with the MSP430 to detect motion or presence. The MSP430 then relays this communication protocols like HC-05 Bluetooth or Wi-Fi. Upon receiving the data, the Android device initiates security actions such as sending alerts.



Fig: Setup of ECSS

The output of HC-05 Bluetooth control typically entails sending commands or data from the Android device to the MSP430 microcontroller.

```

02:46:36 HC-05 > IR_DETECTED
02:46:42 HC-05 < 1
02:46:42 HC-05 > LED turned ON
02:46:52 HC-05 < 2
02:46:53 HC-05 > LED turned OFF

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Fig: Output of HC-05

VIII.CONCLUSION

The electronic eye -controlled security system, developed with an MSP430 controller and Android integration, provides a reliable and user-friendly solutions for security application. By combining the MSP430 microcontroller with an electronic eye sensor and Android interfaces, users can conveniently monitor and control their security

system remotely using their smartphone with minimal communication. This system enhances security by offering real-time monitoring, alerts, and remote access, thereby significantly improving overall security measures. It represents a promising advancements in modernizing and bolstering security systems through integration of microcontroller technology and smartphone interfaces.

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