



International Journal of Engineering Research and Science & Technology

www.ijerst.org

ISSN : 2319-5991

Vol. 22 No. 2(1) (2026)



**ijerst.editor@gmail.com
editor@ijerst.com**

Research Paper

AUTOMATED SUICIDE PREVENTION AND ALERT SYSTEM USING IOT

G RAMAKRISHNA¹, G JYOTHIKA², J MANOJ KUMAR³, G PRASANTHI⁴, K T N MANIKANTA SAI⁵

¹Assistant Professor, Department of Electronics and Communication Engineering, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, India

^{2,3,4,5}UG Students, Department of Electronics and Communication Engineering, Seshadri Rao Gudlavalluru Engineering College, Gudlavalluru, India

Abstract:

This project presents a suicide prevention and monitoring system developed using the Arduino microcontroller. The system integrates multiple sensors, including motion, load, and heartbeat sensors, to detect abnormal or high-risk conditions in hostels and educational institutions. Upon detection of suspicious activity, the Arduino communicates with external modules such as the ESP8266 Wi-Fi module or GSM module to establish wireless connectivity. Additionally, an external camera module is interfaced with Arduino to capture real-time images or video of the environment.

The collected data is transmitted to a cloud platform or caretaker's device, allowing them to visually confirm the situation and respond promptly. Unlike traditional alert mechanisms that rely solely on SMS, this design provides visual context, reduced false alarms, and faster intervention. The project highlights the effective use of Arduino with IoT and camera modules to build a low-cost, sensor-driven safety system for suicide prevention and monitoring.

I. INTRODUCTION

This venture addresses the growing issue of self-harm incidents, specially the ones related to ceiling fans in residential and institutional settings. Current safety structures lack the potential for early detection and actual-time alerts in such conditions, prompting the development of an innovative, IoT-enabled answer. The purpose is to layout a compact device that can be mounted on ceiling enthusiasts to reveal sports and generate alerts in potentially dangerous situations. Driven by way of the pressing want to prevent suicide attempts in hostel environments, this mission leverages the Internet of Things (IoT) to create an early detection gadget aimed at saving lives, decreasing emotional distress for families, and improving protection for students. Beyond its technological advancements, this initiative additionally advocates for mental fitness cognizance and proactive guide systems, emphasizing the importance of early intervention

and prevention. The remaining intention is to foster a supportive surroundings in which capacity self-damage incidents are promptly recognized and addressed, creating a more secure and extra compassionate area for people at threat. By integrating generation with intellectual health support, this venture goals to provide holistic solutions to these pressing troubles

II LITERATURE SURVEY

Introduction The cause of this literature survey is to review current research, technologies, and answers associated with IoT- based totally protection structures and suicide prevention mechanisms. This survey provides context for the IoT-Based Suicide Prevention System, justifies the technological method adopted, and identifies gaps in modern solutions that the assignment objectives to address. Academic Research and Studies IoT in Safety Monitoring Studies by Ashton (2009) and Gubbi et al. (2013) spotlight IoT's position in permitting actual-time records collection and

faraway monitoring, critical for well timed intervention in safety packages. Sensor Technology for Detection Research via Li et al. (2015) emphasizes the use of PIR, ultrasonic, and load sensors for accurate detection and decreased fake alarms in protection structures. Microcontrollers and IoT Communication The ESP32 microcontroller is desired for its low power intake and integrated Wi-Fi, as proven via Espressif Systems (2016), while GSM modules are endorsed for SMS alerts in constrained connectivity areas. Real-Time Monitoring and Cloud Integration Studies with the aid of Da Xu et al. (2014) display the blessings of cloud platforms like Firebase for real-time facts logging and analysis in IoT systems. Gaps in Current Solutions Existing suicide prevention structures often rely on manual monitoring or basic automated structures, which lack actual-time alert mechanisms. This delay in reaction can cause ignored opportunities for well timed intervention, growing the threat of damage. IoT-based systems with immediate alert capabilities can address this gap by using ensuring quicker reaction times. Many conventional safety structures use unmarried-sensor setups, which can lead to excessive false positive quotes. For instance, movement detected by using a unmarried PIR sensor may not always imply a true threat. Integrating a couple of sensors, inclusive of PIR, ultrasonic, and cargo sensors, can considerably enhance accuracy by offering corroborative facts. Many existing structures do now not offer continuous, actual-time tracking, that is essential for detecting and addressing ability self-harm incidents directly. IoT-enabled structures can provide continuous statistics series and actual-time evaluation, enhancing typical responsiveness and effectiveness. Relevance to IoT-Based Suicide Prevention System The IoT-based totally Suicide Prevention System adopts exceptional practices identified in research on protection, user-concentrated design, and real-time tracking. The machine is designed to prioritize the user's nicely-being, ensuring that the era is non intrusive whilst supplying well timed signals. Regular trying out and enhancements based totally on person remarks make sure that the device is responsive and accessible. Addressing Gaps The machine addresses gaps in modern-day protection solutions

through presenting proactive monitoring via an clever sensor placed on ceiling lovers to hit upon ability hanging eventualities. By integrating IoT era, it offers actual-time notifications to caretakers and emergency responders with accuracy. Innovative Features The IoT-primarily based Suicide Prevention System introduces innovative features, consisting of real-time sensor facts analytics, automated notifications to caretakers and authorities, and integration with private gadgets for immediate reaction. Conclusion The literature survey highlights the significance of integrating IoT, sensor technologies, and actual-time conversation to beautify safety structures. The IoT-Based Suicide Prevention System leverages these insights to broaden a strong, real-time monitoring solution geared toward preventing suicide attempts. This survey underscores the innovative technique taken through the task and its ability to deal with vital gaps in current safety monitoring systems.

SCOPE OF PROJECT :

This project ultimate goal is to foster a supportive environment where potential self-harm incidents are quickly identified and addressed. thus, providing a safer and more compassionate space for individuals at risk & prevent suicide attempts in hostel environments, this project leverages the Internet of Things (IoT) to establish an early detection system

MOTIVATION

In recent years, the rising number of suicides by hanging in confined spaces such as hostels, dormitories, and hospitals has become a major concern. The Iot based suicide system is designed to detect the presence of individuals near a ceiling fan, measure distances to objects below the fan, and monitor moments changes near the fan rod. If abnormal conditions are detected, alerts are sent in real-time via alert messages such as emergency alarm to alert the concerned authorities

EXISTING SYSTEM

The increasing incidence of self-harm in residential and institutional settings, particularly involving ceiling fans, demands innovative safety solutions. . By focusing on early detection and leveraging IoT technology, the goal is to save lives, reduce emotional distress for families, and create safer environments for students.

Additionally, this initiative supports mental health awareness and proactive support systems

III PROPOSED MODEL AND DESIGN

A. System Design

Our proposed system consists of two microcontrollers: Arduino Uno and ESP8266 where buzzer, Piezo sensor, pulse sensor, Temperature and IR sensor are connected to the Arduino board. The Esp8266 are connected to the Arduino board. All the values from these sensors are being sent to the cloud server. The reason why we are using two microcontrollers is that the Arduino does not have internet connectivity hence the usage of the ESP8266.

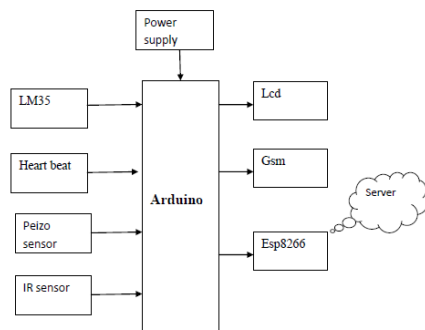
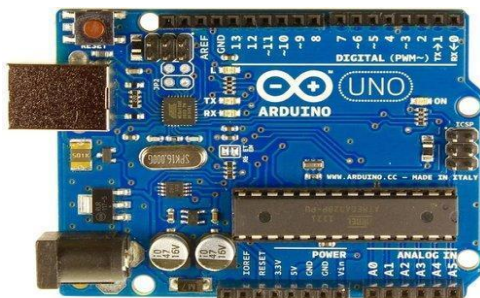


Fig. 1. Block diagram of the proposed System.

IV. SOFTWARE AND HARDWARE

ARDUINO UNO:



The Arduino UNO is a microcontroller board constructed around the ATmega328P. It functions 14 virtual input/output pins, six analog inputs, a sixteen MHz ceramic resonator, a USB port, a strength jack, an ICSP header, and a reset button. It can be without problems related to a computer the usage of a standard USB cable. This

microcontroller board is extensively reachable and low priced [13].

ESP8266:



The ESP8266 is an inexpensive WiFi module from the ESP collection, designed for far off control of digital responsibilities globally. It incorporates a integrated microcontroller and 1MB of flash reminiscence, permitting it to connect with WiFi networks. Thanks to its incorporated TCP/IP protocol stack, the module can communicate using WiFi indicators. It operates at a most voltage of three.3V; applying 5V ought to damage the module.

Pulse Sensor:



The pulse sensor detects the pulse wave caused by the change in the volume of blood vessels when the heart pumps blood. The user just places their finger onto the sensor and detects the pulse wave status and displays it on the dashboard.

LCD:

LCD stands to get Liquid Do rystal Display. LCD is discovering large unfold utilization substituting. The potential to exhibit characters, numbers and images. It will be in contrast to LEDs, that can be constrained through quantities plus a couple figures. Incorporation of the sterile manage in to the LCD, therefore relieving the CPU of this Endeavor of sterile the LCD.

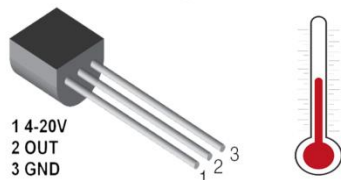
BUZZER:



An audio signaling computing device like a beeper or buzzer may additionally moreover be electromechanical or piezoelectric or mechanical type. The most necessary attribute of this is to convert the sign from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. It consists of two pins in precise extraordinarily exact and negative. The amazing terminal of this is represented with the '+' picture or a longer terminal. This terminal is powered with the useful resource of 6Volts whereas the horrific terminal is represented with the '-'symbol or fast terminal and it is related to the GND terminal.

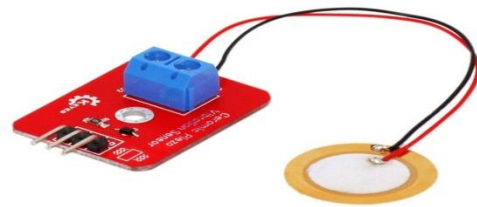
TEMPERATURE SENSOR:

LM35 Temperature Sensor



The LM35 is a precision temperature sensor that provides an output voltage linearly proportional to the temperature in degrees Celsius, making it ideal for various applications in electronics and temperature monitoring. Temperature Range: The LM35 can measure temperatures from -55°C to $+150^{\circ}\text{C}$. Output Voltage: The output voltage increases by 10 mV for each degree Celsius rise in temperature, meaning at 0°C , the output is 0V, and at 25°C , it is 250 mV. Low Power Consumption: It draws only 60 μA from its supply, resulting in minimal self-heating (less than 0.1°C in still air).

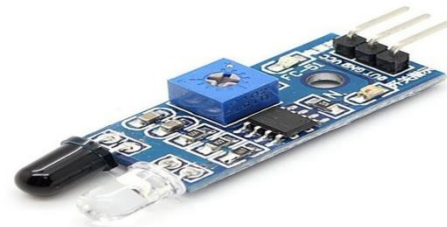
PIEZO SENSOR:



A piezoelectric sensor operates based on the piezoelectric effect, a phenomenon where certain materials generate an electric charge when subjected to mechanical stress. The term "piezo" comes from the Greek word meaning "to press" or "squeeze." These sensors are widely used in various applications due to their ability to accurately measure dynamic changes in physical conditions.

IR SENSOR:

IR Sensor Complete Guide



An IR (infrared) sensor is a device that detects infrared radiation, which is invisible to the human eye, and converts it into an electrical signal for processing. It typically consists of two main components: an IR LED emitter that emits infrared light and an IR photodiode or phototransistor receiver that detects the reflected or emitted IR radiation from objects. The sensor can measure heat, detect motion, or sense proximity, making it widely used in electronics and automation.

ESP32 CAMERA:



The ESP32-CAM is a small, low-cost development board that combines the powerful ESP32 chip with a 2-megapixel camera and a microSD card slot for

saving pictures and videos. This makes it a self-contained module for vision projects and Internet of Things (IoT) applications. Let's explore what makes this little device so capable.

ARDUINO IDE:

Arduino is an open-source PC tools and programming association. The Arduino Community is recommended to the activity and consumer mastermind that constructions and occupations microcontroller-based motion sheets. These alternate sheets are recognized as Arduino Modules, which are open supply prototyping stages. The smoothed out microcontroller board indicates up in an assortment of growth board packs. The transcendent significantly perceived programming strategy is to use the Arduino IDE, which corporations the C programming vernacular. This offers you get to an Arduino Library that is industriously making perception to open supply network.

V. EXPERIMENTAL RESULTS



Fig -2:Project output



Fig -3. Sensor data



Fig -3. Lcd output

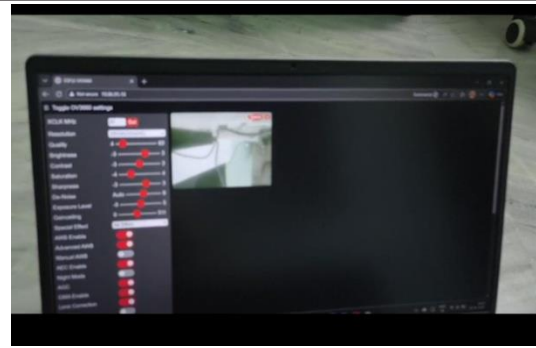


Fig -3. Esp32 camera output

Each suicide is a unique tragedy that takes a person's life too soon and has an ongoing ripple effect that affects families, friends, and communities. In our nation, more than 100,000 people take their own lives each year. Suicides can be caused by a variety of things, including issues with one's job or career, loneliness, abuse, violence, problems with one's family, mental illness, alcoholism, financial loss, chronic pain, etc. Police-recorded suicide cases are a source of information for NCRB on suicides. A total of 1,53,052 suicides were reported in the nation during 2020, a rise of 10.0 percent from 2019 and an 8.7 percent increase in suicide rate from 2020 to 2019. Table shows the frequency and rate of suicides from 2010 to 2020

VI CONCLUSION

Self-destruction is the act of purposefully committing suicide. A youngster or anyone who is fighting misery or passing away from overwhelming horror of disappointment is devastating to loved ones, and the possibility of self-destruction is more notable in homes where a child is left alone because he or she may have trouble focusing or thinking clearly will engage in risk-taking behaviours. People choose to hang themselves from roof fans more frequently than not since it takes some effort for death to occur, and some of them merely consider trying to kill themselves. We'll wrap up by reviewing all of the theories put forth for how we might completely avoid self-destruction attempts with the aid of emerging technologies. Each and every framework presented here is designed to provide parents and guardians with security. The System is capable of producing the needed results and will be created using structured modelling. With a few

adjustments, it will be successfully implemented as a Real Time system. Technology is constantly evolving as a result of key scientific discoveries and inventions in numerous domains. Further, the majority of the units can be produced on a single, together with a microprocessor, making the system compact and increasing the effectiveness of the current system. To make the system applicable for real time purposes components with greater range needs to be implemented

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