

IOT Secure Crate

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Creating a comprehensive journal for your IoT security crate project involves detailing each aspect of the development process, challenges faced, solutions implemented, and future steps. Here's a comprehensive format for your project journal. IoT Security Crate Are the perfect parcel delivery solution, specifically designed for ensures that each person gets their own personalized parcel delivery box. Enjoy hassle free delivery with no more worrying about missing your packages. Our IOT Secure crate are offered in different sizes, this ensures that everyone gets the perfect solution for their individual needs. From frequent online purchases to regular mail deliveries or large packages, we have you covered.

Keywords: Our IoT Security Crate project journal documents development stages, challenges, solutions, and future plans. Designed for personalized parcel delivery, it ensures hassle-free delivery with IOT Secure crate of different sizes. Challenges are overcome with innovative solutions, enhancing user experience and security. Future steps involve planned enhancements and updates for continued innovation.

1. INTRODUCTION:

In an increasingly digitalized world, the demand for secure and efficient parcel delivery systems has never been higher. Addressing this need, we present the development of an innovative IoT (Internet of Things) secure crate system tailored for personalized consignment dispatch. This project aims to revolutionize traditional parcel delivery methods by leveraging IoT technology to enhance security, streamline operations, and provide real-time monitoring capabilities.

The IoT secure crate system offers a comprehensive solution for safely storing and dispatching goods and products in various settings, including residential buildings, office complexes, and logistics facilities. By integrating advanced security features such as a magnetic lock and real-time notifications, the system ensures that only authorized individuals can access the crate, thereby minimizing the risk of theft or tampering.

Central to the system's functionality is its seamless integration with a mobile application, which empowers users to remotely control the secure crate, receive instant notifications, and monitor its status from anywhere. This user-friendly interface enhances convenience and accessibility, allowing for effortless management of consignments in today's fast-paced digital age.

Furthermore, the IoT secure crate system incorporates a robust backend server infrastructure hosted in the cloud, ensuring scalability, reliability, and data security. By leveraging cloud technology, the system can efficiently handle data storage, processing, and communication, while also providing flexibility for future expansion and optimization.

In this project journal, we document the development process of the IoT secure crate system, detailing key activities, challenges faced, solutions implemented, and future steps. By maintaining a comprehensive record of our progress, we aim to ensure transparency, accountability, and continuous improvement as we strive to deliver a cutting-edge solution that meets the evolving needs of modern parcel delivery systems.

2. LITERATURE SURVEY

The literature survey provides valuable insights into the existing research and advancements in the field of internet of things secure crate. Here are the key inferences drawn from the survey :

- Addressing the growing need for secure parcel delivery, our IoT Security Crate project introduces an innovative system tailored for personalized consignment dispatch. Leveraging IoT technology, this system enhances security, operations, and monitoring capabilities.
- The system integrates advanced features like a magnetic lock and real-time notifications to ensure authorized access and minimize theft or tampering risks.
- A user-friendly mobile application enables remote control, instant notifications, and status monitoring, enhancing convenience and accessibility.
- Backend server infrastructure hosted in the cloud ensures scalability, reliability, and data security, facilitating efficient data handling and future expansion.
- This project journal documents the development process, challenges, solutions, and future steps, aiming for transparency, accountability, and continuous improvement.

3. SYSTEM ANALYSIS

Proposed System

The proposed IOT Secure crate will help people to receive the parcel when the owners are away from home, or even when they are outstation.

If the mobile phone is connected to the Internet, the recipient can check the IOT Secure crate has received the parcel. With the number of online shoppers increasing, the process of delivery service is getting important. Especially the guarantee of receiving the correct parcels safely is one of the main targets that advertised by the delivery service companies.

Hence, the proposed x IOT Secure crate can assist in increasing security, reducing the delivery delay, and reducing the delivery cost during the delivery process.

The scopes of this project are to design an efficient Parcel box and this project focused on residents building such as condominium, offices buildings.

- To design a parcel box that avoid the parcel from stolen
- To construct a system that can secure the parcel
- To reducing the delivery delay
- To reducing the delivery cost during the delivery process.

4. SYSTEM DESIGN

4.1 Module Description

A IOT Secure crate is the most recent and cutting-edge technology for collecting packages. It has the appearance of a human and has taken over the role of gathering stuff from humans. A IOT Secure crate is a self-contained system that was created using IoT and Cloud ideas. The project's goal is to create a IOT Secure crate that will be able to authenticate, receive, and return the ordered in a timely manner as well as appreciating customers because the person may not be available to receive the packages at all times. Working in the realm of societal development is a secondary goal. Finally, a new idea for automating parcel delivery collecting has been offered in this project. This facilitates the delivery of the package It has been suggested that parcel deliveries be collected. This makes parcel delivery easier and safer even when the consumer is not present.

4.2 HARDWARE DESIGN

Arduino is a tool for making computers which can sense and management a lot of the physical world than your microcomputer. It's an open-source physical computing platform supported an easy microcontroller board, and a development environment for writing code for the board.

Arduino is employed to develop interactive objects, taking inputs from a variety of switches or sensors, and dominant a variety of lights, motors, and various physical outputs. Arduino comes is complete, or they're going to be communicated with code running on your portable computer.

The boards are assembled by hand or purchased preassembled; the open-source IDE is downloaded for free of charge. The Arduino programing language is an implementation of Wiring, an identical physical computing platform, that's based on the method transmission programming atmosphere.

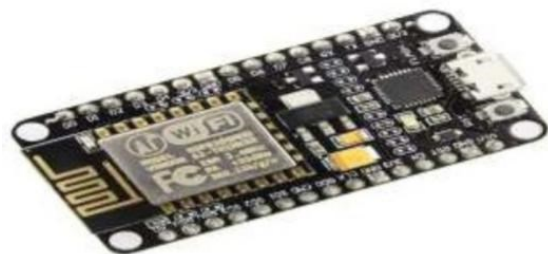


Fig (4.1) Arduino Uno board

4.1.1 Overview

The Arduino microcontroller could be an easy to use but powerful single board portable computer that has gained wide traction within the hobby and professional market. The Arduino is open-source, that suggests hardware is reasonably priced and development computer code is free. For advanced Arduino users, there are varied resources. With the Arduino board, you will write programs and build interface circuits to browse switches and various sensors, and to control motors and lights with very little or no effort. Many of the pictures and drawings throughout this guide were taken from the documentation. This is what the Arduino board seems like.



Fig (4.2) Node MCU Development Board/kit v0.9 (Version1)

NodeMCU is Associate in Nursing open-source LUA primarily based firmware developed for the ESP8266 Wi-Fi chip. By exploring practicality with the ESP8266 chip, NodeMCU firmware comes with the ESP8266

Development board/kit i.e., NodeMCU Development board.



Fig (4.3) Node MCU Development Board/kit v1.0 (Version2)

Since NodeMCU is an open-source platform, its hardware style is open for edit/modify/build. NodeMCU Dev Kit/board contains ESP8266 Wi-Fi enabled chip. The ESP8266 could be a low-priced WI-FI chip developed by communicative Systems with TCP/IP protocol. For additional info regarding ESP8266, you'll be able to refer to the ESP8226 wireless local area network MODULE There is Version2 (V2) offered for NodeMCU Dev Kit i.e., NodeMCU Development Board v1.0 (Version2), that typically comes in black coloured PCB.

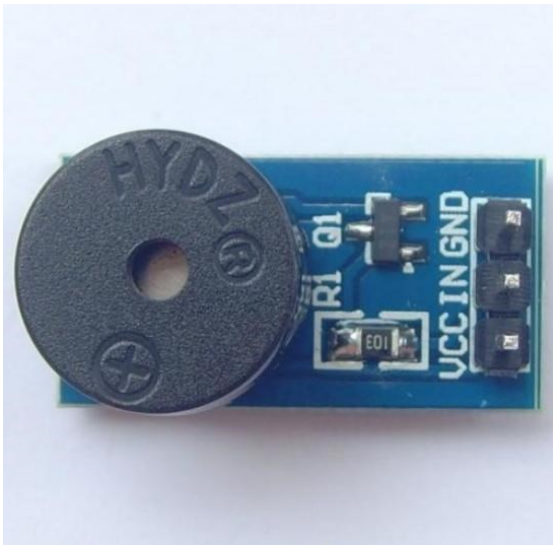
Vibration Sensor

This module features an adjustable potentiometer, a vibration sensor, and a LM393 comparator chip to give an adjustable digital output based on the amount of vibration. The potentiometer can be adjusted to both increase and decrease the sensitivity to the desired amount. The module outputs a logic level high (VCC) when it is triggered and a low (GND) when it isn't. Additionally there is an onboard LED that turns on when the module is triggered.

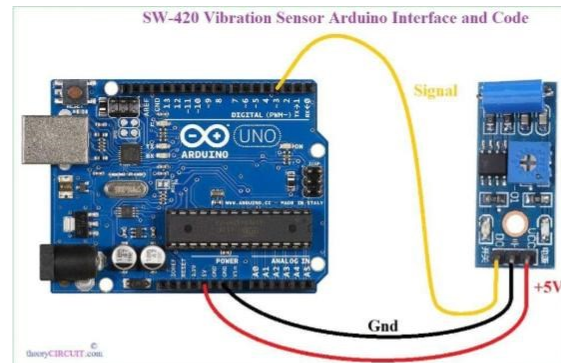
A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or keystroke.

5. SYSTEM IMPLEMENTATION

Functional Requirements



Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to “plug and play.”



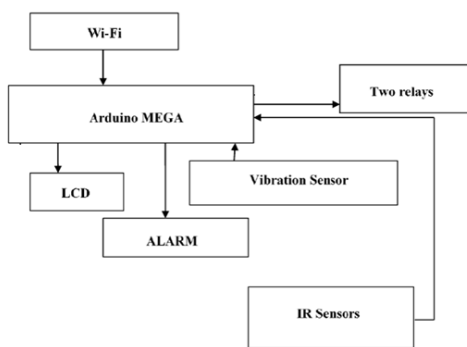
Arduino Hookup with SW-420

Connect Vcc pin of sensor board to 5V pin of Arduino board, connect Gnd pin to Gnd pin of Arduino, Connect DO output signal pin of sensor board to Arduino digital pin D3. Do some calibration and adjust the sensitivity threshold, then upload the following sketch to Arduino board.

Arduino Code for Logic State Output from sensor module, here onboard LED of Arduino indicates the presence of vibration.

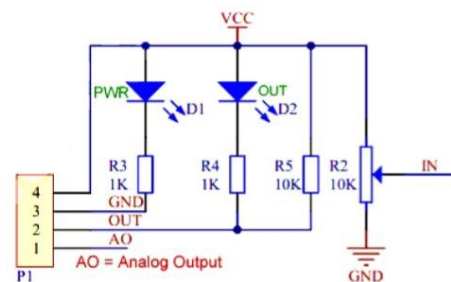
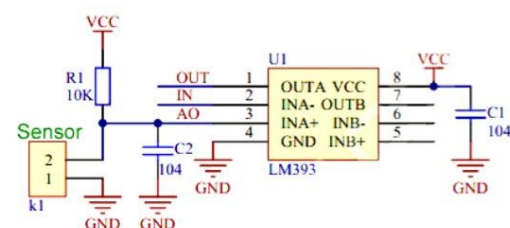
Application Ideas

- Vibration detecting
- Burglary protection system
- Object Movement detecting
- Triggering effect reported theft alarm
- Smart car
- Earthquake alarm
- Motorcycle alarm



- Installed Arduino Mega microcontroller as the central control unit for the crate system.
- Connected and calibrated sensors, including vibration sensors, to detect any unauthorized access attempts or tampering.
- Configured Wi-Fi connectivity for seamless communication with the mobile application and backend servers.
- Tested hardware components thoroughly to ensure proper functionality and reliability.

Board Schematic



Module does not vibrate, vibrate switch is closed conduction state, the output low, the green indicator light comes ON.

- Vibration state, vibration switch instantly disconnect the output high, the green light is not on;
- The output is directly connected to the microcontroller to detect high and low, thereby detecting the vibration environment, play an alarm role

Sensor Details SW-420

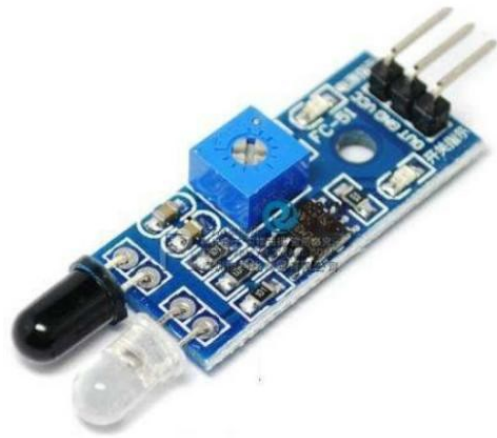
Single-roller type full induction trigger switch. When no vibration or tilt, the product is ON conduction state, and in the steady state, when a vibration or tilt, the switch will be rendered instantly disconnect the conductive resistance increases, generating a current pulse signal, thereby triggering circuit. These products are completely sealed package, waterproof, dustproof.

Principle

Usually at any angle switch is ON state, by the vibration or movement, the rollers of the conduction current in the switch will produce a movement or vibration, causing the current through the disconnect or the rise of the resistance and trigger circuit. The characteristics of this switch is usually general in the conduction state briefly disconnected resistant to vibration, so it's high sensitivity settings by IC, customers according to their sensitivity requirements for adjustments.

Arduino IR Infrared Obstacle Avoidance Sensor Module

The sensor module adaptable to ambient light, having a pair of infrared emitting and receiving tubes, transmitting tubes emit infrared certain frequency, when the direction of an obstacle is detected (reflection surface), the infrared reflected is received by the reception tube, After a comparator circuit processing, the green light is on, but the signal output interface output digital signal (a low-level signal), you can adjust the detection distance knob potentiometer, the effective distance range of 2 ~ 30cm, the working voltage of 3.3V- 5V. Detection range of the sensor can be obtained by adjusting potentiometer, with little interference, easy to assemble, easy to use features, can be widely used in robot obstacle avoidance, avoidance car, line count, and black and white line tracking and many other occasions.



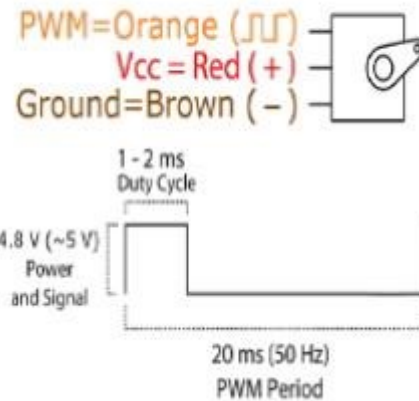
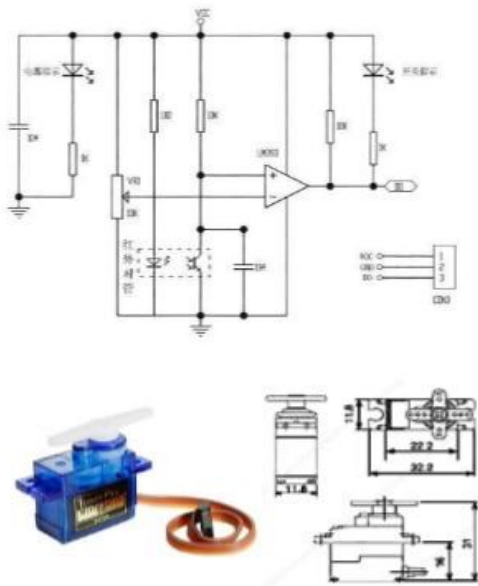
Specification

1. When the module detects an obstacle in front of the signal, the green indicator lights on the board level, while the OUT port sustained low signal output, the module detects the distance 2 ~ 30cm, detection angle 35 °, the distance can detect potential is adjusted clockwise adjustment potentiometer, detects the distance increases; counter clockwise adjustment potentiometer, reducing detection distance.
2. The sensor active infrared reflection detection, target reflectivity and therefore the shape is critical detection distance. Where the minimum detection distance black, white, maximum; small objects away from a small area, a large area from the Grand.
3. The sensor module output port OUT port can be directly connected to the microcontroller IO can also be directly drive a 5V relay; Connection: VCC-VCC; GND-GND; OUT-IO
4. Comparators LM393, stable;
5. The module can be 3-5V DC power supply. When the power is turned on, the red power indicator lights;
6. With the screw holes 3mm, easy fixed installation;
7. Board size: 3.2CM * 1.4CM
8. Each module has been shipped threshold comparator voltage adjusted by potentiometer good, non-special case, do not adjustable potentiometer.

CONCLUSION:

Module Interface Description

1. **VCC** : 3.3V-5V
external voltage (can be directly connected to 5v and 3.3v MCU)
2. **GND** : GND External
3. **OUT** : small board digital output interface (0 and 1)



In conclusion, this project journal serves as a comprehensive record of the development process, challenges faced, solutions implemented, and future steps for the IoT secure crate system. By documenting each aspect of the project in detail, we ensure transparency, accountability, and continuous improvement as we progress towards the final delivery of the solution.

- By following this detailed journal format, you can effectively document the development journey of your IoT secure crate project and ensure clarity and coherence in tracking progress and addressing challenges.

Micro Servo

Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

Specifications

- Weight: 9 g
- Dimension: 22.2 x 11.8 x 31 mm approx.
- Stall torque: 1.8 kgf·cm
- Operating speed: 0.1 s/60 degree
- Operating voltage: 4.8 V (~5V)
- Dead band width: 10 μs
- Temperature range: 0 °C – 55 °C

Position “0” (1.5 ms pulse) is middle, “90” (~2 ms pulse) is all the way to the right, “-90” (~1 ms pulse) is all the way to the left.

REFERENCE

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2. <https://en.wikipedia.org/wiki/Mailbox>
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5. This document explains how to connect your Uno board to the computer <https://www.arduino.cc/en/Guide/ArduinoUno>
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7. <https://www.srsgroup.co.nz/blog/7-benefits-of-stainless-steel/>
8. The Ring Mailbox Sensor will let you know when your mailbox has been opened and can trigger Alexa and other Ring devices.
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