

Development of Smart Storage for CNC Tools Holder for Improving the Safety and Ease of Use of Tool Storage Systems

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Abstract

This project presents the development of a Smart Storage System for CNC Toolholders designed to enhance the security, efficiency, and user convenience of tool management in modern manufacturing environments. Traditional tool storage solutions often rely on manual locking mechanisms and offer limited user authentication, resulting in potential security vulnerabilities and operational inefficiencies. To address these issues, the proposed smart storage system integrates a suite of advanced technologies, including RFID-based access control, a solenoid lock, an infrared (IR) sensor, an OLED display, and a buzzer for alerts. Authorized users can access the toolholder by scanning their RFID tags, while unauthorized access attempts trigger an audible alarm and a warning message on the display. The IR sensor provides continuous monitoring of tool presence, with real-time updates shown on the OLED screen. All interactions including access events and toolholder status are logged via the serial monitor for monitoring and troubleshooting purposes. Survey feedback indicates strong user support, with over 90% agreeing that RFID access is essential to meet current technological standards. The Smart Storage System for CNC Toolholders demonstrates a reliable, scalable, and user-friendly solution adaptable to various industrial applications, showcasing the potential of integrating smart technologies into conventional storage systems.

1. Introduction

Computer Numerical Control (CNC) machines represent the cornerstone of modern manufacturing technology, integrating sophisticated machine bodies with advanced computer numerical control systems [1,2]. These machines have become essential equipment in contemporary industrial operations due to their superior repeatability, accuracy, and automation capabilities compared to conventional machining systems [3]. The reliability of CNC machine tools directly impacts production efficiency and product quality, making proper tool management critical for manufacturing success [2].

Traditional CNC tool storage systems face significant challenges including security vulnerabilities, inefficient access control, and a lack of real-time monitoring capabilities [4]. Manual locking mechanisms and limited user authentication result in potential tool theft, misplacement, and operational delays that can cost manufacturing facilities thousands of dollars annually. Current tool storage solutions in the market lack integration with

modern IoT technologies and fail to provide comprehensive access logging and monitoring capabilities. The absence of automated inventory tracking and user authentication systems creates bottlenecks in production workflows and compromises tool security [5].

This research addresses these limitations by developing an intelligent storage system that combines RFID technology, sensor networks, and real-time feedback mechanisms. The main objective is to design and develop a Smart Storage System for CNC Toolholders that integrates RFID-based access control, real-time tool monitoring, and user-friendly feedback mechanisms to enhance security, improve accessibility, and support efficient tool management in modern manufacturing settings.

The integration of smart technologies in manufacturing tool management has gained significant attention in recent years, driven by the need for enhanced security, efficiency, and automation in industrial environments. Foundational research by Adetoyi [6] demonstrated the effectiveness of smart card door access control systems, highlighting the potential for RFID-based authentication in industrial applications. This work established the foundation for secure access control mechanisms that can be adapted for tool storage systems, setting the stage for more sophisticated inventory management solutions.

Building upon these security foundations, RFID technology has proven particularly valuable in supply chain and inventory management applications. Chetouane [7] provided a comprehensive overview of RFID technology instruction and applications, demonstrating its reliability in automated identification systems. Extending this work further, Tan and Sidhu [5] explored RFID and IoT integration in supply chain management, showing significant improvements in tracking accuracy and operational efficiency. This convergence of technologies was further validated by Sun et al. [8], who designed and fabricated an automatic classifying smart trash bin based on Internet of Things, thereby proving the feasibility of intelligent storage solutions in automated environments and establishing a precedent for smart storage applications beyond traditional inventory systems.

Complementing RFID technology, sensor integration plays a crucial role in smart storage systems by providing real-time monitoring capabilities. Ajmera [9] reviewed infrared sensor applications, while concurrently, Khan [10] examined various object detection techniques and methods. Specifically addressing motion detection requirements, Y. Pawar et al. [11] investigated motion detection using PIR sensors, demonstrating their effectiveness in automated monitoring systems. Collectively, these studies highlight the importance of reliable sensor systems for continuous monitoring and real-time feedback in automated storage solutions, forming the technological backbone for comprehensive smart storage implementations.

To implement these integrated technologies, the application of Arduino microcontrollers in industrial automation has been extensively studied and validated. Louis [12] examined Arduino as a research and development tool, complemented by Kondaveeti et al. [13], who provided a systematic literature review on Arduino prototyping applications, challenges, and limitations. These foundational studies confirm Arduino's suitability for embedded system development in industrial applications. Advancing this understanding, Fezari [14] presented detailed analysis of Arduino Leonardo based on ATmega32U4, demonstrating enhanced capabilities for USB communication and industrial applications. Practical validation of these capabilities has been successfully demonstrated through various implementations: OO and TT [15] designed and implemented Arduino microcontroller-based automatic lighting control with I2C LCD display, while similarly, U, K, and Priya [16] implemented AC power standby switch-off outlets using Arduino Mega2560. Synthesizing these findings, Ismailov and Jo [17] conducted comprehensive studies on Arduino microcontroller boards, providing technical specifications that support their selection for embedded system development in industrial applications.

Essential to user interaction in these systems, display technologies for user interface applications have evolved significantly to meet industrial requirements. Bhrijesh et al. [18] discussed OLED as a modern display technology, highlighting its advantages in terms of contrast, power consumption, and readability. Supporting this technological evolution, Kalyani [19] provided historical context for OLED display development, thereby justifying its selection for user interface applications in industrial environments.

Despite these technological advances, traditional CNC tool storage systems documented in industrial applications continue to rely on conventional approaches focusing on manual inventory management and basic security measures [20]. While commercial solutions such as those offered by ROUSSEAU METAL INC. [21] provide specialized CNC tool storage systems, these typically lack integration with modern smart technologies and automated monitoring capabilities, creating a significant gap between available technology and practical implementation.

Consequently, existing literature reveals a critical gap in comprehensive smart storage solutions specifically designed for CNC tool management. Current systems fail to integrate multiple technologies (RFID, sensors, displays) in a single, cost-effective platform tailored for manufacturing environments, thus necessitating the development of an integrated solution that combines the proven effectiveness of individual technologies into a cohesive, automated tool management system.

2. Methodology

To achieve the comprehensive objective of developing a Smart Storage System for CNC Toolholders using Arduino microcontroller technology, a structured and systematic methodology was implemented to ensure methodical development and seamless integration of both hardware and software components [12,13]. This section provides a detailed outline of the overall project workflow, describes the systematic design and development stages, and highlights the key procedural steps involved in implementing the smart storage system. The methodology serves as a comprehensive roadmap to guide the project progression from initial conceptualization through final system execution and validation.

2.1 Flowchart of Project

The design framework incorporates multiple layers of functionality, including hardware abstraction, sensor integration, user interface management, and security protocols [22,23]. The flowchart serves as a blueprint for system behavior, helping to ensure that all functional requirements are met in the design and coding stages as illustrated in Fig. 1. The design process was guided by established engineering principles and best practices to ensure both functional reliability and operational efficiency. Initial planning phases included detailed component selection based on compatibility requirements, operational specifications, and cost-effectiveness considerations. Each selected component underwent individual testing and validation before integration to ensure optimal performance within the complete system [11].

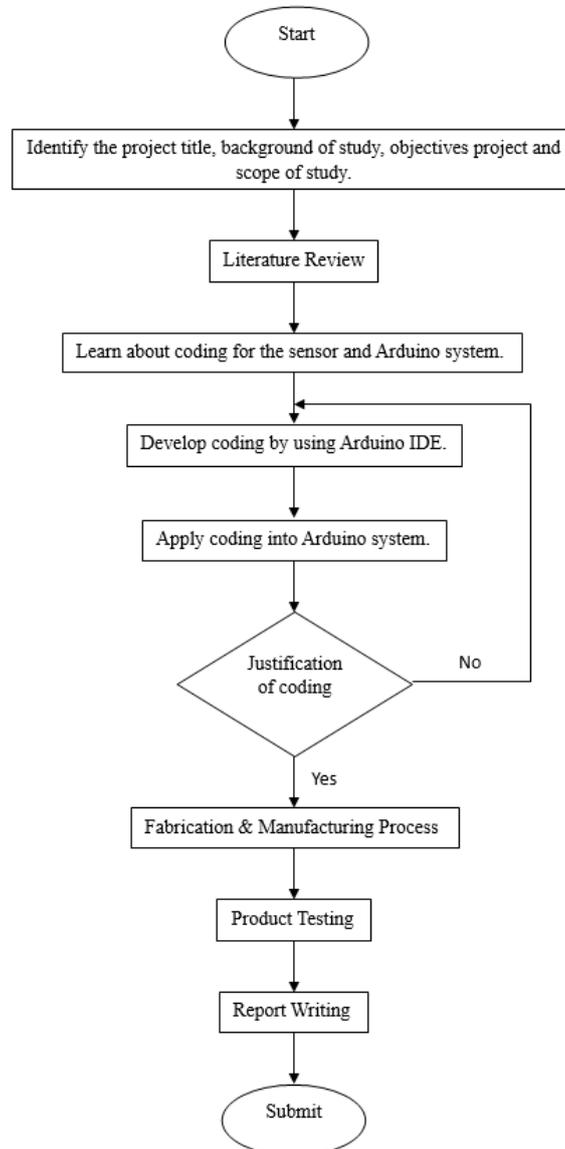


Fig. 1 Illustrates the operational flowhart

2.2 Project Design

This section focuses on the systematic design approach applied to develop the Smart Storage for CNC Toolholder system. The design process was guided by production and engineering principles to ensure both functionality and reliability. Initial planning included the preparation of a block diagram as presented in Fig. 2, which helped visualize system operation and guided hardware-software integration. Existing components were selected and studied based on their compatibility and operational requirements, and their working principles were understood prior to implementation. Before the physical assembly, each component—such as the RFID reader, IR sensor, OLED display, and solenoid lock was tested individually. This ensured that when integrated, the entire system would operate according to protocol. The final circuit was developed following a structured evaluation and prototyping process to verify system behavior and refine performance.

- i. RFID Card and Reader - The user initiates access by scanning an RFID card using the RFID reader. This serves as the first level of authentication.
- ii. Arduino Microcontroller - The Arduino acts as the central processing unit, receiving input from both the RFID reader and the IR sensor. It handles all decision-making processes based on sensor data and programmed logic.
- iii. IR Sensor with LED - The IR sensor detects the presence or absence of the CNC toolholder inside the storage. Its LED indicates detection status and supports object placement verification.
- iv. User Authentication and Authorization - The microcontroller verifies the RFID tag against stored authorized IDs. If the tag is valid, the system proceeds to the next step. If not, it denies access and may trigger an alert.
- v. Solenoid Lock and Damper - Once authenticated, the Arduino signals the solenoid lock to disengage, allowing the storage door to open smoothly with the help of a damper.
- vi. OLED Display - The OLED screen provides real-time feedback to the user, such as access granted/denied messages, tool status, or system errors.
- vii. Feedback and Monitoring - Throughout the process, user interactions and sensor data are logged for monitoring and debugging via the serial monitor, ensuring traceability and transparency.

This design ensures a secure, intelligent, and user-friendly tool storage solution, effectively combining hardware control with real-time feedback and data logging.

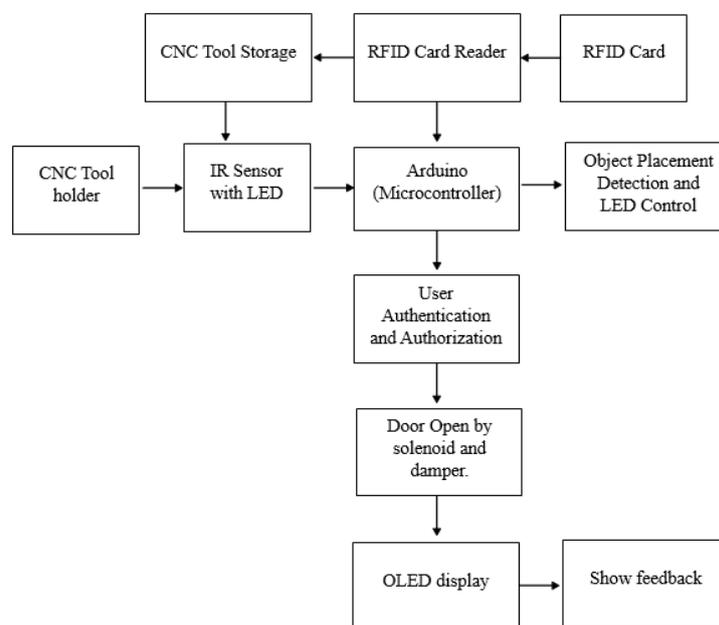


Fig. 2 Illustrates the operational flow of the smart toolholder system, starting from input detection to feedback display

2.3 Project Component

Table 1 lists the key components used in the development of the Smart Storage for CNC Toolholder system, along with their specifications and quantities. This carefully selected component set balances performance, cost-efficiency, and ease of integration, making it suitable for prototyping a smart, secure CNC toolholder storage system. The hardware selection process involved careful evaluation of available components based on technical specifications, compatibility requirements, and integration complexity [23,24].

Table 1 Lists the key components used in the development of the Smart Storage for CNC Toolholder system

NO	COMPONENT	QUANTITY	SPECIFICATION
1	Arduino Microcontroller	1	Arduino UNO
2	RFID Card Reader	1	RC522
3	RFID Tags	1	Mifare Card
4	Solenoid Lock	1	12V DC
6	IR Sensor	1	HW201
7	LED	1	5mm
8	Buzzer	1	3V
9	OLED	1	128x64 1.3 inch

2.4 Software Implementation

Arduino is a freely available electronics platform that utilizes user-friendly hardware and software. Arduino boards possess the capability to perceive various inputs, such as light detected by a sensor, contact with a button, or a message received from Twitter, and subsequently convert them into outputs, such as operating a motor, illuminating an LED, or publishing content online. To command your board, you can transmit a series of directives to the microcontroller embedded on the board. To accomplish this, you utilize the Arduino programming language, which is derived from Wiring, and the Arduino Software (IDE), which is based on Processing. [12]

SolidWorks is a robust computer-aided design (CAD) software that is extensively utilized by engineers, designers, and architects for the purpose of generating intricate 3D models and simulations. Created by Dassault Systèmes, SolidWorks has a user-friendly interface and extensive features for creating, evaluating, and visualizing intricate structures and mechanisms. Users could construct accurate 3D models, conduct simulations to test functionality and durability, and produce comprehensive manufacturing drawings and specifications. The software facilitates a range of design methods, such as parametric design, direct modelling, and assembly modelling. Additionally, it offers capabilities for product data management, collaboration, and compatibility with other CAD and CAE tools. The simulation capabilities of SolidWorks, along with its comprehensive collection of materials and components, enable the optimization of designs for both performance and manufacturability. This results in reduced development time and costs, as well as improved product quality.

2.5 Circuit Design

The circuit schematic illustrated in Fig. 3 presents the comprehensive electrical architecture of the proposed smart CNC tool storage system, demonstrating the systematic integration of multiple subsystems centered around an Arduino UNO microcontroller platform. This design configuration incorporates several critical components strategically interconnected to achieve the desired functionality of enhanced safety and operational efficiency. The central processing unit, represented by the Arduino UNO microcontroller, serves as the primary control hub, coordinating all system operations and managing data flow between peripheral components. Connected to this central unit are several key subsystems: an RFID module (RC522) positioned in the upper portion of the circuit for tool authentication and identification purposes, an OLED display module providing real-time user interface and system status information, and a breadboard configuration facilitating prototype development and component interconnection.

The power management subsystem is represented by the external power supply unit, ensuring stable voltage regulation and adequate current supply to all system components. Color-coded wiring throughout the schematic indicates different signal types and power distribution pathways, with systematic routing that minimizes electromagnetic interference and ensures reliable signal transmission between components. This circuit configuration demonstrates the practical implementation of the theoretical framework discussed previously, showing how individual components are physically and electrically integrated to create a cohesive smart storage solution. The modular design approach evident in the schematic allows for system scalability and component upgradeability, essential characteristics for industrial applications where maintenance and future enhancements may be required. The proposed architecture effectively addresses the core requirements of CNC tool storage safety and ease of use through its integrated sensor network, secure authentication protocols, and intuitive user interface, as evidenced by the systematic component arrangement and interconnection methodology presented in the circuit diagram.

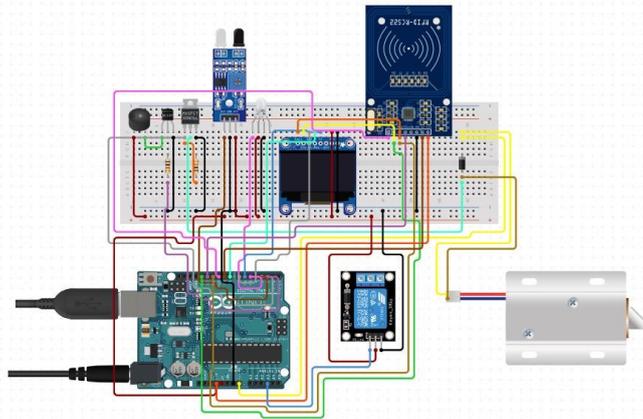


Fig. 3 Circuit Diagram

2.6 Fabrication of Product

Before beginning the process of manufacturing, it is imperative to carefully arrange the product to determine the exact measurements of each individual part. This entails applying design software like SolidWorks to generate intricate 3D models that include every aspect of the Smart Storage system. Precise measurements are required for each component, such as the structural framework, RFID reader slots, solenoid spacing, IR sensor placements, and OLED display mount. The meticulous design approach guarantees the seamless integration of all components during assembly, enables the optimization of material utilization, and facilitates the early detection of any possible faults prior to the commencement of physical production. By carefully planning the product in advance, the likelihood of mistakes during manufacturing is reduced, resulting in a more streamlined and prosperous construction process.

A comprehensive exploded view as presented in Fig. 4 is included to show the intricate features and precise positioning of each component within the Smart Storage system. This perspective separates each element and presents them in a manner that exposes their distinct positioning and connectivity points within the complete assembly. An exploded view aids in comprehending the arrangement of components, their proportions, and their precise positions within the design by visually separating the sections. Comprehensive depiction is crucial for both the validation of the design and the assembly procedure, guaranteeing accurate placement and seamless integration of each component into the product. Additionally, it assists in detecting any possible disruptions or difficulties in assembling, hence enabling a more seamless and precise construction procedure.

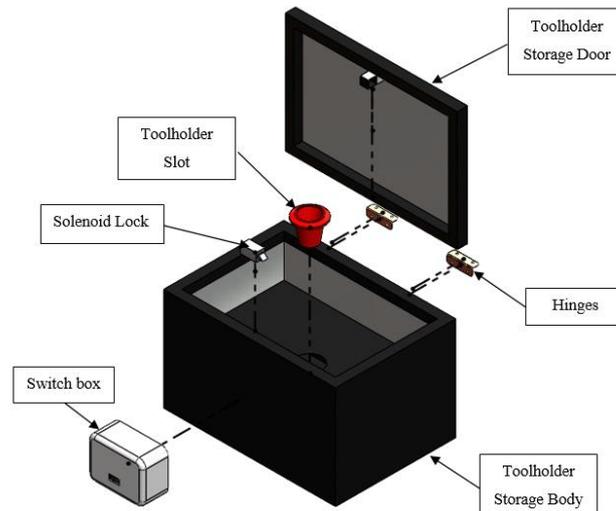


Fig. 4 Exploded View of Product

3. Results and Discussion

This section presents the implementation results of the Smart Storage for CNC Toolholder project and discusses the functionality and performance of the system. Emphasis is placed on software integration, hardware behaviour, and system responsiveness based on user interaction.

3.1 Arduino Coding Implementation

The Arduino-based code developed for the Smart Storage system successfully integrates multiple hardware components to provide secure, automated, and intuitive access control. The RFID module (RC522) plays a central role by reading RFID tag data and verifying the tag's unique identification number (UID) against a list of authorized users predefined in the system. Upon detecting a valid RFID tag, the microcontroller initiates the unlocking mechanism by activating the 12V solenoid lock. An LED indicates whether the compartment is locked or unlocked. In contrast, if an unauthorized tag is scanned, the system immediately triggers the buzzer to sound an alert and displays a warning message on the OLED screen, reinforcing the system's security functionality.

The IR sensor (HW201) continuously monitors the presence of the toolholder inside the storage compartment. When a toolholder is detected, the OLED screen provides real-time feedback to the user by displaying a relevant message, ensuring transparency and guiding the user throughout the interaction. After any interaction, whether successful or denied, the OLED display resets to its default state, prompting for the next RFID scan, thus maintaining continuous readiness. Additionally, the Arduino serial monitor logs essential runtime information such as scanned UID, authorization status, and toolholder detection. This data is critical for system monitoring, debugging, and future optimization. This coding structure demonstrates effective integration of embedded hardware and software to build a user-friendly, secure, and responsive smart storage system as shown in Fig.5 - Fig. 8.

```

test_new_coding
#include <SPI.h>
#include <MFRC522.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>

#define SCREEN_WIDTH 128
#define SCREEN_HEIGHT 64
#define OLED_RESET -1 // Reset pin # (or -1 if sharing Arduino reset pin)

#define SS_PIN 10
#define RST_PIN 9
#define IR_PIN 7
#define SOLENOID_PIN A3 // Define solenoid pin
#define DOOR_LED_PIN 6
#define OBJECT_LED_PIN 5
#define BUZZER_PIN 8 // Define buzzer pin

#define OLED_ADDRESS 0x3C

MFRC522 rfid(SS_PIN, RST_PIN);
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, OLED_RESET);

byte authorizedUID[4] = {0x83, 0x80, 0xDB, 0xFD};
bool isDoorOpen = false;
bool toolholderDetected = false;

void setup() {

```

Fig. 5 Coding Arduino

```

test_new_coding

void loop() {
  if (rfid.PICC_IsNewCardPresent() && rfid.PICC_ReadCardSerial()) {
    Serial.print("Card UID: ");
    for (byte i = 0; i < rfid.uid.size; i++) {
      Serial.print(rfid.uid.uidByte[i] < 0x10 ? " 0" : " ");
      Serial.print(rfid.uid.uidByte[i], HEX);
    }
    Serial.println();

    if (isAuthorized()) {
      Serial.println("Authorized Tag");
      toggleSolenoid(); // Toggle solenoid status if authorized
      delay(3000); // Keep the solenoid engaged for 3 seconds
      returnToInitialPosition(); // Return solenoid to initial position
    } else {
      Serial.println("Unauthorized Tag");

      // Activate buzzer when unauthorized tag is detected
      tone(BUZZER_PIN, 1000); // Turn on buzzer at 1000 Hz frequency
      delay(1000); // Wait for 1 second
      noTone(BUZZER_PIN); // Turn off buzzer

      // Update OLED with unauthorized tag message
      updateDisplay("Unauthorized Tag", "Please use authorized tag.");
      delay(2000); // Delay to show the unauthorized message for 2 seconds

      // Reset the display to the initial message
      updateDisplay("Tap RFID/NFC Tag", "");
    }
  }
}

```

Fig. 6 Coding Arduino (continue)

```

test_new_coding
bool isAuthorized() {
    return memcmp(rfid.uid.uidByte, authorizedUID, sizeof(authorizedUID)) == 0;
}

void toggleSolenoid() {
    isDoorOpen = !isDoorOpen; // Toggle door status

    if (isDoorOpen) {
        Serial.println("Unlocking Door");
        digitalWrite(SOLENOID_PIN, LOW); // Engage solenoid
        digitalWrite(DOOR_LED_PIN, HIGH); // Indicate door is unlocked
    } else {
        Serial.println("Locking Door");
        digitalWrite(SOLENOID_PIN, HIGH); // Disengage solenoid
        digitalWrite(DOOR_LED_PIN, LOW); // Indicate door is locked
    }
}

void returnToInitialPosition() {
    Serial.println("Returning to Initial Position");
    digitalWrite(SOLENOID_PIN, HIGH); // Ensure solenoid is disengaged
    digitalWrite(DOOR_LED_PIN, LOW); // Indicate door is locked
    isDoorOpen = false; // Update door status

    delay(2000);

    // Display initial message on OLED
    updateDisplay("Tap RFID/NFC Tag", "Take your toolholder carefully.");
}

```

Fig. 7 Coding Arduino (continue)

```

    updateDisplay("Tap RFID/NFC Tag", "Take your toolholder carefully.");
}

void updateDisplay(String line1, String line2) {
    display.clearDisplay();
    display.setTextSize(1);
    display.setTextColor(SSD1306_WHITE);
    display.setCursor(0, 0);
    display.println(line1);
    display.setCursor(0, 10);
    display.println(line2);
    display.display();
}

```

Fig. 8 Coding Arduino (continue)

3.2 Final Prototype

The completed prototype of the Smart Storage for CNC Toolholder reflects the successful physical implementation of the design and coding principles. All core components including the Arduino UNO, RFID reader, solenoid lock, IR sensor, buzzer, and OLED display were correctly wired and integrated within the casing of the toolholder storage unit. Key functional observations:

- i. **Access Control:** The RFID system reliably granted or denied access based on tag authentication. Valid users were able to unlock the storage compartment seamlessly.
- ii. **Security Feedback:** Unauthorized access attempts were consistently flagged with both audio (buzzer) and visual (OLED warning) alerts.
- iii. **Tool Presence Monitoring:** The IR sensor accurately detected the presence or absence of the toolholder, with real-time feedback shown on the OLED display.
- iv. **User Interface:** The OLED display proved to be an effective medium for delivering user feedback, offering clarity in operation status and error notifications.
- v. **Data Logging:** All interactions were successfully recorded on the serial monitor, providing a transparent view of system behavior for diagnostics and improvements.

Fig.9 and Fig.10 show the final prototype validates the practical feasibility of the design and confirms that the system functions as intended. The project not only demonstrates the application of embedded systems in enhancing tool management but also establishes a scalable foundation for future expansion—such as cloud data logging, mobile notifications, or biometric integration.

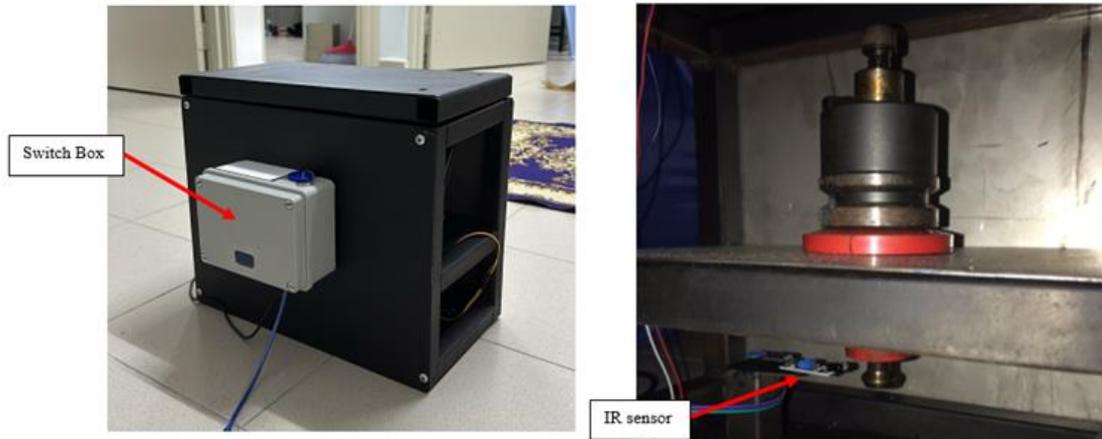


Fig. 9 Switch box and IR sensor placement

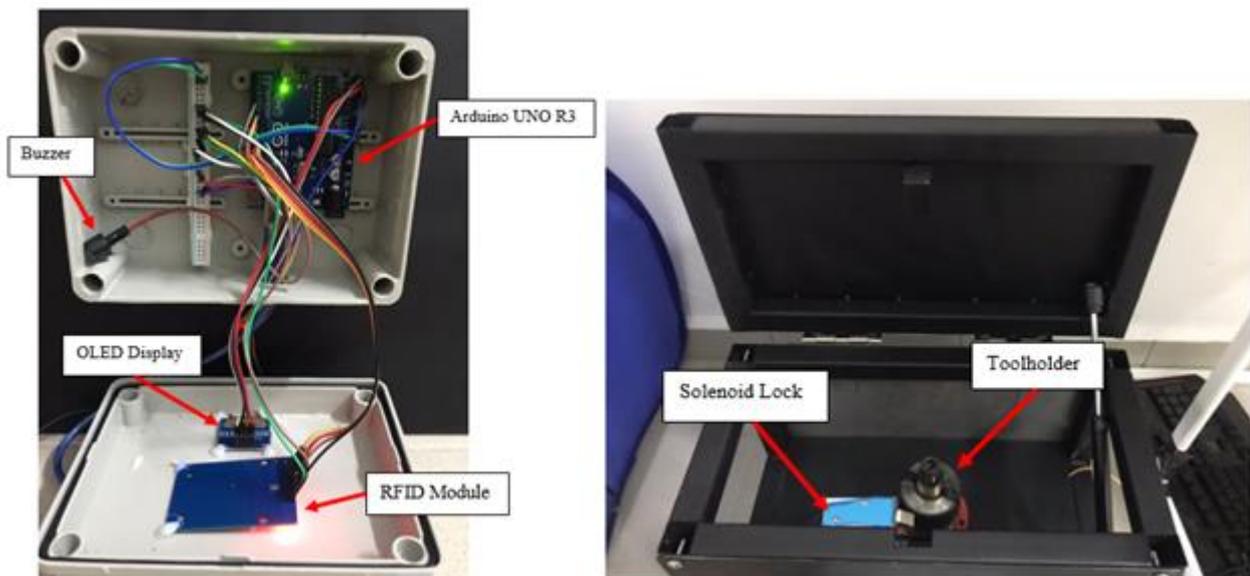


Fig. 10 Wiring for hardware and Solenoid placement

3.2.1 Result of OLED Display

The OLED display plays a crucial role in the user interface of the Smart Storage for CNC Toolholder system by delivering clear, real-time feedback throughout each stage of system operation. The implementation of a 1.3-inch 128x64 OLED display enhances the interactivity and usability of the system, enabling users to understand system status instantly and respond accordingly. During testing and actual operation, the OLED display effectively communicated the following messages and system states:

- i. Initial Prompt: Upon system initialization, the OLED display presents the default operational interface as demonstrated in Figure 11A, which shows the system in its ready state before any RFID interaction. The display clearly indicates "Scan your RFID card" or similar instructional messaging, establishing immediate user awareness of system availability and providing clear guidance for initial interaction. This standby interface ensures users understand the system is fully operational and awaiting authentication input.

- ii. **Access Authorization Feedback:** Following successful RFID authentication, the system transitions to the authorized access state illustrated in Figure 11B, where the OLED display presents confirmation messaging such as "Access Granted – Door Unlocked." This positive feedback interface provides immediate visual confirmation of successful authentication, enabling users to proceed with confidence while clearly indicating that security protocols have been satisfied and system access has been granted.
- iii. **Security Alerts and System Events:** In case of unusual activity or repeated invalid access attempts, the OLED serves as a visual alarm by showing warning messages alongside buzzer activation, thereby reinforcing system security protocols. The system activates the security denial state shown in Figure 11C, displaying prominent warning messages such as "Access Denied – Unauthorized Card!" The high-contrast, bold text presentation ensures immediate recognition of access rejection, while the clear messaging reinforces security protocol enforcement and prevents confusion regarding system status.
- iv. **Toolholder Status Indication:** The OLED provides real-time updates based on data from the IR sensor. The system displays real-time inventory status as demonstrated in Figure 11D when the toolholder is present or removed, messages like "Toolholder Detected" or "No Tool Detected" appear. This gives users assurance about the storage status and tool availability.
- v. **Reset and Loop Readiness:** After completing a task or message display, the OLED automatically resets to the default state, prompting "Scan your RFID card". This ensures the system is continuously available for the next interaction, improving workflow efficiency.

The OLED's high contrast and pixel resolution ensured excellent readability, even in various lighting conditions. Its compact size allowed it to fit neatly within the system housing without compromising on information display quality. The dynamic display logic helped guide users intuitively through each operation stage, reducing the need for external instructions or manual supervision.

Overall, the OLED display significantly improved the system's usability, user experience, and communication clarity. It served not only as a functional display unit but also as a critical tool for real-time system monitoring and status reporting.



A) Display OLED before tap any RFID



B) Display OLED when tap the authorized RFID card



C) Display OLED when tap the wrong

D) Display OLED when toolholder

Fig. 11 RFID tool access system displaying four operational states

4. Conclusion

The Smart Storage Toolholder project successfully demonstrates the integration of modern embedded technologies to enhance security, usability, and efficiency in CNC tool storage systems. By incorporating RFID-based access control, a solenoid locking mechanism, an infrared (IR) sensor, a buzzer, and an OLED display, the system addresses the limitations of traditional manual storage methods and offers a smart, automated solution. RFID authentication ensures that only authorized users can access the toolholder, while the solenoid lock provides reliable physical security. Unauthorized access attempts are immediately identified, triggering both audible and visual alerts, thereby enhancing safety. The IR sensor continuously monitors the presence of the toolholder, and real-time feedback is displayed on the OLED screen, guiding users effectively through system interactions. All events are logged via the serial monitor, providing valuable data for system diagnostics and performance monitoring. Survey results reinforce the system's relevance, with over 90% of respondents agreeing that RFID access is essential to align with current technological advancements. This project highlights the practical application of smart technologies in industrial environments and lays the groundwork for further enhancements, such as network connectivity, cloud integration, or multi-user support. Overall, the Smart Storage Toolholder exemplifies a scalable and adaptable solution for modern tool management—secure, efficient, and user-centric.

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Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

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