EEE4103 MICROPROCESSOR AND EMBEDDED SYSTEM
COURSE CAPSTONE PROJECT PROPOSAL FORM

SEMESTER: SUMMER 2024-25

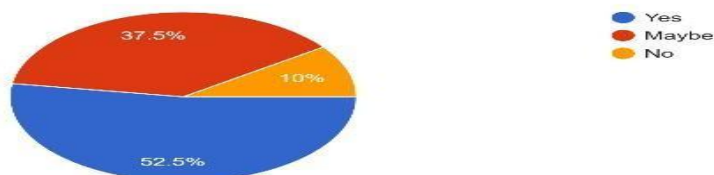**PROJECT TITLE: Password-Based Door Lock System using Arduino UNO**

SURVEY:

How satisfied are you with your current door lock?
40 responses

- Very dissatisfied
- Very satisfied
- Yes
- No

47.5% / 10% / 15% / 27.5%

Do you think a Password Based Door Lock System will help our security?
40 responses

- Yes
- Maybe
- No

37.5% / 10% / 52.5%

How much this Password Based Door Lock System would be effective in terms of our culture?
40 responses

- more effective
- less effective

22.5% / 72.5%

Would you prefer this in our society?
40 responses

- Highly recommended
- recommended
- no

32.5% / 15% / 52.5%

How much you pay for this system?
40 responses

- 1500-2800 tk
- 3000-5000 tk
- 5000-6000tk
- 7500+ tk
- 800-1200
- 500-800
- 500-800 tk
- 2500+

△ 1/2 ▼
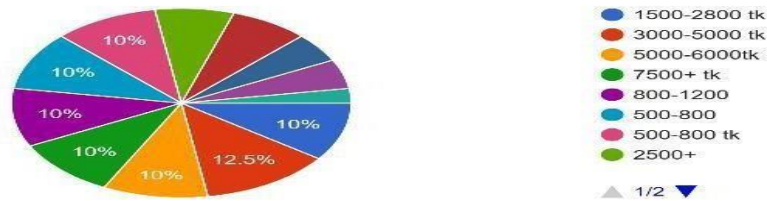
Where this system would be more suitable?
40 responses

Home — 18 (45%)
Society — 20 (50%)
City-Corporation — 11 (27.5%)
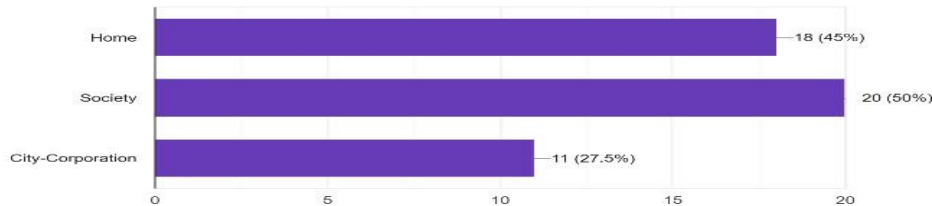
Would you be interested in a door lock system that uses a password for access instead of a physical key?
17 responses

- Yes
- No

76.5%
23.5%
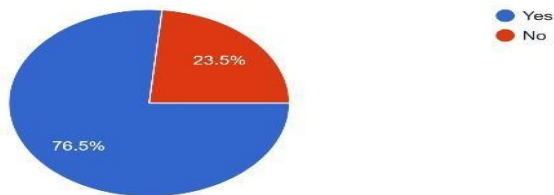
What features would be most important to you in a password-based door lock system?
17 responses

- multiple user accounts
- temporary access codes
- remote access

29.4%
35.3%
35.3%

AIMS AND OBJECTIVES OF THE PROJECT:

AIMS:

1. **Secure Entry**: Ensure door access is limited only to those who know the correct password.
2. **Automation**: Automate the door lock/unlock system using a servo motor.
3. **Feedback Mechanism**: Provide visual and auditory feedback for both correct and incorrect password entries.
4. **Standalone Operation**: Create a reliable standalone system that does not rely on external connectivity.
5. **User Interface**: Display relevant messages on an LCD screen for ease of use.

OBJECTIVES:

The primary objective of this project is to enhance home security through a low-cost, standalone smart lock. The system ensures that only authorized users with the correct password can gain entry, and displays all status messages clearly on an LCD. It also prevents unauthorized access through password checking and alerts via a buzzer sound.

LITERATURE REVIEW:

Embedded system design has become a crucial part of modern security systems, especially in the development of smart door locks. Various methods, including biometric, wireless, and IoT-based technologies, have been explored in recent research to improve security and usability. However, these systems also introduce complexity, cost, and reliability issues, which can be mitigated using simpler, standalone embedded solutions like password-based systems.

1. Shinde & Gholap (2020) developed an **Arduino-based biometric door lock** using fingerprint sensors integrated with an embedded microcontroller platform [1]. While offering high security, the system depends on expensive biometric modules and raises concerns about sensor accuracy in dusty or humid environments. Power failure may also lead to data loss without EEPROM backup.

2. Jyoti & Singh (2020) presented a **Smart Door Locking System using IoT**, which connects to smartphones via Wi-Fi or Bluetooth [2]. Although convenient, this method relies heavily on internet connectivity, making it unsuitable for rural or offline areas. The setup also introduces data privacy risks and higher development complexity.

3. Shanthini et al. (2020) implemented an **IoT-enhanced smart door lock** using ESP8266 and a mobile app [3]. While this system allows remote access, it has limitations such as high-power consumption, dependency on cloud servers, and vulnerability to hacking if not properly encrypted.

4. Singh & Pal (2021) designed a **password-based door lock system using Arduino**, demonstrating how a simple embedded design can offer effective local access control without complex networking [4]. Their system did not include feedback mechanisms like LCD display or buzzer alerts, making user interaction less intuitive.

5. Panigrahi et al. (2021) proposed a **low-cost electronic door lock** with an LCD and keypad using an embedded microcontroller [5]. Although the project showed promising results in minimizing cost and complexity, it lacked features such as failed attempt feedback and dynamic password change support.

Based on these studies, our project focuses on a standalone, password-protected embedded system that eliminates the dependencies on internet or biometric modules. The design leverages simple and widely available components—Arduino UNO, servo motor, 4x4 keypad, I2C LCD, and buzzer—to ensure cost-effectiveness, ease of implementation, and reliability. Unlike complex IoT or biometric systems, it is suitable for low-resource settings, offers fast user interaction via LCD and buzzer, and can be further upgraded with EEPROM-based password storage and lockout mechanisms for enhanced security.

EXPERIMENTAL BLOCK DIAGRAM:
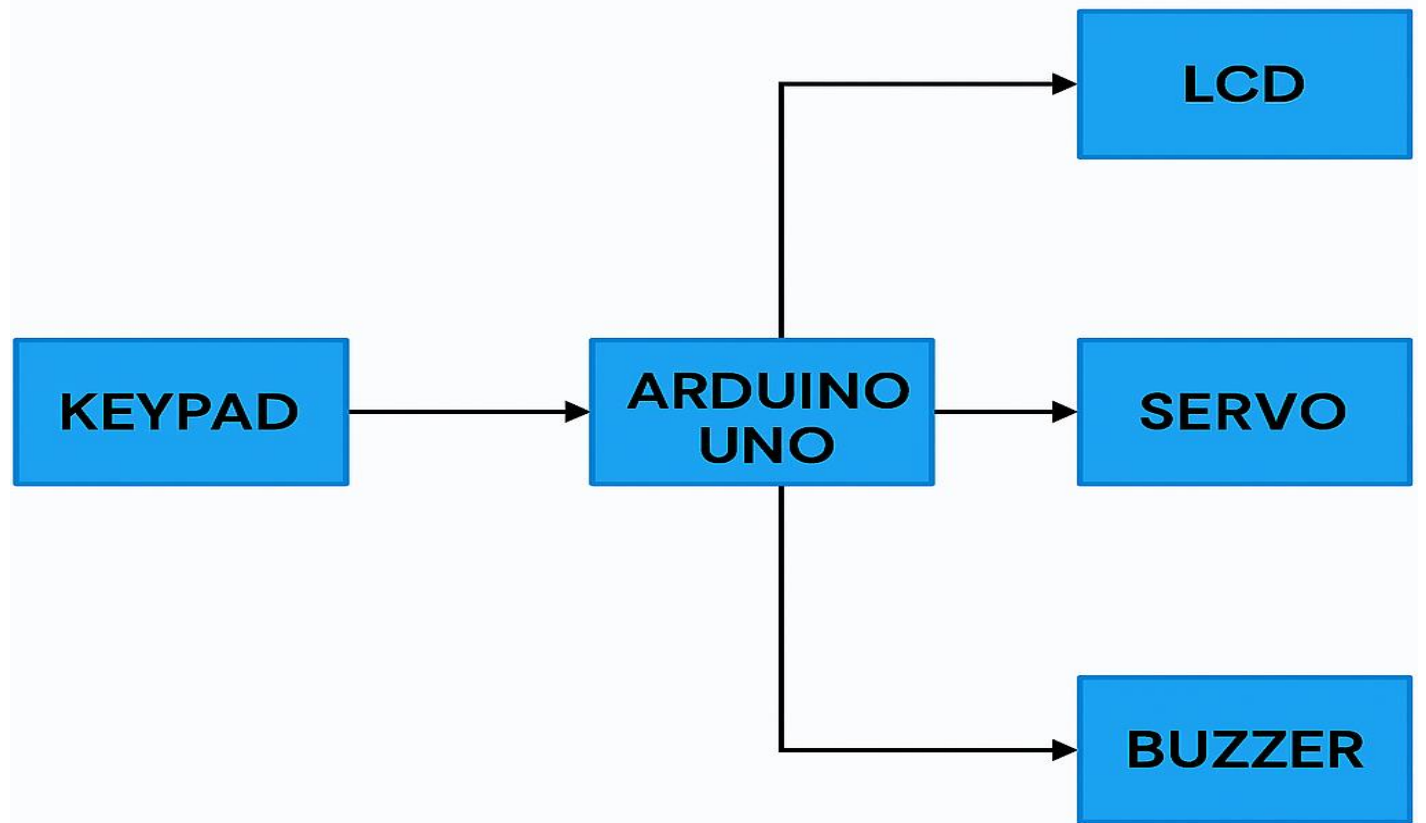
POSSIBLE OUTCOMES OF THE PROJECT :

Possible Outcomes of the Password Door Lock Project

1. **Enhanced Security for Homes and Offices:**
   This project provides a reliable and affordable method to secure doors using password protection, reducing unauthorized access and increasing safety for families and workplaces.
2. **Promotion of Smart Technology Adoption:**
   By introducing easy-to-use electronic locks, it encourages society to embrace smart and automated solutions, paving the way for more advanced home automation and security systems.
3. **Reduction in Key-related Problems:**
   Eliminates issues like lost keys, copying of physical keys, or lock picking, promoting convenience and reducing risks of theft or unauthorized entry.
4. **Awareness and Skill Development:**
   As a DIY or educational project, it helps individuals and communities learn about embedded systems, programming, and electronics, fostering innovation culture and technical skill growth in society.

PROJECT TIMELINE (GANTT CHART):

REFERENCES:

[1] P. P. Gholap and S. P. Shinde, "Arduino-Based Biometric Smart Door Lock Security System," *International Journal of Innovative Research in Science, Engineering and Technology*, vol. 9, no. 1, pp. 30–35, Jan. 2020.

[2] S. Jyoti and G. Singh, "Smart Door Locking System using IoT," *International Journal of Advanced Research in Computer Science*, vol. 11, no. 2, pp. 56–60, 2020.

[3] M. Shanthini, G. Vidya, and R. Arun, "IoT Enhanced Smart Door Locking System," in *Proc. 3rd Int. Conf. Smart System and Inventive Technology (ICSSIT)*, Tirunelveli, India, 2020, pp. 92–96, doi: 10.1109/ICSSIT48917.2020.9214288.

[4] A. Singh and R. Pal, "Design and Development of a Password-Based Door Lock System Using Arduino," *International Journal of Emerging Trends in Engineering Research*, vol. 9, no. 6, pp. 234–239, Jun. 2021.

[5] S. Panigrahi, S. Mishra, and S. K. Sahu, "Design and Development of a Low-Cost Electronic Door Locking System," in *Proc. Int. Conf. on Computing, Communication and Cyber-Security (ICCCS)*, 2021, pp. 403–411, Springer, Singapore.

Instructions:
1. There is no definite format to write the proposal, but students must follow the mentioned instructions properly.
2. Fill in the form accurately with all necessary information.
3. Make a color print on this form.
4. Figures, tables, charts, circuit diagrams, block diagrams, and wave shapes must be color printed.
5. The survey form links with the answers must be provided in the proposal form.

FOR FACULTY USE ONLY

COMMENTS BY COURSE TEACHER:

COURSE TEACHER'S NAME	COURSE TEACHER'S SIGNATURE	DATE

GROUP MEMBERS

(Maximum 6 students are permitted to carry out a single Project. However, depending on the capability of the students, 4 students may be allowed but not less than that)

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<table>
<tr><td colspan="2">

NAME: TABASSUM AKTAR SADIA

ID : 23-52427-2

PROGRAM: CSE

EMAIL: 23-52427-2@student.aiub.edu

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NAME: ISRAT JAHAN TASLIMA

ID: 23-50172-1

PROGRAM: CSE

EMAIL: 23-50172-1@student.aiub.edu

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NAME: … SHAMA ZERIN **ID :22-49210-3** **PROGRAM: CSE** **EMAIL: 22-49210-3@student.aiub.edu**	**NAME: ANKAN SAHA** **ID #: 23-50621-1** **PROGRAM: CSE** **EMAIL: 23-50621-1@student.aiub.edu**
NAME: SHEIKH ARFIN AHAMED **ID : 22-48898-3** **PROGRAM: CSE** **EMAIL: 22-48898-3@student.aiub.edu**	**NAME: …………………………………………** **ID #:………………………………** **PROGRAM: EEE/CoE/CSE** **EMAIL:**

REMARKS (for OFFICE use only)

Course Name:	Microprocessor and Embedded System	**Course Code:**	EEE 4103
Semester:	Summer 2024-2025	**Sec:**	B
Faculty Member:	Protik Parvez Sheikh		

Capstone Project Title:	**MICROPROCESSOR AND EMBEDDED SYSTEM**
Project Group No.	08

Sl #	Student ID #	Student Name	Obtained Marks
1.	23-52427-2	TABASSUM AKTAR SADIA	
2.	23-50172-1	ISRAT JAHAN TASLIMA	
3.	22-49210-3	SHAMA ZERIN	
4.	22-48898-3	SHEIKH ARFIN AHAMED	
5.	23-50621-1	ANKAN SAHA	
6.			

Assessment Materials and Marks Allocation:

COs	Assessment Materials	POIs	Marks
CO3	Course Capstone Proposal Form	P.c.2.C6	35

Assessment Rubrics:

KPIs	Excellent [2]	Proficient [1.5]	Good [1]	Acceptable [0.5]	Unacceptable [0]	No Response [0]	Secured Marks

Project Title	The title reflects an issue related to complex engineering problems showing targets and methods with possible outcomes.	The title reflects an issue related to complex engineering problems showing targets and methods but some missing issues.	The title reflects an issue related to the course capstone project but there may be some missing issues.	The title reflects an issue related to the course capstone project but is not complete or specific.	The title does not reflect any issues related to the course capstone project.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						Total Marks (2)	

KPIs	Excellent [6-7]	Proficient [4-5]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Survey	The survey developed as a process for complex engineering problems considering cultural and societal factors have superior variables, targets, measures, and the implementation process is clear and challenging for future project implementation with several possible outcomes having good impacts.	The survey developed as a process for complex engineering problems considering cultural and societal factors has good variables, targets, measures, and The implementation process is clear and challenging for future project implementation, with some possible outcomes and little impact.	The survey developed as a process for complex engineering problems considering cultural and societal factors has moderate variables, targets, measures, and The implementation process is clear and challenging for future project implementation, with a few possible outcomes and impacts.	The survey developed as a process for complex engineering problems considering cultural and societal factors has good variables, targets, measures, and The implementation process is somewhat clear for future project implementation, with very few possible outcomes and little impact.	The survey developed as a process for complex engineering problems considering cultural and societal factors has poor variables, targets, measures, and the implementation process is very unclear for future project implementation with a few possible outcomes but no impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						Total Marks (7)	

KPIs	Excellent [4]	Proficient [3]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
Aims and Objectives	Aims and objectives are written to solve complex engineering problems considering cultural and societal factors with specific targets, measurement, and implementation processes that are clear and challenging and have several possible outcomes having very good impacts.	Aims and objectives are written to solve complex engineering problems considering cultural and societal factors with general targets, measurement, and implementation processes that are not clear and challenging and have some possible outcomes having good impacts.	Aims and objectives are written to solve complex engineering problems considering a few cultural and societal factors with narrow targets; measurement, and implementation processes are clear and challenging and have a few possible outcomes having some impacts.	Aims and objectives are written to solve complex engineering problems considering cultural or societal factors with a very target; measurement and implementation processes are not clear or challenging and have little possible outcome having no impact.	Aims and objectives are written to solve complex engineering problems but do not consider cultural and societal factors with any targets; measurement, and implementation processes are not clear and challenging, and no possible outcomes have no impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						Total Marks (4)	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Literature Review	Specific formats are maintained to review and cite the literature with recent publications. Identified and analyzed the problem correctly.	Specific formats are maintained to review and cite the literature with recent publications. Identified and analyzed the problem correctly, but all issues were not addressed with relevant or intended work.	Specific formats are maintained to review and cite the literature with recent and past publications. Identified and analyzed the problem correctly, but all issues were not addressed with relevant or intended work.	Specific formats are maintained to review and cite the literature with recent and past publications. Identified but could not analyze all the problems correctly, and all issues were not addressed with relevant or intended work.	No specific formats are maintained to review and cite the literature with recent publications. Could not identify and analyze all the problems correctly, and all issues are not addressed with relevant or intended work at all.	No Response at all/ copied from others/ identical submissions with gross errors/ image file printed	
Comments						Total Marks (5)	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks

Experimental Block Diagram	The block diagram is drawn to show the connections of all the possible components or sub-systems to show their interdependence with all possible flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of all of the possible components or sub-systems to show their interdependence with a few missing flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of most of the possible components or sub-systems to show their interdependence with a few missing flows of signals from inputs to outputs.	The block diagram is drawn to show the connections of a few possible components or sub-systems to show their interdependence with some missing flow of signals from inputs to outputs.	The block diagram is not drawn to show the connections of all possible components or sub-systems to show their interdependence and flow of signals from inputs to outputs.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (5)**	

KPIs	Excellent [4]	Proficient [3]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
Possible Outcomes	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and showing measurement, and implementation processes to attain the outcomes with all possible impacts.	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and showing measurement, and implementation processes to attain the outcomes with some impacts.	Outcomes are written to achieve complex engineering problems' solutions considering cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	Outcomes are written to achieve complex engineering problems' solutions but do not consider cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	Outcomes are not written to achieve complex engineering problems' solutions do not consider cultural and societal factors and do not show measurement, and implementation processes to attain the outcomes without showing any impacts.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (4)**	

KPIs	Excellent [5]	Proficient [4]	Good [3]	Acceptable [2]	Unacceptable [1]	No Response [0]	Secured Marks
Gantt Chart	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with all work to be done.	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with a few works missing.	Specific formats are maintained to draw the Gantt chart and there is the order of workflow with some works missing.	No specific formats are maintained to draw the Gantt chart and there is little order of workflow with some works missing.	No specific formats are maintained to draw the Gantt chart and there is no order of workflow with the most important works missing.	No Response at all/ copied from others/ identical submissions with gross errors/ image file printed	
Comments						**Total Marks (5)**	

KPIs	Excellent [3]	Proficient [2.5]	Good [2]	Acceptable [1]	Unacceptable [0.5]	No Response [0]	Secured Marks
References	Specific formats are maintained to write references, and all are recently published journal and conference papers having no missing information.	Specific formats are maintained to write the references, and all are journal and conference papers, but some old papers have missing information.	No specific formats are maintained to write the references, and many are internet sources with several missing information and very old references.	No specific formats are maintained to write the references and most of them are internet sources with missing information.	No specific formats are maintained to write the references, and all are internet sources with missing information.	No Response at all/ copied from others /identical submissions with gross errors/ image file printed	
Comments						**Total Marks (3)**	