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COIN BASED MOBILE CHARGING SYSTEM USING MATLAB

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1.ABSTRACT :

The Coin-based Mobile Charging System is an interactive platform that allows users to charge their mobile devices by inserting coins of different values (1, 5, or 10 rupees). The system supports both new user registration and existing user login with unique registration IDs. Upon login, users can perform actions such as inserting coins, checking their balance, and using their balance to charge their mobile phones based on predefined coin-to-charging-minute ratios. The system provides a user-friendly interface to manage transactions, ensuring that users can easily track their remaining balance and successfully charge their devices. The program also supports multiple users, each with their own balance, and ensures secure login through unique registration IDs.

Keywords : Mobile charging ,Coin-operated System, Portable charger, User convenience, Public spaces.

2 .INTRODUCTION

In the era of digital connectivity, mobile phones have become indispensable tools for daily life—serving not only as means of communication, but also for navigation, digital transactions, entertainment, social networking, and emergency access. However, as smartphone usage intensifies, battery consumption has increased significantly, often outpacing the device's ability to last through a full day of active use. This issue becomes especially critical when users are traveling, commuting, or spending extended time outdoors where charging options may be limited or unavailable. Consequently, there is a growing demand for reliable and convenient public mobile charging stations in places such as bus stops, railway stations, parks, malls, and other public areas.

The Coin-based Mobile Charging System is an innovative solution designed to address the growing need for accessible and efficient mobile charging facilities in public spaces. As mobile phones become integral to daily life, the demand for reliable charging options has increased, particularly in areas where traditional power sources are unavailable or unreliable. This system allows users to charge their devices by inserting coins, providing a convenient and self-sustaining model for public charging stations.

The system operates by accepting coins of various denominations, which correspond to specific charging durations. Upon coin insertion, the system activates a charging mechanism that supplies power to the user's device for the designated time. This approach ensures that users have access to charging facilities without the need for complex payment methods or subscriptions.

This project, developed using MATLAB, simulates the core functionalities of the Coin-based Mobile Charging System, including user registration, coin insertion, balance management, and charging duration allocation. The simulation serves as a foundational model for the development of physical charging stations, demonstrating the feasibility and effectiveness of the coin-operated charging concept in public settings.

3. LITERATURE SURVEY

1. Simulation of Automatic Power Control System Using MATLAB - [Ali et al.(2014)]

The study by Ali et al. (2014) presents a MATLAB/Simulink-based simulation of an automatic power control system designed to manage the distribution of electrical energy to various outputs based on programmed logic. This system integrates key features such as timed control, switching circuits, and safety mechanisms, ensuring efficient and safe energy distribution. Although the original model does not incorporate payment input, its structural components are highly applicable to mobile charging systems. By adapting the simulation model to include a payment detection mechanism, the system

can activate power delivery upon receiving valid payment, supply power for a predetermined duration thereby safeguarding both the user device and the charging infrastructure.

2. Smart Charging Mechanisms - [Sharma & Gupta, 2020]

Sharma & Gupta (2020) developed an advanced coin-based mobile charging system that integrates essential features such as charging time control, over-voltage protection, and digital displays. Their design utilizes a microcontroller to manage power switching and timing, ensuring efficient energy distribution. The system employs voltage regulation circuits to maintain optimal charging conditions, preventing battery overcharging and enhancing safety. Additionally, the incorporation of coin validation algorithms ensures that power is supplied only after successful payment, preventing unauthorized usage. The digital display provides real-time feedback to users, displaying information such as remaining charging time and battery status, thereby improving user experience. Furthermore, the use of MATLAB simulations allows for the testing and optimization of control algorithms.

3. ***Automatic Timer-Based Mobile Charging System with two additional points included – [Pawar et al. (2017)]***

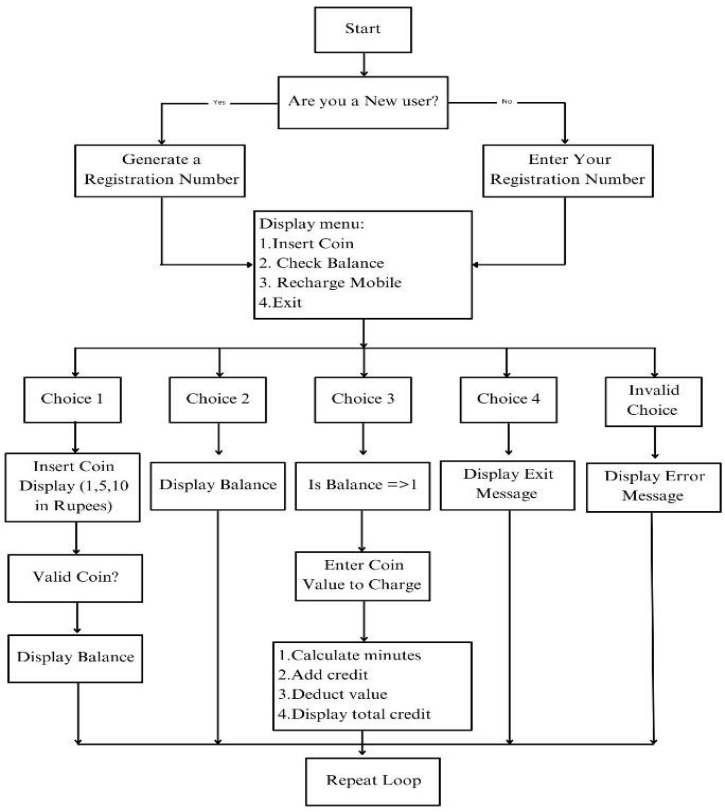
Pawar et al. (2017) describe a microcontroller-based mobile charging system that activates for a fixed period once a user initiates the process by pressing a button. Although the activation method is not coin-based, the study emphasizes the use of timer circuits and relay-based control to manage power delivery, which closely aligns with the logic needed in coin-operated systems. The setup includes an LCD display to show the remaining charging time, providing user feedback during

operation. Additionally, the system incorporates basic protection features, such as overcurrent and short-circuit protection, to ensure safe operation. The design is straightforward, cost-effective, and suitable for public or shared charging stations.

4. METHODOLOGY

The Coin-Based Mobile Charging System is a MATLAB-based simulation designed to emulate the functionality of a real-world coin-operated mobile charging station. This system enables users to insert coins of denominations Rs.1, Rs.5, and Rs.10, corresponding to charging durations of 2, 7, and 15 minutes, respectively. The simulation features a user-friendly, menu-driven interface that allows users to insert coins, check their balance, and initiate the charging process. Input validation ensures that only valid coin denominations are accepted, and a real-time countdown simulates the charging duration. Additionally, the system maintains a transaction log to record coin inputs and charging sessions. Developed using MATLAB, this simulation provides a cost-effective and efficient platform for testing and refining the system's logic before transitioning to hardware development using microcontrollers or embedded platforms. The modular design of the simulation allows for easy adaptation to various hardware implementations, facilitating the development of a fully functional coin-operated mobile charging station.

5. SYSTEM ARCHITECTURE :



6. SYSTEM : OVERVIEW

Accepted coin denominations: Rs.1, Rs.5, Rs.10.
Charging time for coins:
Rs.1 → 2 minutes
Rs.5 → 7 minutes
Rs.10 → 15 minutes
Users may insert multiple coins in a session.
Invalid coin detection is simulated.
Time is calculated cumulatively and displayed after every charge.
The system follows a simple menu-based approach using console inputs. The architecture is logically divided into five stages:
1. User Interaction Flow (New User Registration , Existing User Login)
2. Coin Insertion and Validation
3. Balance and Credit Mapping
4. Charging Time Calculation
5. Display and Charging Simulation.

7. ALGORITHM

Step 1: Start Main Simulation Loop
Display welcome message
Prompt user: "Are you a new user? (y/n or q to quit)"
Step 2:Handle User Input
If user chooses 'q', exit the program
If user chooses 'y', proceed to user registration
If user chooses 'n', proceed to user login
Step 3: User Registration
Generate a unique registration ID
Add new user to the database
Step 4: User Login
Prompt user to enter registration ID
If ID is valid, display balance and proceed to user session
If ID is invalid, prompt for re-entry
Step 5 :Display options
Insert Coin
Check Balance
Charge Mobile
Exit to Main Menu
Step 6: Handle Menu Selection
If "Insert Coin" is selected:
Prompt user for coin value (1, 5, or 10)
Validate coin value
If valid, update balance and display success message
If invalid, display error message
If "Check Balance" is selected:
Display current balance
If "Charge Mobile" is selected:
Prompt user for amount to use for charging
Deduct used amount from balance
Display allocated charging time
If invalid, display error message
If "Exit to Main Menu" is selected:
Display remaining balance
Return to main menu
Step 7:Repeat or Exit
Repeat Step 6 until user selects "Exit to Main Menu"
Exit program when user chooses 'q' in main menu
Step 8:End Program

8. OUTPUT AND DISPLAY

TEST CASE 1:

Welcome to the Coin-based Mobile Charging System

Are you a new user? (yes/no or quit): yes
Registration successful. Your registration ID is: REG8332
Coin-based Mobile Charging System - User:REG8332

TEST CASE 2:

Welcome to the Coin-based Mobile Charging System
Are you a new user? (yes/no or quit): no
Enter your registration ID: REG8332
Welcome back, User REG8332! Your balance is 5 rupees.
Coin-based Mobile Charging System

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1. Insert Coin
2. Check Balance
3. Charge Mobile
4. Exit

Enter your choice: 1

Enter coin value (1, 5, or 10): 5

Coin inserted successfully. Balance: 10

Enter your choice: 3

Your current balance is 10. Enter how many rupees you want to use for charging: 5
Charging: 7 minutes added for 5 rupee coin(s).
Mobile charged successfully. Total charging credit: 7 minutes.

9. MATLAB IMPLEMENTATION

Main Control Loop: The simulation runs within a while true loop, prompting users with options: Insert Coin, Check Balance, Charge Mobile, and Exit.

Charging Credit Calculation: Balance is reduced by determining how many coins of each type can be used and calculating total charging time accordingly (from largest coin down to smallest).

System Flow: The system allows new users to register with a unique ID, existing users to log in, and both to insert coins to accumulate balance; users can check their balance, initiate mobile charging by selecting the amount to use, which deducts the corresponding balance and allocates charging time, and exit the system, with the remaining balance displayed upon exit.

10. ADVANTAGES

1. Simple Interface: Easy to understand and simulate.
2. Scalable Design: Can be extended to GUI or hardware platforms.
3. Realistic Simulation: Reflects real-life coin-based systems.
4. Cost-Effective: No hardware required for initial testing.

11. APPLICATIONS

1. Railway stations
2. Airports and metro stations
3. Malls and public lounge
4. Hostels and campuses
5. Parks and community centers

12. CONCLUSION

This project successfully demonstrates the core functionality of a coin-based mobile charging system using MATLAB. It handles coin recognition, charging time allocation, and balance management through a simple user interface. The simulation offers an effective base for further development into embedded system designs using microcontrollers like Arduino or Raspberry Pi. Future work can involve adding a GUI using MATLAB App Designer or integrating with real coin acceptors for physical implementation.

IX. REFERENCE JOURNAL

[1]S. Manikandan et al., "Coin Based Mobile Charger", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 5, Issue 3, March 2016.
A similar real-world project, helpful for system design and working principle.
[2] R. Chaitanya et al.,"Coin Based Universal Mobile Battery Charger", International Journal of Research in Engineering and Technology (IJRET), 2014. Describes hardware aspects and flow of the charging system.

12. REFERENCES

[1] S.B.Shridevi, A.Sai.Suneel, K.Nalini "Coin based mobile charger using Solar tracking system", IJAREC, pp 741-745,Sept. 2013.
[2] K. M. Trautz, P. P. Jenkins, R. J. Walters, D. Scheiman, R. Hoheisel, R.Tatavarti, R. Chan, H. Miyamoto, J. G. Adams, V. C. Elarde, and J.Grimsley "Mobile Solar Power", IEEE, pp 535-541,Jan. 2013.
[3] F. Boico, Brad L. K. Shujaee, "Solar Battery Chargers for NiMH Batteries" IEEE Trans. Power Electronics, vol. 22, no. 5, pp 1600-1609, Sept. 2007.
[4] J. Eakburanawat, I. Boonyaroonate, "Development of a thermoelectric battery-charger with microcontroller based maximum power point tracking technique", Applied Energy 83,pp- 687–704 , ELSEVIER, 2006.
[5] Dan Dai, Jing Liu. "Design of a Practical Human Powered Contactless Charger for Cellphone" IEEE Trans. Consumer Electronics, pp 11601165Aug. 2013.
[6] Y. Yadav, A. Sood, "A Comparative Survey on Various Coin Recognition Systems Based on Image Processing", pp- 3272-3277, 11 Nov. 2013, IJECS.
[7] A Hefner, A. Magdaleno, "Cell Phone Charger for the DC House Project", California Polytechnic State University, 2012.
[8] S. Sharma, R. Kaur, "Design and Simulation of Coin Based Mobile Charger Using MATLAB Simulink", International Journal of Scientific & Engineering Research (IJSER), Vol. 9, Issue 6, pp. 1232–1237, June 2018.Focuses on simulating such systems using Simulink blocks and control logic.
[9] N. Karthik, R. Venkatesh, "Coin Based Mobile Charger using Arduino", International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), Vol. 6, Issue 3, pp. 4457–4461, March 2017.
[10] G. Stojanovic, A. Milinkovic, "Contactless Energy Transfer System for Charging Mobile Devices", Journal of Electrical Engineering, Vol. 64, No. 2, pp. 83–88, 2013.