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PrintBuddy: A Smart Assignment Printing and Delivery System

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Abstract
In the modern academic environment, students frequently encounter difficulties in completing assignments within strict deadlines. One of the major challenges faced by students is the lack of quick and easy access to printing facilities. This issue becomes more critical for students residing in hostels or rented accommodations, where printing services are not readily available. As a result, students often waste valuable time searching for print shops, especially during last-minute submissions. The proposed system, Last Minute Print (PrintBuddy), is designed to provide an efficient and user-friendly solution for this problem. It is a web-based application that allows users to upload documents, select printing preferences, and place orders online. This eliminates the need to physically visit printing shops and significantly reduces the time required for printing tasks.
The system is developed using modern technologies such as Node.js for backend processing, MongoDB for data storage, and Firebase Authentication for secure login functionality. These technologies ensure smooth performance, secure access, and efficient handling of user data. Additionally, the application includes a shopkeeper dashboard that enables vendors to manage orders, download documents, and update their status. The main goal of this system is to simplify the printing process and provide a fast and reliable service to students. By integrating digital technologies with local printing services, the system enhances convenience and improves productivity. It also creates a structured workflow for shopkeepers, making order management easier and more organized. Overall, the Last Minute Print system demonstrates how a simple full-stack application can solve real-world problems effectively. It has the potential to improve academic workflows and can be expanded into a large-scale service platform in the future.

Keywords: PrintBuddy, Online Printing, Assignment Delivery, Student Services, Full Stack Development, MongoDB, Node.js, Firebase Authentication, File Upload System

1. Introduction

In today's fast-paced world, students are required to complete academic tasks within limited time. Assignments, reports, and other documents are an essential part of education, and most institutions require them in printed format. Despite the availability of digital tools, printing remains a necessary step in the submission process. However, accessing printing facilities is not always convenient for students.

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Many students, especially those living in hostels or paying guest accommodations, do not have personal printers. They depend on nearby printing shops, which may not always be accessible. During peak academic periods, these shops are often crowded, leading to delays and inconvenience. This problem becomes more severe when students complete their work at the last moment and need urgent printing services.

The Last Minute Print system is developed to address these challenges by providing an online platform for printing services. Instead of visiting a shop, users can upload their documents through a web application and request printing services. This system connects students with local printing vendors, allowing them to complete the printing process quickly and efficiently.

The application focuses on simplicity and usability, ensuring that even non-technical users can easily navigate the system. It provides features such as file upload, price calculation, order placement, and status tracking. The integration of Firebase Authentication ensures secure login, while the backend system handles data processing and storage efficiently.

The objective of this project is to create a practical and scalable solution that reduces time consumption and improves user experience. By digitizing the printing process, the system aims to make academic workflows more efficient and accessible for students.

2. Objective of the Study

- To design a user-friendly system for online assignment printing
- To minimize time and effort required for printing tasks
- To provide a fast and reliable delivery mechanism
- To enable shopkeepers to manage orders digitally

Scope of the Work

The system is designed for college-level usage but can be expanded to cities, coaching institutes, and commercial printing businesses. It can also evolve into a multi-vendor platform.

3. Literature Review

The concept of online service platforms has gained significant attention in recent years, as they provide convenience and efficiency to users. Traditional printing services rely on manual processes where users must visit a shop, submit their documents, and wait for printing. This method is time-consuming and not suitable for urgent requirements.

Several online printing platforms have been developed, but most of them focus on bulk printing or commercial use rather than individual student needs. These systems often involve longer processing times and do not provide immediate solutions for last-minute requirements. Additionally, many of these platforms lack user-friendly interfaces and quick delivery options.

Research studies on digital service systems indicate that integrating online ordering with local service providers can significantly improve efficiency. By reducing physical interaction and automating processes, such systems can provide faster and more reliable services. However, there is still a lack of platforms specifically designed for academic printing needs.

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The PrintBuddy system is designed to overcome these limitations by providing a simple and fast solution tailored for students. It combines the advantages of online platforms with the accessibility of local printing services. The system focuses on ease of use, quick processing, and real-time order management.

This review highlights the gap in existing solutions and emphasizes the need for a system like Last Minute Print. By addressing the specific challenges faced by students, the proposed system provides a practical and effective solution.

4. Problem Statement

In the current academic environment, students are required to submit assignments and documents within strict deadlines, most of which need to be in printed form. However, a significant number of students face difficulties in accessing printing facilities due to the unavailability of nearby print shops, especially for those residing in hostels or paying guest accommodations. This creates inconvenience and delays in completing academic tasks.

Another major issue is the time constraint faced by students. Many students tend to complete their assignments at the last moment, which increases the urgency for quick printing services. Traditional printing methods require students to physically visit printing shops, wait in queues, and spend additional time and effort, which is not always feasible under tight deadlines.

Furthermore, existing printing services lack digital integration and do not provide features such as online file submission, instant order placement, or home delivery. This results in an inefficient and time-consuming process that does not meet the needs of modern students.

Therefore, there is a need for a smart and efficient system that allows students to upload documents online, select printing options, and receive printed copies quickly without physical effort. The proposed Last Minute Print (PrintBuddy) system aims to address these challenges by providing a user-friendly, fast, and reliable solution for assignment and document printing.

5. Proposed Methodology / Model

The proposed system follows a client-server architecture. The frontend interacts with the backend via REST APIs. The backend processes requests, stores data in the database, and manages file uploads.

System Architecture / Design:

- Frontend: HTML, CSS, JavaScript (UI and user interaction)
- Backend: Node.js with Express (API handling)
- Database: MongoDB (data storage)
- Authentication: Firebase (secure login)
- File Handling: Multer (upload and storage)

System Architecture Diagram:

The system follows a client-server architecture. Below is the conceptual design:

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[Student/User] → [Frontend (HTML, CSS, JS)] → [Backend (Node.js + Express)] → [MongoDB Database] ↓ [File Storage (Uploads Folder)] ↓ [Shopkeeper Dashboard]
Explanation:

- The user interacts with the frontend to upload files and place orders.
- The backend processes requests and stores data.
- MongoDB stores order details.
- Uploaded files are stored locally in the uploads folder.
- Shopkeeper accesses orders via dashboard.

Workflow:

1. User logs in using Firebase authentication
2. Uploads assignment file
3. Selects print options and confirms order
4. Backend stores order and file
5. Shopkeeper views order and downloads file
6. Status is updated and shown to user

Algorithms / Techniques Used:

- Price Calculation: pages × cost per page
- File Upload Handling using Multer
- CRUD operations for order management
- REST API communication between frontend and backend

6. Implementation

The system was implemented using modern web technologies. The frontend was built using HTML, CSS, and JavaScript for simplicity and responsiveness. The backend was developed using Node.js and Express framework.

Tools & Technologies

- Visual Studio Code (Development Environment)
- Node.js (Backend runtime)
- Express.js (Server framework)
- MongoDB (Database)
- Firebase Authentication (User login)
- Multer (File upload handling)

The application consists of multiple modules including login system, student dashboard, shopkeeper dashboard, and order management system.

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7. Results and Discussion

The system was tested in a simulated environment. Results show that users can successfully upload files, place orders, and receive confirmation. Shopkeepers can view orders, download documents, and update order status.

Output Screens

- Login Page (Firebase Authentication)
- Student Dashboard (Upload and order placement)
- Payment Page (Demo interface)
- Shopkeeper Dashboard (Order management)

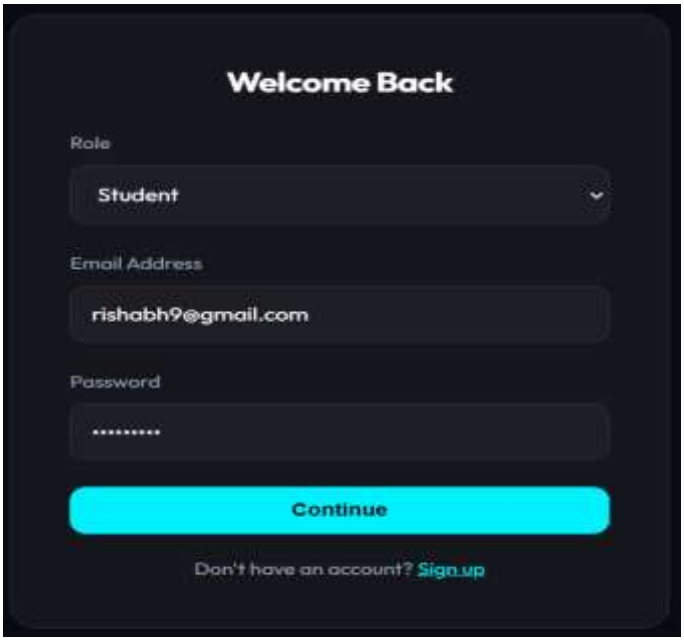
Comparison with Traditional System

S. No.	Feature	Description
1	Payment Integration	UPI, Cards, Wallets
2	Mobile App	Android & iOS support
3	Real-time Tracking	Track order status live
4	Notifications	SMS/Email alerts
5	Multi-location	Support multiple cities

8. Page Description

1. Login Page

The login page allows users to register and log in using email and password via Firebase Authentication. It includes role selection (student or shopkeeper).



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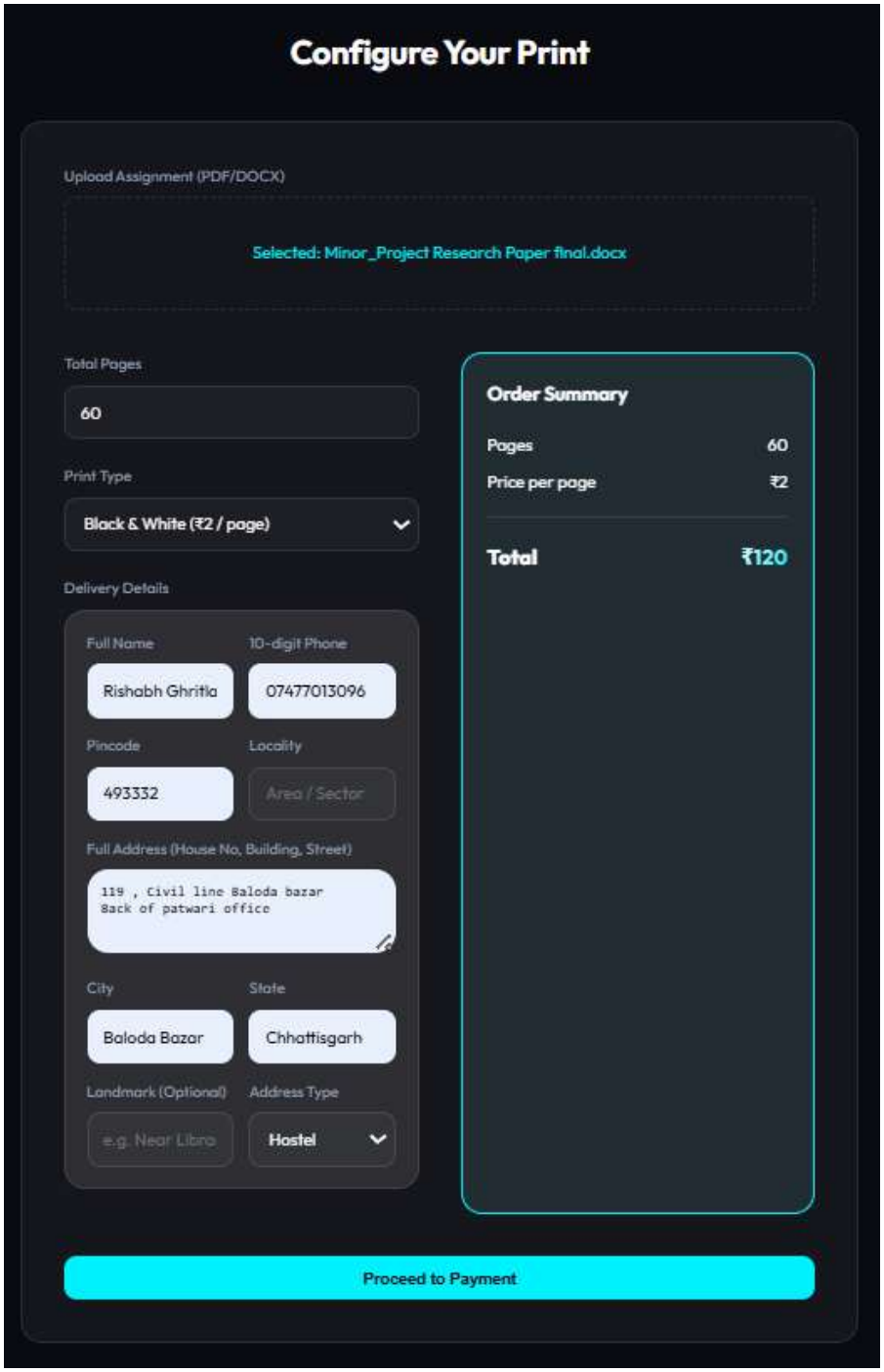
2. Student Dashboard

The student dashboard provides options to upload assignment files, select number of pages, choose print type, and place orders. It also displays calculated price.



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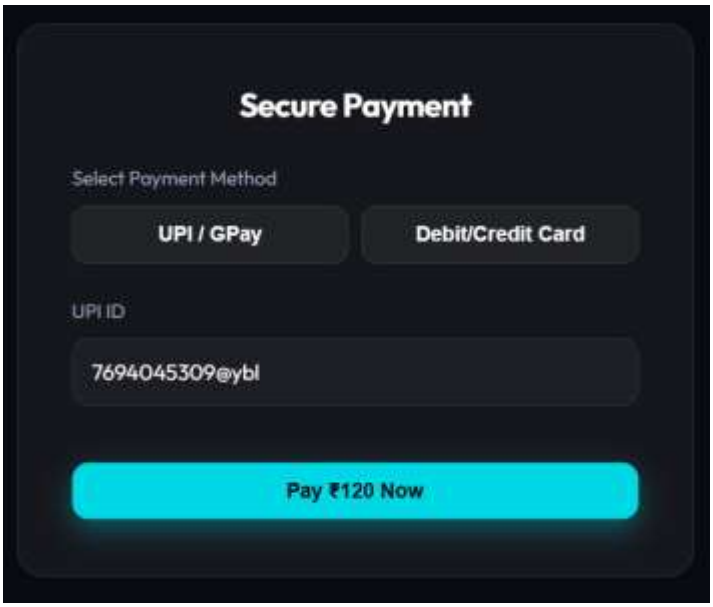
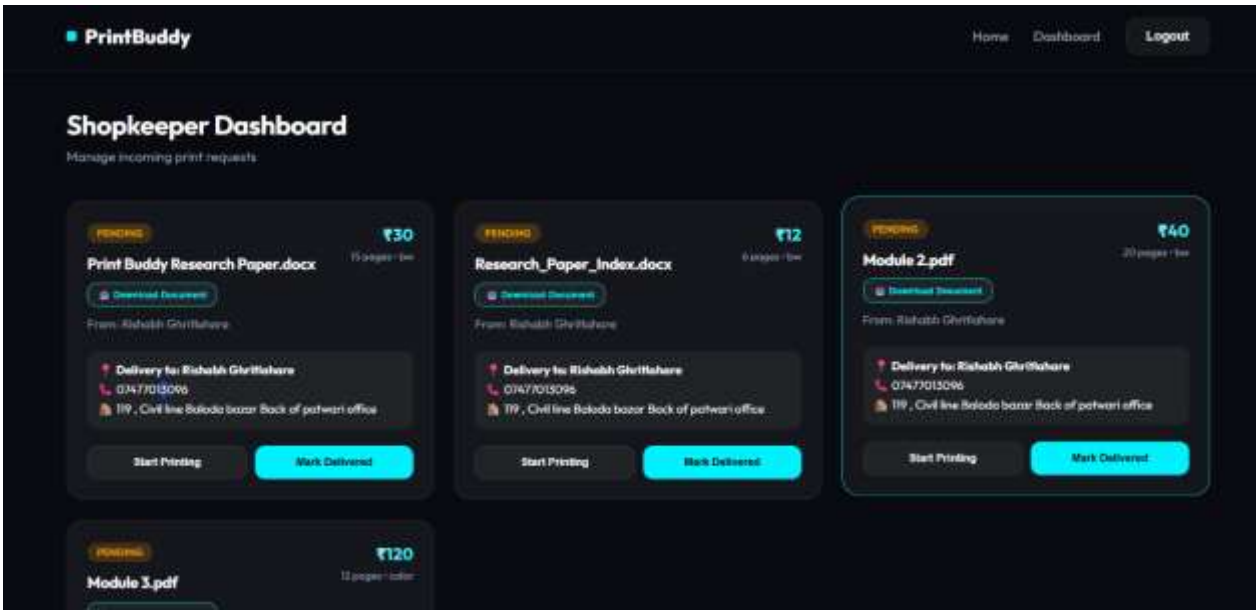
3. Payment Page

The payment page shows the total amount and provides options like UPI and card payment (demo implementation). It confirms payment before order processing.



4. Shopkeeper Dashboard

The shopkeeper dashboard displays all incoming orders with details such as pages, price, and status. It includes options to download files and update order status.



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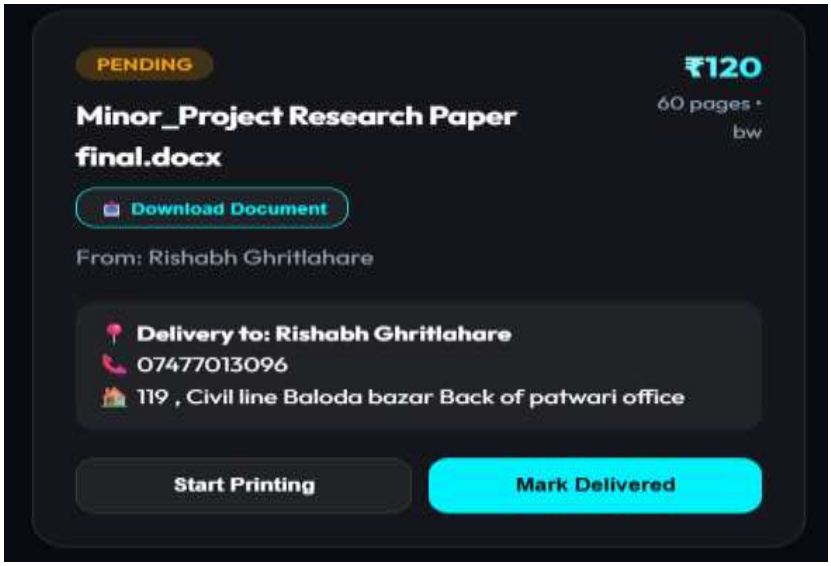
5. Order Processing Screen

This screen shows real-time updates such as Pending, Printing, and Delivered. It helps in tracking the progress of each order.



9. Performance Analysis

- Fast response time for API requests
- Efficient file handling for small to medium files
- Smooth user experience on desktop browsers

The system performs well for small-scale deployments and can be optimized further for large-scale usage.

10. Testing and Validation

The application was tested using different scenarios:

- User registration and login
- File upload functionality
- Order creation and storage
- Order retrieval for shopkeeper
- Status update functionality

All modules were validated and found to be working correctly. Minor UI improvements can enhance usability further.

11. Conclusion

The Last Minute Print (PrintBuddy) system provides an effective and practical solution to one of the most common problems faced by students, which is the difficulty in printing assignments on time. In the current academic environment, where deadlines are strict and time is limited, students often struggle to find nearby printing facilities, especially during last-minute submissions. This

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project successfully addresses these challenges by offering a digital platform that simplifies the entire printing process.

The system allows users to upload documents, select printing preferences, and place orders from their devices without the need to physically visit a printing shop. This not only saves time but also reduces effort and stress. The integration of modern technologies such as Node.js, MongoDB, and Firebase Authentication ensures that the system is efficient, secure, and easy to use. The inclusion of a shopkeeper dashboard further enhances the functionality by enabling vendors to manage orders systematically and update their status in real time. One of the key strengths of this system is its simplicity and user-friendly interface, which makes it accessible even to non-technical users.

The application demonstrates how full-stack web development can be used to create real-world solutions that directly benefit users. It also highlights the importance of digital transformation in improving traditional services such as printing. Overall, the project meets its objectives by providing a fast, reliable, and convenient solution for assignment and document printing. It has the potential to be expanded into a larger platform with additional features such as payment integration, mobile applications, and real-time tracking. The system not only improves productivity for students but also creates new opportunities for local printing businesses.

12. Future Scope

The system can be enhanced with:

- Real payment gateway integration (UPI, cards)
- Mobile application development (Android/iOS)
- Real-time delivery tracking
- Notification system (SMS/Email)
- Multi-location expansion

These improvements can transform PrintBuddy into a scalable startup solution.

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