IOT-enabled Dhobi Connect: A seamless Integration Platform Linking Customers with Laundry Services

[1]Dr. Anish John Paul M, [2]Abishek Joel G M , [3] Aron Carter Rajesh Singh, [4]Raghul R S, [5]Jacob Samas J
[1]Assistant Professor, Mar Ephraem College of Engineering and Technology, Elavuvilai
[2,3,4,5]Student, Mar Ephraem College of Engineering and Technology, Elavuvilai

Abstract: The present invention relates to a solar powered smart ironing cart which provides customer service at affordable price, improve customer satisfaction by providing quick service and improve the economic status of the dhobis. The system includes an ironing floor for placing the iron box, An adjustable solar roof to provide adequate power and shade, Advanced control strategy with power backup to control the solar powered ironing cart, Sliding chair to avoid prolonged standing, storage racks to keep clothes, iron box and battery, Special lever arrangement for moving the cart in curved path along with the braking system, Automated Sensor based rain guard system to safeguard the cloth from black spot during rainy season and mobile application with gadget in regional languages to ease accessibility between customer ad dhobi.

Index Terms—Cart Fabrication, Mobile Applications, Solar Charge Controller, Flask, Python, MOSFET, Protection Components, Automatic Rain Shutter, ESP32, Intensity, MPPT, Converter, Solar Panel, LCD, Battery, Utility and Rain Guard System..

I. INTRODUCTION

In recent years, the technology have been a growing demand for automated systems that enhance convenience and safety. Innovations in sustainability and technology are continuously shaping the way we address everyday challenges.

Among these challenges, laundry stands as a fundamental chore for many households, yet it often comes with its own set of hurdles, especially in areas with unpredictable weather patterns.

However, imagine a solution that not only simplifies the laundry process but also incorporates renewable energy and smart functionality to adapt to varying weather conditions. Enter the Solar Dhobi Cart with Automatic Rain Sensing Rolling Shutter. Harnessing the power of the sun, the Solar Dhobi Cart utilizes solar panels to generate clean energy, reducing reliance on conventional power sources and minimizing environmental impact. This not only makes the cart eco-friendly but also cost-effective in the long run, providing a sustainable solution for communities seeking to reduce their carbon footprint. The ingenuity of this cart lies in its automatic rain sensing rolling shutter mechanism. Traditional laundry carts are susceptible to damage from sudden downpours, leading to inconvenience and potential loss.

However, with the incorporation of smart sensors, the Solar Dhobi Cart anticipates changes in weather conditions and seamlessly activates its rolling shutter to protect the laundry inside. This innovative feature ensures that laundry remains dry and safe, irrespective of unexpected rain showers, enhancing convenience and peace of mind for users. Furthermore, the Solar Dhobi Cart is designed with mobility and usability in mind. Its ergonomic layout facilitates easy loading and unloading of laundry, streamlining the entire process for users. Whether it's navigating through narrow alleyways or maneuvering around obstacles, this cart's agile design ensures accessibility even in challenging This groundbreaking concept integrates solar power and intelligent design to revolutionize the traditional laundry experience.

With a keen focus on sustainability and efficiency, this innovative cart offers a glimpse into the future of household chores. Beyond its practical functionality, the Solar Dhobi Cart symbolizes a shift towards sustainable living andtechnological advancement. By embracing renewable energy and smart automation, it exemplifies how innovation can enhance everyday tasks while minimizing ecological impact. Solar

Dhobi Cart with Automatic Rain Sensing Rolling Shutter embodies the fusion of sustainability, efficiency, and technology. As communities strive towards a greener future, innovations like these pave the way for a more sustainable and interconnected world, one laundry load at a time.

On such application is the automatic control of rolling shutters, which provide protection against environmental conditions such as rain. we will explore the concept of rain sensing automatic rolling shutters and discuss how NodeMCU, an open source IOT platform, can be utilized to create an intelligent and efficient system. Rain sensing automatic rolling shutters offer a significant improvement over traditional manual or time based control systems. Mobile Applications can be done by python and GPS System location.

II.LITERATURE REVIEW

This literature review systematically examines existing research on IoT applications in the laundry service industry. It identifies key technologies, challenges, and opportunities associated with implementing IoT-enabled platforms for seamless customer engagement and operational efficiency[1]. Focusing on customer experience enhancement, this review explores recent developments in IoT technologies applied to laundry services. It discusses how IoT-enabled platforms improve convenience, reliability, and personalization for customers while optimizing service delivery for laundry operators[2]. Offering a comprehensive overview, this literature review delves into the various ways IoT drives innovation in laundry services. It covers topics such as machine connectivity, predictive maintenance, data analytics, and customer engagement, highlighting the transformative potential of IoT in this sector[3]. Focused on the practical aspects of implementation, this review identifies challenges and opportunities laundry service businesses face when adopting IoT solutions. It discusses factors such as infrastructure requirements, cost considerations, regulatory compliance, and workforce training needs[4]. This literature review explores user perspectives and acceptance factors related to IoT-enabled laundry platforms. It investigates how customers perceive and interact with smart laundry services, examining factors influencing adoption, satisfaction, and loyalty[5]. This review explores the sustainability implications of integrating IoT technology into laundry services. It investigates how IoT-enabled platforms contribute to energy efficiency, water conservation, waste reduction, and overall environmental impact within the context of sustainable business practices[6]. This literature review examines the implications of IoT integration in shared laundry spaces, such as apartment complexes, co-living facilities, and laundromats. It discusses the unique challenges and opportunities for implementing IoT-enabled platforms in multi-user environments[7]. This literature review examines IoT-driven business models adopted by laundry service providers. It investigates innovative strategies such as subscription-based models, pay-per-use pricing, value-added services, and partnerships with IoT technology vendors[8].

III. PROPOSED SOLUTION

The solar dhobi cart comprises of solar panel, cart, mppt charge controller , battery, and loads.

A. Solar Charge Controller: Solar Charge Controller is also known as solar regualator, is basically a solar battery charger connected between solar panels and the battery. Its job is to regulate the battery charging process and ensure the batterry is correctly charged, or more importantly, not over-charged.
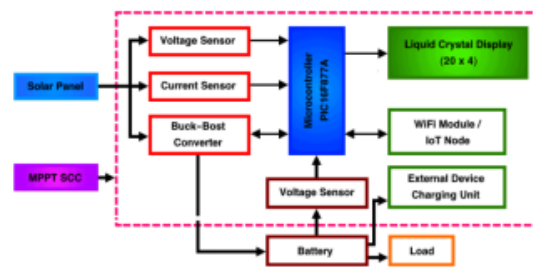

Fig 1: Block diagram of solar charge controller

B. Integration of cart Fabrication: Ironing cart, which uses solar panels to power a steam iron box. This can be powered by pre-charged batteries, electricity or diesel-powered generator in the absence of sunlight. The most important benefit of solar ironing cart is that it eliminates the need of coal for ironing. The vendors can move around and offer services at doorstep for

increasing their daily earning. For earning extra income, the ironing cart can be fitted with a coin-operated GSM PCO, USB charging points and mobile recharging.

C.Automatic Rain Shutter: The design of the automatic rain shutter and it closes automatically by sensing rain droplets. The block diagram of automatic rain shutter. The major blocks of the block diagram are Node MCU, Rain sensor module, Synchronous Motor, V8 cable, and adapter. design of the automatic rain shutter and it closes automatically by sensing rain droplets. The figure 4.1 represents the block diagram of automatic rain shutter. The major blocks of the block diagram are Node MCU, Rain sensor module, Synchronous Motor, V8 cable, and adapter.

SERIAL NUMBER	COMPONENT	QUANTITY
1	Node MCU ESP32	1
2	4 Channel 5v 10A Relay	1
3	Rain sensor Module	1
4	Synchronous motor	1
5	Adapter	1
6	Connecting Wires	As Required

Fig 2: Components of RSM

A synchronous motor is one in which the rotor normally rotates at the same speed as the revolving field in the machine. The stator is similar to that of an induction machine consisting of a cylindrical iron frame with windings, usually three-phase, located in slots around the inner periphery. The purpose of rain sensor module and relay in an automatic rain rolling shutter is to detect rain and control the operation of the motorized rolling shutter system. The rain sensor module detects the rain, while the relay acts as a switch to activate or deactivate the motor based on the rain sensor's input. By integrating rain sensor module and relay into the automatic rain rolling shutter system, the shutter can respond autonomously to changes weather conditions. It eliminates the need for manual intervention, providing convenience, protection against rain, and efficient operation of the rolling shutter.

D. Mobile Application: Mobile application connect the dhobi with the customers through the mobile app. API is a method where your app connects the database layer like a web service or cloud function.it can be programmed through python and Django.

E. Sliding Chair: Sliding chair is to avoid the prolonged standing of the dhobi for an long time.

F. Working: The system consist of controller, Rain sensor modules, and Rolling shutter motor. Rain sensor module is fixed on every side of the cart. The rain sensor detects the rain level continuously, the signal send to the central control unit or a micro controller that process the information. The control signal analyse the signal to determine the amount of rainfall. Based on the rainfall intensity or a pre-determined threshold value, the control unit sends the command to the motorized rolling shutter to close. The command activates the rolling shutter mechanism. As the rolling shutter closes, it forms a barrier that prevents the rainwater from entering to the protected area.

IV. FIGURES

Fig 3: Cart Fabrication

V. RESULTS AND DISCUSSION

The IOT-enabled platform connecting laundry services with customers provides User Adoption- The mobile application garnered significant user adoption, with an increasing number of customers utilizing the platform to schedule laundry services remotely. Improved Efficiency- Integration of IOT devices led to improved efficiency in laundry operations by

enabling real-time monitoring of machine usage, reducing downtime, and facilitating proactive maintenance. Enhanced Customer Experience: Customers appreciated the convenience of being able to monitor their laundry remotely, receive timely notifications, and customize their preferences through the application. Revenue Growth: The platform contributed to revenue growth for laundry service providers by attracting new customers, increasing service frequency through subscription options, and optimizing machine utilization.

V.CONCLUSION

In conclusion, the development and deployment of the IOT-enabled platform for connecting laundry services with customers represent a significant milestone in the evolution of the laundry industry. By leveraging cutting-edge technology and innovative solutions, this project has successfully addressed key challenges faced by both customers and service providers. The platform has delivered tangible benefits, including, Customers can now schedule laundry services at their convenience, monitor the progress of their laundry remotely, and receive timely updates, leading to a seamless and hassle-free experience, Optimized Operation IOT integration has enabled laundry service providers to optimize machine usage, improve maintenance efficiency, and enhance overall operational effectiveness, resulting in reduced costs and increased productivity. The user-friendly interface, personalized customization options.

ACKNOWLEDGEMENT

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APPENDIX(PROGRAM)

```
int b=0;
void setup() {
pinMode(34,INPUT);
pinMode(19,OUTPUT);
pinMode(21,OUTPUT);
digitalWrite(19,HIGH);
digitalWrite(21,HIGH);
Serial.begin(9600); }
void loop() {
int a=analogRead(34);
Serial.println(a);
if(a<3500&&b==0) //close
{ digitalWrite(19,LOW);
delay(13000);
digitalWrite(19,HIGH);
b=1; 25 }
if(a>3500&&b==1) //open
digitalWrite(21,LOW);
delay(13000);
digitalWrite(21,HIGH);
b=0; }
delay(1000);
}
```