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ICSEC 2023 will be held over two days with special sessions and presentations delivered by researchers from the international communities, including presentations from well-known keynote speakers. All accepted papers will be submitted for inclusion into IEEE Xplore. In addition, the authors of the selected papers will be suggested to submit the paper to many journals that are indexed by SCOPUS.

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Table of Contents

Backorder Prediction in Inventory Management: Classification Techniques and Cost Considerations	1
Representing Source Movement in Sequences of Telescopic Images Based on Contrastive Learning for Asteroid Detection	9
Automatic Oral View Classification in the Photographic Images	15
Oral Tissue Detection in Photographic Images Using Deep Learning Technology	21
Marathi Speech Quality Assessment	28
Efficient Numerical Computation of the Integral Equation for the Ruin Probability	37
Human Action Recognition by Deep Learning Technique With Multiple-Searching Genetic Algorithm	42
An Implementation of ICD Coding for Bi-Lingual Medical Records Using Deep Learning	47
Exploring Chromatin Interaction Between Two Human Cell Types and Different Normalization Techniques for HI-C Data	53
What Type of Advice Does Change Decisions on Moral Dilemma Effectively?	60
An Integrated Technique for Detecting Seven Segment Digits on Medical Devices	65
A Phase Difference Angle Detection System Through MQTT Protocol in Monitoring Induction Motor Using ESP32	69
AXREL: Automated Extracting Registry and Event Logs for Windows Forensics	74
KruCode: An Online Learning Programming Platform for Programming Course	79
From Positive Feedback to Comprehensive Rating: An Auto-Rating Models for Online Fictions in Sharing Communities	85
Prototyping a Low-Cost Pest Detection System for CNT0718-26-1-1-1 Rice Farming	94
Efficiency Measurement of Energy Yield From Solar Photovoltaic Cell With Embedded System of Alternative Clamp Meter	98
Osteoporosis Prognosis Through Machine Learning Analysis of X-Ray Films	104
Fast and Accurate Bolt Classification for a Retail Motorcycle Shop in Thailand	110

2023 27th International Computer Science and Engineering Conference (ICSEC) | 979-8-3503-4210-9/23/$31.00 ©2023 IEEE | DOI: 10.1109/ICSEC59635.2023.10329688

Visual Glitches Classification for Video Game Using Deep Learning-Based Techniques 116
A Dual-Stage Optimal Controller Design for Controlling AVR System 122
Transformation of Kripke Structure With Linear Temporal Logic Formula to Büchi Automata 127
Blockchain in Healthcare: A Case Study of Healthcare Insurance 132
Modified YOLO Model for Small Platform Application Using SimRepCSP Module With Case Study: Objects Detection Model on GlobalWheat2020 Dataset 138
Effects of Facial Expressions and Parts on Changes in Facial Attractiveness by Brief Presentation 143
Improving the Performance of K-Means Clustering to Reduce Repetitive Work by Addressing the Gap in Findings 148
Proposed Technique for Data Security With the AES Algorithm in Robot Operating System (ROS) 153
Pneumonia Detection Using Snapshot Ensemble Model 157
Securing Patient Confidentiality in EHR Systems: Exploring Robust Privacy and Security Measures 163
From Individuals to Collectives: Investigating Traffic Flow Dynamics in the Totally Asymmetric Exclusion Process With Driver Behaviour 169
The Low-Cost IoT Mornitoring the Quality of River: A Case Study of Wang River in Lampang Municipality 178
Traceabilty in the Instant Herbal Compress Ball Supply Chain 184
Long-Term Care System for Individual With Disabilities in Bandu Municipality, Chiang Rai 189
Generating Synthetic Population Using Transformer Based Networks 193
Predicting Game Results for Football League Using Deep Learning 201
Applying IoT Technology to Develop Banana Slicer for Digital Banana Processing 207
The Promoting Vegetable Cultivation Pesticide Free for Food Security and Safety Through Precision Agriculture: A Case Study of Ban Pang Klang, Mae Korn Subdistrict, Muang District, Chiang Rai 213
Do Fictive Sexual Orientations Induce In-Group Bias in Emotion Recognition? 220
A Blockchain-Based Ticket Sales Platform 226
Data Modeling for Identification and Classification of Learning Outcomes in Flexible Educational Learning Units 231

Service Issues of Chiang Mai Chinese Restaurants to Chinese Tourists Based on Text Analysis and Sentiment Analysis 237
Improving Detection of SQL Injection Attack by SMOTE 243
CID-CJA: Co-Occurrence Information Discovery in Computer-Related Job Advertisements 247
Automatic Severity Grading of Optic Disc Edema Using Appearance-Based Features 253
Development of Autonomous Drones to Detect Diseases on Plant Leaves of Durian Trees 258
Guidance System for Visually Impaired Persons Using Deep Learning and Optical Flow 266
Analysis of Advanced 2D Convolution in Image Processing by Using AVX and OpenMP 272
Inter Subject Emotion Recognition Using Spatio-Temporal Features From EEG Signal 277
Human-Computer Interaction for Decision Making in Digital Twins With Various Display Environments 281
Accurate and Decentralized Approach for Traffic Flow Prediction Using Federated Learning 287
Optimizing Task Scheduling Algorithms for Efficient CPU Utilization in Enhancing Server Availability 293
Chatbot for University Students Major Determination With Rasa Framework 299
A Best Practice Model of CDIO Implementation in IT Classrooms 304
Gamification: Crowdsourcing Approach
Salted Crab Grading Using Computer Vision 310
Evaluation of Traditional Finance Models and Machine Learning Approaches in FOREX Volatility Prediction 315
Ethics in AI Governance: Comparative Analysis, Implication, and Policy Recommendations for the Philippines 319
Classification of Pineapple Fiber Woven Fabrics on Raspberry Pi Based on Convolutional Neural Network 327
Offline Interactive Map From Hybrid App Development: A Case From Geologic Map App 331
Quality Assessment of Cocoa Bean Using Regression Convolutional Neural Network 335
Handling Various Conditions in a Web Service Client's Method by Using the Visitor Design Pattern 341

Automated Ensemble Deep Learning for Chest X-Ray Covid-19 Image Classification Using Multiple Hyperparameter Optimizations 348
Thermal Inspection System Prediction for Circuit Breaker on Load Panel With Image Classification Technique by Tensorflow: A Case Study Textile Industry 354
Leveraging Machine Learning for Estimating Relationship Model Through Empirical Scientific Data 358
Ballet Gesture Recognition and Evaluation System (Posé Ballet): System Thinking, Design Thinking, and Dynamic Improvement in Three Versions 362
Comparing and Normalizing the Measurement of Step Counts and Heart Rates of Selected Wristbands and Smartwatches 371
Web Service for Palindrome Detection From Algorithm Sequence 377
A Comprehensive Framework for Cold Start Problem in Hybrid Recommendation Systems Extending the Efficient Multi-Mode Approach 382
VIS Spectrometer Based on the Diffraction Grating and Raspberry Pi Camera 392
The Development of a Web Service for Tandem Repeat Detection 398
A Secure Model Based on Symmetric Encryption for REST API in Data Integration 402
Enhanced Architecture of Convolutional Neural Network (CNN) for Intracranial Hemorrhage Prediction From CT-Scan Images 407
Foot Photo Application for Diabetes People 415
GENSS: Defect Classification Method on Extremely Small Datasets for Semiconductor Manufacturing 419
Overcoming Imbalanced Data Challenges in Spinal Disorder Detection: An Integrated YOLOv5 and CNNs Approach With SMOTE 425
Mobile Application for Triage Medical System in Emergency Rooms: Enhancing Accuracy and Attitude - A Case Study in Hospitals of Chiang Mai Province 429
Applying GIS Analytics and ADAS With DMS to Assessment Heavy-Duty Vehicles Unsafe Acts and Unsafe Conditions in Thailand 434
Data-Driven Performance Assessment and Knowledge Management for Sustainable Supply Chain of Organic Gymnema Tea: A Case Study in Northern Thailand's Mountainous Region 440
Revolutionized Customs Declaration Documents Preparation Process 444
Cognitive Performance Evaluation in Early Stage of Dementia: A Hybrid EEG/Eye Movement Analysis 453
Integration of Maritime Management System to Reduce co2 Emission in Sustainable 457

Trajectory-Based Convergence Acceleration of Evolutionary Algorithms 461
Using Telematics and AI Technology to Reduce Road Accidents for Heavy-Duty Vehicles 466
Virtual Tour Technology Innovation to Increase the Potential of Ethnic Homestay Tourism in Mae Hong Son Province 471
Database System Development for Food Safety Management of UHT Milk at Chiangmai Fresh Milk Factory Using Blockchain Technology 477

Virtual Tour Technology Innovation to Increase the Potential of Ethnic Homestay Tourism in Mae Hong Son Province

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***Abstract*— The objective is to develop virtual tour technology innovation to promote ethnic homestay tourism in Mae Hong Son, using 360-degree virtual reality media to present information to create new homestay alternatives and study user satisfaction with the website. The research method uses a system development cycle model (SDLC); first, it collects data to study the problems inherent in the old system. It was then taking the data to analyze and design a new plan by choosing a way to present the homestay's information in the form of a virtual website through virtual reality technology. That makes people Interested. People can see the atmosphere of the homestay in advance as if they had entered that place with the 3D Vista Virtual Tour program and added information to the website.**

The result of a virtual tour website development will help people save time by not having to visit the homestays in person to see all the information. An assessment of satisfaction from a group sample of 20 people found that the average joy was 4.17, which is a high level.

Keywords*— *Virtual tour, VR 360°, Innovation Technology, Community-Based Tourism, Homestay

I. INTRODUCTION

A. Background

"Homestay" refers to a tourism initiative that seeks to mitigate the adverse effects of tourism on the local community's environment and way of life, hence mitigating any potential decline in tourist appeal. Promote the direct acquisition of items and services from the local community, encompassing many aspects such as accommodation, culinary offerings, and memorabilia. Currently, homestay tourism is available through several means, such as residing as a household member in the residences of local rural inhabitants. Most facets of village life have been modified to cater to the needs and preferences of tourists. Housing facilities have been strategically developed in designated areas while preserving the communal homestay experience. The sojourn exemplifies the unique way of life of the indigenous Thai populace. The site possesses a particular allure and regional identity that originates from the unpretentiousness of everyday existence and the customary practices necessary to support the encompassing natural surroundings. All homestays must be inspected and re-registered to ensure compliance with the established regulations. The Ministry of Tourism and Sports oversees the Tourism Department. The administration seeks to prioritize the promotion of local sovereignty. Community development strongly emphasizes establishing employment opportunities that contribute to economic prosperity. Employ tourism as a strategic approach to enhance the range of tourist attractions inside the community. [1] The "Homestays" initiative, which has been implemented thus far [2][3], encompasses a total of 171 villages or towns around the country that organize activities and offer homestay accommodations. A reservation system is seen as one of the essential characteristics of homestays. Consequently, the registration money and deposit will be employed to administer the homestay program inside the community.

Mae Hong Son possesses abundant natural tourism resources, including mountains, forests, rivers, and picturesque landscapes. Additionally, the region's exceptional local lifestyle further contributes to the escalating development rates observed in visitor arrivals and the establishment of tourism-related facilities. Furthermore, there is a persistent upward tendency in the popularity of tourists interested in visiting Mae Hong Son and its surrounding provinces. The organization has been implementing comprehensive community tourism initiatives for 15 years. Numerous villages serve as exemplary educational sites for pupils. Developers and researchers within the community have undergone a process of acquiring knowledge and skills. The management and development of community-based tourism have been facilitated by local groups thus far. Despite its relatively little share in the overall tourism sector, ASEAN tourism continues to consider this option a viable alternative. Hence, this approach effectively enhances the development of community-based tourism. We live in an era characterized by the prevalence of information and communication technologies. The Internet, which has extensive coverage throughout Thailand, facilitates the convenient and rapid interchange of information and communication across several domains. The application of information technology has been observed across various disciplines. Information technology has widespread use in multiple sectors, including education,

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business, and tourism. Additionally, it has been utilized in the field of public relations.

The construction of websites to advertise tourist destinations, the utilization of GPS systems on mobile phones for travel, and the application of information technology in tourism management, such as hotel reservation systems, are some examples of technological advancements in the tourism industry. In contemporary times, the dissemination and endorsement of tourism in Thailand encompass many regions, including the North, Central, Northeast, and South. Each province boasts numerous tourist attractions. The number of domestic and international tourists visiting Thailand has been steadily increasing. Nevertheless, tourist attractions continue to employ traditional forms of public relations and media, such as brochures, in addition to embracing modern technologies like 360-degree virtual reality (VR). These advancements enhance tourism promotion by seamlessly integrating virtual experiences with the physical world. Indeed. Through virtual reality technology, individuals can perceive visual content in a manner that simulates the experience of physically being present in the depicted location.

Moreover, it can identify and retrieve significant objects inside each composition, enabling a closer examination of their intricate intricacies and potential reversibility. Elevate the degree of excitement in the media to a new paradigm. The ability to perceive virtual visuals as if physically present at a remote location via computer or mobile devices represents a transformative development in new media, akin to the advent of the internet. In contrast to conventional media platforms like "boxes," virtual reality is venturing into a novel realm that engenders enthusiasm through interactive media. Virtual and augmented reality are technological advancements integrating real-world environments with virtual worlds generated by software and interconnected devices. To integrate the virtual realm, encompassing elements such as graphics, video, 3D shapes, text, and characters, with the physical environment, it is essential to superimpose real-world imagery captured by the camera. By engaging in a virtual tour, individuals can explore various tourist attractions in a manner that simulates being physically present at the location. This is made possible by using digital devices such as computers, tablets, and smartphones, thereby offering a novel and immersive travel experience. The research team observed that virtual tour technology innovation was utilized to boost community-based tourism among homestay operators in Mae Hong Son Province. This would enhance the visibility and convenience of the tourist attraction for visitors. This study aims to develop novel virtual tour technology to enhance the promotion of homestay accommodations among operators in Mae Hong Son Province. To improve the visibility and awareness of community-based tourism within the province, efforts should be made to promote its recognition on a broader scale.

B. Research objectives

We are developing innovative virtual tour technology to promote homestay publicity among Mae Hong Son Province homestay operators.

C. Conceptual framework

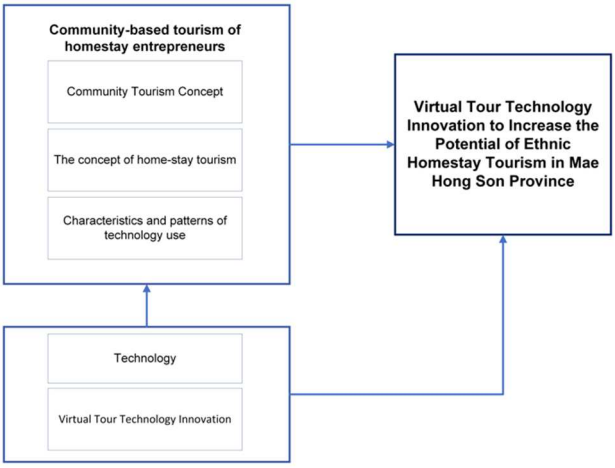

Fig. 1. Conceptual Framework

II. LITERATURE REVIEW

Community-based tourism refers to tourism that considers the sustainability of the environment, society, and culture. It determines the direction of tourism by community members. Manage community-based tourism for the community. The community that owns the tourist attraction plays the owner role and has the right to manage and care to learn for visitors [4]. Tourism is a story of promoting shared learning among People in the local community and visitors, Including maintaining various community resources by using community tourism as a tool for sustainable community development. Participation of all sectors in the community for the benefit of the community [5][6]. Tourism is a tool for conserving natural resources. The local way of life managing tourism in a balanced way results in various benefits. The results from tourism are returned to the community and the local area [7]. The success of tourism management leads to the development of the potential of the community, region, community economy, society, and people in the community to live well. And the environment has been preserved. Including maintaining the culture, traditions, and good way of life of the community, passed on from generation to generation. Manage resources efficiently and create sustainability in the community.

Development of virtual learning media on a computer network with 360-degree panoramic photography technology Case Study: Mahasarakham University Learning Resources Database Website. The objectives are to 1) develop the virtual learning media on the Internet network, 2) study the efficiency of the virtual learning media on the Internet network, and 3) study users' satisfaction with the 360-degree virtual learning media on the network. Computer network. The target groups are students and personnel of Mahasarakham University. The research tools were 1) 360-degree virtual electronic media, 2) 360-degree virtual learning media efficiency test, and 3) user satisfaction with the media. Developed. The statistics used in the research were Mean and Standard Deviation. The research results showed that 1) virtual learning media on the Internet network developed. There are three steps in the preparation of 360-degree virtual reality media, which are the planning stage, rehearsing the understanding of the use of photographic equipment to develop and design the 360-degree virtual reality

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media, and the dissemination of the 360-degree virtual reality media via website http://vkp.msu.ac.th and step Disseminate the work through the website. 2) Virtual knowledge media on the Internet. The overall efficiency was at an excellent level. 3) Users were satisfied with the 360-degree virtual learning media on computer networks. Overall, each aspect was at the highest level. [8]

Development of virtual multimedia teaching materials on the history of Ayutthaya architecture: a case study of Rama Temple. The purpose of this research is to create virtual multimedia teaching materials. History of Ayutthaya Architecture: A Case Study of Wat Phra Ram To study the suitability of teaching media from experts and to study satisfaction in teaching media from students. The development of virtual multimedia teaching media involves six research steps: 1) The analysis and design stage, 2) The virtual image data preparation stage, 3) The presentation system construction stage, and 4) The presentation stage. Create a navigation system for visiting Ayutthaya Island 5) Procedure for dissemination and 6) Summing Up Procedure The following development programs were used: 1) Easypano Tour Weaver 7.50 Professional Edition 2) Photoshop CS 6 program 3) Maya program and 4) Dreamweaver CS6 program—undergraduate students in Technology architecture in universities across Thailand. The results of the research showed that virtual multimedia teaching media. History of Ayutthaya Architecture: A Case Study of Wat Phra Ram Passed the appraisal by content experts at a high level (mean =4.42, S.D.=0.40) and technical experts assessed the suitability at a high level (mean=3.53, S.D.=0.46). Architectural technology students at The Eastern Rajamangala University of Technology Uthenthawai Campus evaluated satisfaction at a high level (mean =4.23, S.D.=0.16). [9]

Production of a virtual image viewing system on the Internet for public relations to Rajamangala University of Technology Rattanakosin. This research combines panoramic photography with high-resolution photography. And produce workpieces with software to develop a virtual tour system. It results in a virtual tour system showing A 360-degree real place. An important feature is that the audience can determine the viewing of the virtual tour system by themselves on the Internet. By the research tools created by the researcher and the media quality assessment form and content quality assessment form, the results showed that the quality of the virtual tour guide system was good. With an average of 4.03, suitable and valuable for public relations Rajamangala University of Technology Rattanakosin by content evaluation with an average of 3.93 and media evaluation with an average of 4.13 [10]

Development of a virtual exhibition titled One Hundred and Twenty-two Years at Khlong Rangsit Prayoonsak for elementary school students The objectives of this research were 1) to develop a virtual exhibition titled "One Hundred and Twenty-Two Years at Khlong Rangsit Prayoonsak." for primary school students 2) to study the learning outcomes of primary school students 3) to study the satisfaction of primary school students after. Learn from the virtual exhibition "One Hundred and Twenty-Two Years at Khlong Rangsit Prayoonsak." The sample group used in the research was Prathom Suksa, 5 students at Wat Samrong School. (Hiranratphakdeewittaya) In the amount of 30 people by simple random sampling. The instruments used in this research were: 1) a virtual exhibition titled "One Hundred and Two Years Khlong Rangsit Prayoonsak." for elementary school students, 2) a pre-and post-test knowledge test, and 3) a satisfaction questionnaire. The statistics used in the research were mean, standard deviation and t-test independently. The research results were as follows: 1) The quality of the virtual exhibition entitled "One Hundred and Two Years Khlong Rangsit Prayoonsak". For elementary school students, Quality is at an excellent level. Elementary school students had a higher average after school with statistical significance at the .05 level, and 3) the satisfaction of the students who learned from the virtual exhibition entitled "One Hundred and Twenty-Two Years at Khlong Rangsit Prayoonsak." At the highest level [11]

They developed an online information system to present information on tourist attractions. By using a positioning system to give information in tourist attractions with 360-degree video for easy use and access to a wide range of users by developing information systems on web browsers that can be used on all types of devices without There is an experimental study area, namely, the ancient site of Wat Si Chum. Sukhothai Province The information system in this research divides the design and development of the system into three main parts: a database system used to manage data within the system, a web-browser positioning system, and data presentation within a 360-degree video; the researcher assessed the effectiveness of the system. And evaluate the use of the system with groups of tourists and guides in the area and then use the results from the evaluation of the service to improve.[12]

III. Research Methodology

This study is a research and development (R&D) study in which the researcher adapted the System Development Life Cycle (SDLC) [13] 7 steps into four steps of system development.

A. Requirement and Feasibility study.

This research is experimental. Five homestay communities in the Mae La Noi and Khun Yuam districts of Mae Hong Son served as the practical/data collection sites. They collected secondary data from research documents, textbooks, community research, and publications from public and private organizations, communities, and the Internet as fundamental information.

Data were collected from a sample group that was determined using an interview form, conducted in a study in a standardized homestay community area and is currently being submitted for standards by the Homestay Committee or the representative responsible for the homestay community. Management and observation of community homestay services during a local study to determine the actual conditions of community homestay services. They utilized structured and semi-structured interviewing techniques.

For this research, we selected tools and software shown in Figures 2-4 and Table 1-2.

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TABLE I. HARDWARE AND PURPOSE OF THE USE.

Hardware	Purposes of use
The Insta360 ONE X2	Used for a 360° action camera with dual- and single-lens modes to capture panoramic video in all directions
Bullet Time Tripod Handle	used for swinging your 360-camera overhead.
Memory Card	used for storing photos in digital cameras and for storing and transferring programs and data between handheld computers

TABLE II. SOFTWARE AND PURPOSE OF THE USE.

Software	Purposes of use
PHP Language	The open-source is a server-side scripting language embedded in HTML in its simplest form. PHP allows web developers to create dynamic content and interact with databases
MariaDB	The open-source is used for various purposes such as data warehousing, e-commerce, enterprise-level features, and logging applications
3D VISTA Virtual Tour	To create and display Virtual Tours In 360 and VR.

B. *System Analysis and Design.*

Take the study results to analyze and design the system to meet the community's needs by examining the original plan, including the nature of the original work, the problem situation, suggestions, and analysis of new job characteristics. Including the form of a new work system compared to the old position. By designing a newly created website to present both written information with illustrations and VR Touring presentations, also known as 360-degree virtual reality simulations, add a system to contact the staff through the website when you want to visit the real place, including database design and user interface design, as shown in Figures 2-4.

Concept diagram

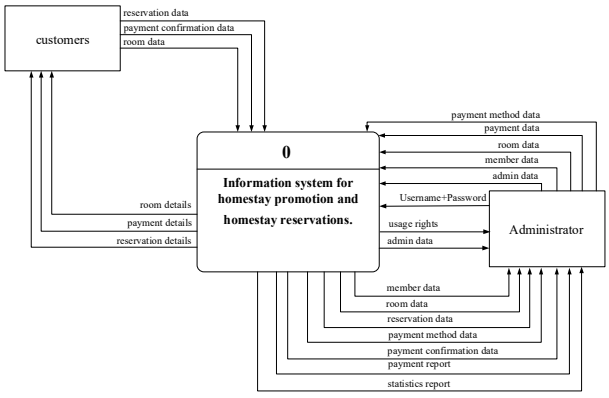

Fig. 2 Context Diagram

Figure 2 shows that those involved in the system or users include system administrators and customers.

Data Flow Diagram

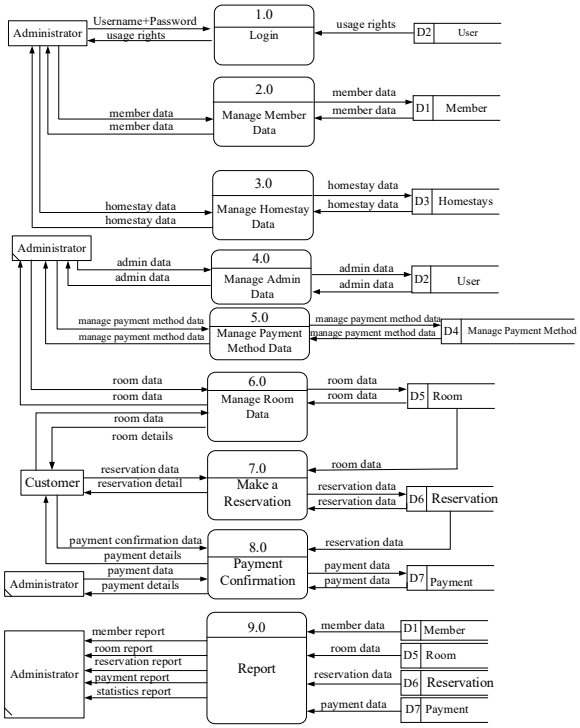

Fig. 3. Data Flow Diagram.

Figure 3 shows a data flow diagram of the information system for homestay publicity and reservations. Ten processes are as follows: Process 1.0 Login, Process 2.0 Manage Member Data, Process 3.0 Manage Homestay Data, Process 4.0 Admin Data, Process 6.0 Manage Payment Method, Process 5.0 Manage Room Data, Process 7.0 Make a Reservation, Process 8.0 Payment Confirmation, and Process 9.0 Report.

Database Design

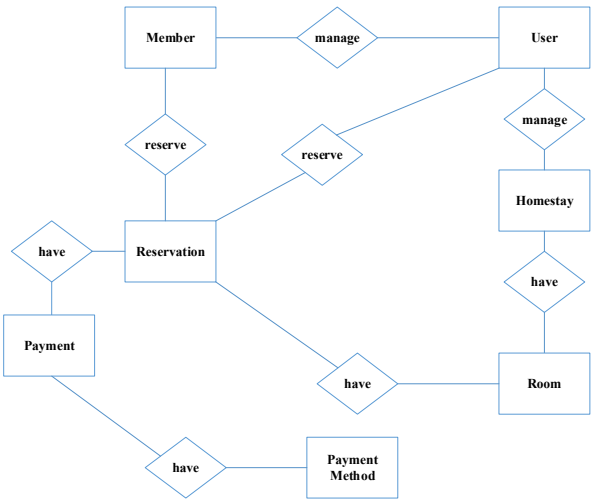

Fig. 4. Entity Relationship Diagram.

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From the Entity relationship diagram [14], the ability to convert the data connection into a data table may be utilized to store the system's data. There are a total of 6 tables shown in Table 3.

TABLE III. LIST THE TABLES IN THE DATABASE.

Table	Data
member	Collect data on members.
user	Collect data on users
homestay	Collect data on homestays
room	Collect data on rooms
reservation	Collect data on reservations
payment method	Collect data on the payment method
payment	Collect data on the payment

C. *Implementation.*

System development is the process of developing the program. The programmer must create the program as designed. It is the development of virtual reality technology media. At this stage, the researcher studied virtual reality technology from papers and research papers and searched various databases. Related to Virtual reality technology is the essential information in developing virtual reality technology media. Then, analyze, synthesize, and design the content to meet the desired objectives. Virtual reality technology There are components of 360-degree virtual reality through the homestay website.

D. *System Validation and Maintenance.*

They are implementing the created information system in the homestay community. Users will be the homestay committee and youth in each homestay.

IV. EXPERIMENTAL RESULTS

A. *Information system development for homestay publicity and homestay booking*

From collecting information, the researcher and team analyzed, designed, and developed an information system for homestay publicity and homestay booking. It is presented as a Web Application using the PHP programming language and MariaDB database system an open-source software developed. In this presentation, the researcher used the name of the website. That "hilltribehomestay" under the URL https://hilltribehomestay.com/ with the following information on the website.

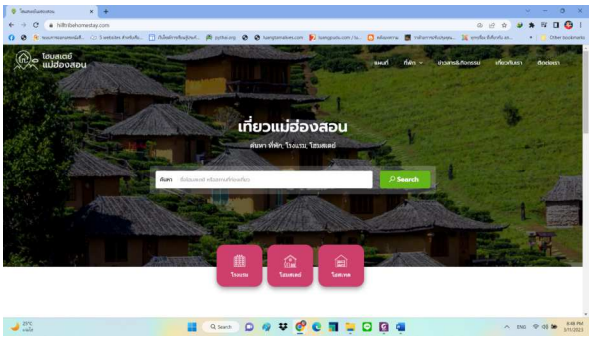

Fig. 5. Homepage.

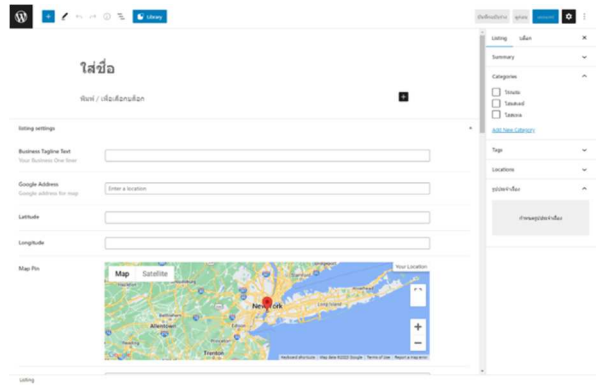

Fig. 6. The recording of room details information.

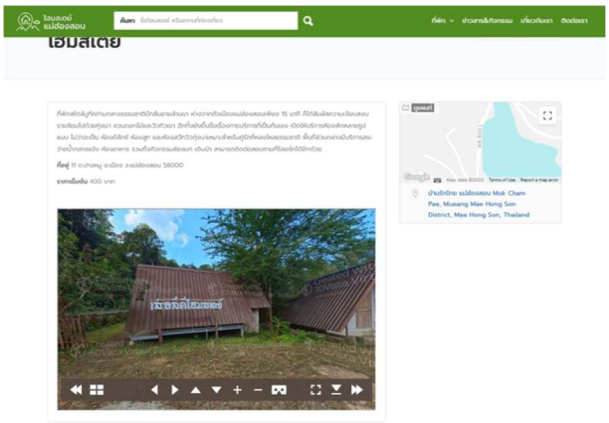

Fig. 7. An example of a Virtual Tour results page.

B. *Satisfaction evaluation*

An analysis of the average satisfaction of users of the homestay virtual tour website of ethnic groups in Mae Hong Son Province. Take a sample Including a group of 20 homestay operators divided into 3 areas.

TABLE IV. MEAN RESULTS OF THE SATISFACTION ASSESSMENT FORM ANALYSIS FOR USING THE HOMESTAY VIRTUAL TOUR WEBSITE OF ETHNIC GROUPS IN MAE HONG SON PROVINCE.

Satisfaction issues	Mean	Satisfaction level
The design and formatting	**4.08**	**High**
1. The beauty, modernity, and interest of the website.	4.12	High
2. The content and illustrations are consistent.	4.11	High
3. The menu is easy to use.	4.09	High
4. Readability formatting and usability	4.13	High
5. The use of background colors and font colors are appropriate for reading.	3.97	High
The content aspect	**4.24**	**High**
1. The information is accurate, clear, and reliable.	4.17	High
2. Speed of downloading data	4.51	High
3. The text on the website is correct in terms of language and grammar.	4.15	High
4. The accuracy of links within the website.	4.20	High
5. The quantity of content is sufficient for the needs.	4.16	High
The usability	**4.20**	**High**
1. Convenient and fast to use Virtual Tour.	4.25	High
2. Increase the interest in providing location information.	4.19	High
3. The realism of presenting information in a Virtual Tour	4.15	High
Total average	**4.17**	High

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From Table 4, it was found that the sample groups were satisfied with the use of virtual homestay virtual tour websites of ethnic groups in Mae Hong Son Province as follows:

1) The design and formatting aspects are at a high level. (mean= 4.08). Individually, Readability formatting and usability were the highest averages. It was at a high level (mean = 4.13). The topic with the lowest mean was the menu is easy to use at a high level (mean = 4.09).

2) The content aspect was high (mean = 4.24). When considered individually, it was found that the data download speed was the highest average. It was at a high level (mean = 4.51). The topic with the lowest mean was the text on the website is correct according to the language. And grammar at a high level (mean = 4.15)

3) The usability is high (mean = 4.20). Using Virtual Tour with the highest average is convenient and fast when considering each item. It was at a high level (mean = 4.25). The topic with the lowest mean was the realism of the Virtual Tour presentation is at a high level (mean = 4.15).

V. Conclusion and Future Research

Ethnic Homestay Virtual Tour website in Mae Hong Son Province It is a design and development of a website that displays via a web browser using 360-degree virtual reality media to present homestay information to create a new alternative for those who want to visit the museum by using 360-degree virtual reality technology to apply. Used for presentation and to study user satisfaction with ethnic homestay virtual tour websites in Mae Hong Son Province. This can meet the needs of users who find it inconvenient to visit the actual location, including those who would like to visit ethnic homestays in Mae Hong Son province on the website. It is a new and modern alternative, and it does not have problems displaying information because the website has interesting features, including images, videos, and written content. And a view in the form of a virtual image that can be viewed around 360 degrees. The virtual homestay tour website of ethnic groups in Mae Hong Son Province is useful for students and tourists. The public wants to visit ethnic homestays in Mae Hong Son Province on-site and on the website. This will help create novelty and attractiveness, bringing tourists to the real place. Results of the satisfaction study of the sample. Including 20 homestay entrepreneurs who have contributed to the homestay virtual tour website of ethnic groups in Mae Hong Son Province. It was found that the mean = 4.17 was highly satisfied.

In the future, we suggest that 1) More information and content should be added. Because some information is incomplete, it should be updated at least once a year. 2) There should be the development of technology media and virtual homestay tour websites for ethnic groups in Mae Hong Son Province by combining Augmented Reality to coordinate virtual images with images in the real world. It will make more interaction between media and viewers. This will make the media more interesting, and 3) The media has limitations. Namely, the viewing computer may require medium-quality processing of the virtual 3D image.

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