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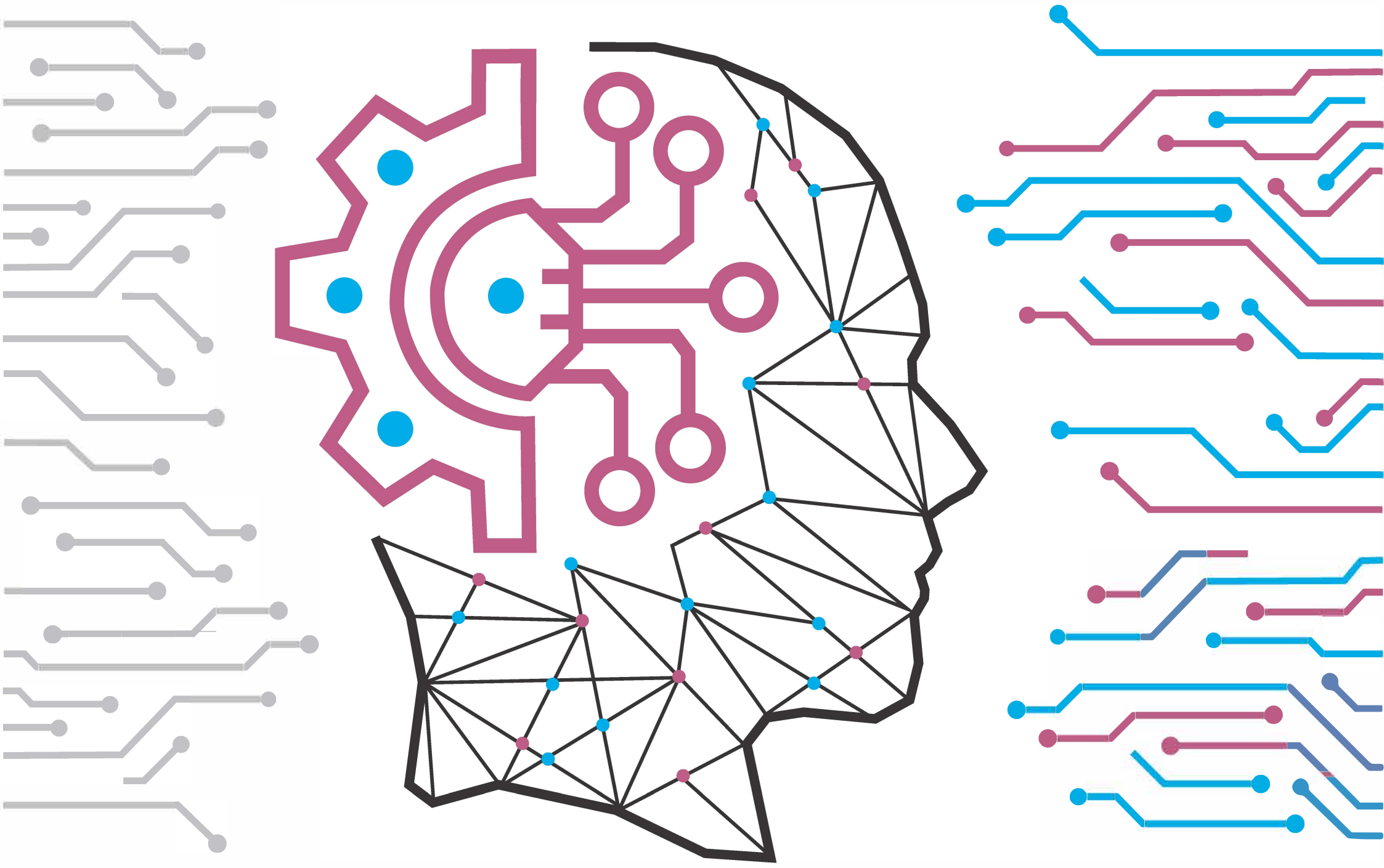

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THE 13TH INTERNATIONAL INNOVATION, INVENTION & DESIGN COMPETITION 2024

EXTENDED ABSTRACTS

e-BOOK

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THE 13th INTERNATIONAL
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NOMADCONNECT

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ABSTRACT

NomadConnect is a new product that aims to make it easier to record clinical data about patients in places where internet access is hard. UNIMAS Teaching Hospital and Medical Centre (HPPPU) has been entrusted with implementing health programmes for the underserved population of Sarawak. Capturing and retrieving patients' clinical data is a problem during a mission as multiple service providers attempt to access relevant information about the clients, ranging from registration to clinical assessment and drug prescription. Methods tried so far include the use of manual forms leading to difficult paper management, the use of ReKa cloud services limited by scarce internet access in rural areas, and Excel VB limitations in combining databases and post-mission data cleaning for analysis. Therefore, NomadConnect, a mobile patient data management system, attempts to resolve these issues by functioning without an internet connection. It does this by using a portable server system and giving users easy access to the integrated databases. The result is that patient data can be collected quickly, making it easier for patients to move through the stations and giving clinicians and providers more time to focus on better patient care rather than a broken system and quick data analysis that needs to be shared with the relevant people. In summary, NomadConnect is an important toolkit for on-site patient management with poor internet access for those who want to provide health services in rural areas.

Keyword: Clinical Data, Patient Data Management System

1. INTRODUCTION

Accurate patient registration and comprehensive medical history documentation are crucial for ongoing care, but manual, paper-based methods pose risks of loss and damage due to environmental factors (Jung et al., 2024). This is pertinent in developing a system that can work in rural areas with lacking internet infrastructure (Fraser et al., 2005). The system needs to be able to do these things:

a) Independent of the internet connection.
b) Allows multiple users to input data in real-time
c) Easy retrieval of data after each mission.

The system was therefore designed to operate within a local area network (Naderi Soorki et al., 2016), with the laptop serving as a server. All of the devices at each station were wirelessly connected to the laptop-based server. This enables multiple user inputs simultaneously, and the patient data is updated in real time, allowing the consulting physician to view pertinent health data and provide better client care (Levine et al., 2017).

The system's fields or variables were generated after multiple discussions between the system designers and medical personnel (Dudhe & Ahmed, n.d.), which include but are not limited to medical doctors, nurses, paramedics, and medical lab technologists. During earlier missions, the system was simulated and tested to determine its functionality and usability.

Information about the medicine dispensed is also recorded, which helps the pharmacists keep track of the stock. The pharmacists in charge would also be able to plan in advance for the purchases of medicine to be made for future missions. Having a unified system enables us to submit timely data to the relevant parties, in our case, the Ministry of Higher Education.

Additionally, the dependency on internet connectivity in many healthcare settings limits the accessibility of patient information (Rural Health Information Hub, 2022). Furthermore, challenges related to data integration arise when attempting to combine information from various sources. Moreover, the available data management system lacks features for effective medicine dispensing and inventory management, hindering efficient healthcare practices.

2. METHODOLOGY

2.1 Parameter identification and validation.

The process starts by identifying parameters essential for the system's operation in remote locations. A medical database management tool is developed with specific parameters to cater to the unique requirements of remote medical facilities. Health care workers, including medical doctors, nurses, and laboratory technologists, are consulted to determine the important clinical and laboratory variables (Ryobeza, Grobbelaar, & Botha, n.d.). The next crucial stage involves validating the system through tests to ensure functionality, accuracy, and reliability. If the system fails to meet the established criteria during validation, it undergoes additional refinement and re-testing. The loop persists until the system is successfully validated, marking the end of the development process. The flowchart illustrates the methodology for developing a patient database management system tailored for remote areas.

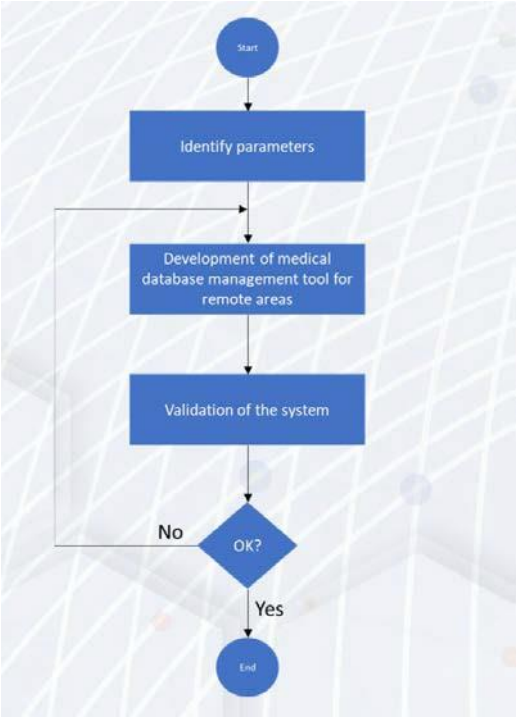

Figure 1 Flowchart of the development of patient database management system

This hotspot facilitates the connection of a diverse array of devices, including but not limited to notebooks, tablet PCs, smartphones, and other Wi-Fi-capable devices. Within this framework, a notebook is configured as a local server, establishing a centralised access point for data and resources. To ensure structured access and heightened security, the system assigns specific access roles to connected users. These roles are pivotal in managing user permissions thereby they safeguard sensitive information while promoting the seamless exchange of necessary data. The NomadConnect System's structured approach to connectivity and access positions it as an exemplary solution for contemporary settings characterised by mobility, multiple device usage, and restricted Internet connectivity.

2.2 Field work schematics

Deployments of multiple devices and a router within the same room during the event are shown in the diagram below.

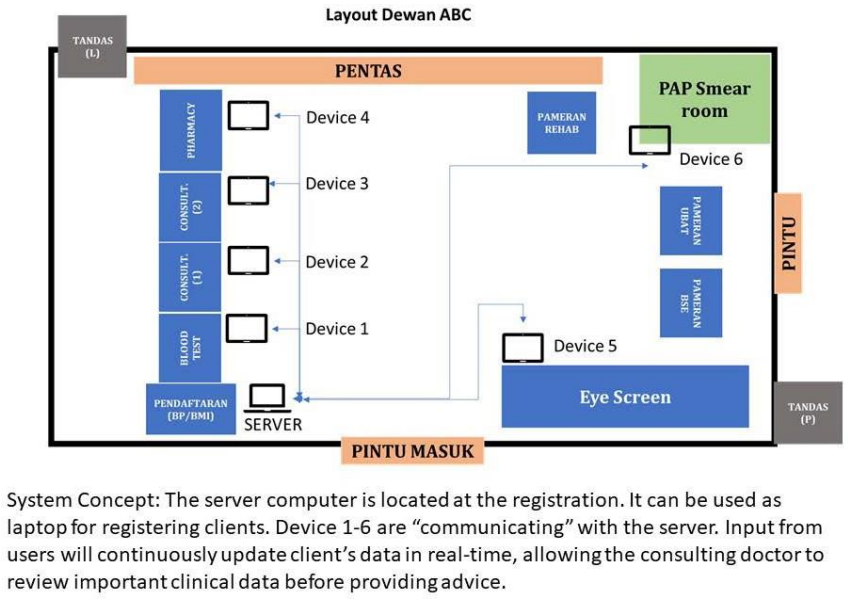

Figure 2 Layout for NomadConnect Setup.

3. FINDINGS

The system was designed to operate independently from an internet connection and successfully maintained uninterrupted functionality even in disconnected environments. It supported multiple users entering data simultaneously and in real-time, which significantly enhanced collaboration among team members. Following each mission, the system facilitated the easy and rapid retrieval of data, effectively streamlining access to and utilization of information and enabling efficient submission to relevant stakeholders. Moreover, the flexibility of the system allows for the easy integration of new services as required, ensuring it remains adaptable to evolving needs.

4. CONCLUSION

In conclusion, the application of NomadConnect System ensures the integration of innovative solutions within healthcare organisations, NGOs, and government agencies marking a significant

stride towards enhanced patient care. The accessibility of data, coupled with the versatility and portability of modern technologies, paves the way for comprehensive patient management, especially in underserved areas. Moreover, the cost savings associated with these advancements cannot be overstated, as they enable a broader market penetration, ensuring that even the most remote communities are not left behind. Furthermore, the potential application of these technologies extends beyond healthcare, offering a valuable tool for data collection in various fields where connectivity is a challenge. This paradigm shift promises not only to revolutionise patient care but also to transform data management in remote locations, heralding a new era of global health and information accessibility.

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