CHAPTER 1
INTRODUCTION

1.1 Background

Analyzing the accuracy of digital portable blood pressure devices is critical for a variety of reasons, including the fact that accuracy has a direct influence on device dependability and quality. Here are some of the main reasons why accuracy assessment is important: patient safety, clinical decision-making, disease management, public health surveillance, home monitoring, self-management, research and clinical trials, regulatory compliance, patient trust and adherence, technology advancement, and healthcare cost savings.

Choosing a digital blood pressure device over an analog or traditional device is frequently based on the numerous benefits that digital devices provide. Digital blood pressure instruments are generally preferred for several reasons, including their level of accuracy and precision, simplicity in use, digital display, memory and data storage, automatic cuff inflation and deflation, advantage features, portability and compact design, automatic averaging, integration with electronic health records, fast measurement time, and real-time feedback.

Although digital blood pressure devices have several advantages, they also have disadvantages and restrictions. It is critical to understand these elements to obtain accurate and dependable blood pressure readings. Here are some of the disadvantages of digital blood pressure devices, including accuracy in certain populations, calibration and maintenance, user method, battery dependency, electrical interference, and quality variability. These limitations must be solved through adequate training, frequent calibration, and validation of digital blood pressure equipment. When deciding on the best monitoring equipment, healthcare providers should take into account the needs and preferences of each patient. Regular maintenance, following manufacturer requirements, and keeping up to date on technological changes and developments all help to reduce the downsides of digital blood pressure devices.

In summary, the accuracy of a digital portable blood pressure device is crucial for patient safety, informed clinical decision-making, and successful

disease treatment. Regular accuracy testing helps to enhance healthcare procedures and build trustworthy medical equipment. In this research, a Raspberry Pi device is recommended as a little computer to analyze and store blood data from a digital blood pressure meter. MySQL and Jupiter applications will be loaded on the Raspberry Pi 4B+ device to process input data using Gaussian Transform, Wavelet Transform, and OMP techniques, which will then be evaluated

1.2 Problem Formulation

The problems to be analyzed are as follows:

1. How to ensure that the blood pressure device used has high accuracy in measuring blood pressure for patient safety reasons, which is very important as inaccurate readings can lead to incorrect diagnoses, inappropriate treatment decisions, and potential harm to the patient.

2. How to improve the accuracy of digital blood pressure devices?

3. How does increased data size affect digital blood pressure device accuracy?

1.3 Objectives and Benefits

The objective of this project is to develop a type of digital blood pressure measuring equipment that allows medical professionals, such as physicians or nurses, to remotely assess a patient's blood pressure using the internet as a web base, regardless of their location.

The aims of this study are:

1. Designed a compressive sensing system to collect blood pressure data via sparse binary estimate matrices and OMP reconstruction techniques.
2. The design includes internal memory and data storage for storing and tracking many readings over time, enabling improved monitoring of blood pressure patterns.
3. The architectural design can be adjusted to integrate with electronic health record systems, allowing for smooth data transmission between healthcare providers and ensuring a more complete patient health history.

Benefits of Research Results:

1. Minimize patient-medical worker interactions to prevent infectious infections.
2. Blood pressure data can be remotely monitored and stored in the database.
3. Medical institutions or personnel at home can use this system for many purposes related to medical health. The blood pressure device is friendly for common people at home.

1.4 Scope of Thesis

The scope of this research includes:

1. Blood pressure data collection using a digital blood pressure device, with a total data collection of 260 blood pressure data points, which is then stored in a database in the MySQL application using a Raspberry Pi 4B + as an interface device.

2. Displaying the database in matrix form (4 x 260) and also in graph form to show blood pressure fluctuations in the form of systolic, diastolic, BPM, and measurement time.

3. Programming method using orthogonal matching pursuit (OMP).

4. The evaluation metrics used consist of mean square error (MSE), peak relative differences (PRD), signal noise ratio (SNR), and mean absolute error (MAE).

5. Requires an internet connection to send results to local data

1.5 Research Methods

Methods of Observation as following:

1. Theoretical Study/Literature Study
2. Empirical Measurement
3. Simulation
4. Design
5. Implementation

1.6 Bachelor Thesis Organization

Table 2.1 Time Schedule of The Thesis Project

No.	Description	Duration	Date of Completion	Milestone
1	System Design of Hardware	7 week	06 March 2023 - 24 April 2023	Block Diagram and Spesification
2	Component Selection	7 week	01 May 2023 - 22 June 2023	List of components used
3	Implementation of Hardware	1 week	26 June 2023 - 6 July 2023	Testing of device
4	System Design of Software	2 week	17 July 2023 - 31 July 2023	Block Diagram of Software
5	Implementation of Software	6 week	07 August 2023 - 18 September	Construct the Script of Programs
6	Integration between H/W and S/W	3 week	19 September 2023 - 10 October 2023	Testing and Commisioning of Device
7	Construction of Thesis	14 week	11 October 2023 - 18 January 2024	Final Thesis Document
	Total	**40 Week**		

The systematics of report writing is as follows:

- Chapter 2 BASIC CONCEPT

This chapter contains an explanation of the basic theory, application and tools.

- Chapter 3 PROPOSED DESIGN ARTCHITECTUR BLOOD PRESSURE MODELS AND SYSTEM

This chapter contains the flowchart, algorithm, experimental diagram and the method.

- Chapter 4 RESULTS AND ANALYSIS

This chapter contains work steps, test conducted, test result and analysis of the result of the test gained.

- Chapter 5 CONCLUSION AND SUGGESTION

This chapter contains the conclusion and suggestion of this final assignment.

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