DESIGN THE POTENTIOSTAT CIRCUIT FOR NEUROCHEMICAL SENSING

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ABSTRACT

This thesis presents electrochemical cell that will be applied to potentiostat circuit to show its characteristics. The potentiostat is used to measure the neurochemical that act as a neurotransmitter in human body like dopamine. The potentiostat circuit consists of electronic devices and components, including operational amplifier, to set up a control circuit for neurochemical sensing. The circuit is required to go under simulation tools such as PSice, Multisim or Simulink to design and simulate the circuit for analyzing its performance and parameters involved. The potentiostat circuit will amplify the signal current from the working electrode. The voltage source, V_{src}, of the circuit should be same with the voltage cell, V_{cell}, between reference electrode and working electrode. Output voltage is depending on current flow across electrochemical cell.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

The potentiostat is part of the voltammetry system that measure neurochemical in human body. The voltammetry consists of digital-analogue converter, potentiostat, operational amplifier, and voltage-frequency converter. Digital signals were converted to analogue voltage by a digital-analogue converter. The specific voltage potential was applied using a potentiostat between the references and working electrodes. The resulting current was converted to voltage via an operational amplifier, and then changed to pulses via a voltage–frequency converter [1].

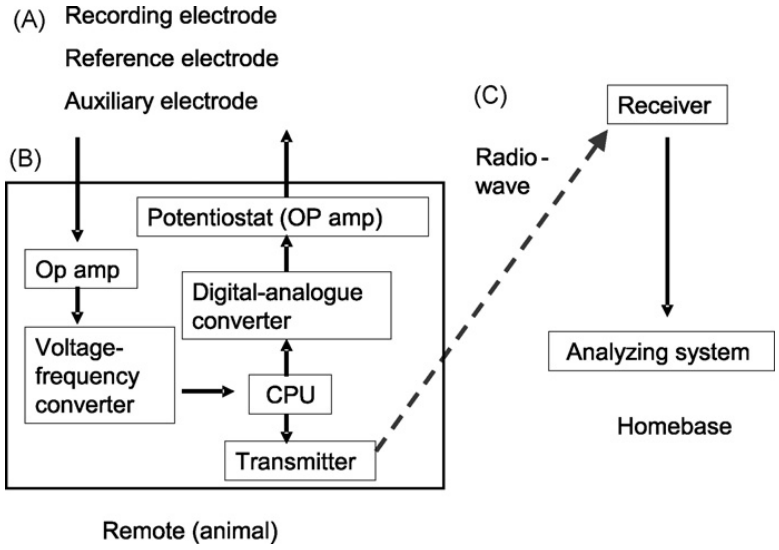

Figure 1.1: Voltammetry system

1.2 TYPE OF MEASUREMENT

The system can be setup in vivo or vitro measurements. In vivo refers to experimentation using a living organism as opposed to a partial or dead organism. Animal testing and clinical trials are two forms of in vivo research [2]. In the past, the guinea pig was such a commonly used in vivo experimental subject. Usually in vivo experiment, rat often been used because it is small, cheaper and fast breeding to act as living creature in getting the experimental results.