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SCHOOL OF MICROELECTRONIC ENGINEERING

ANALOGUE DIGITAL CONVERTER for E-TONGUE
APPLICATION

by

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DECLARATION OF AUTHORSHIP

This project report titled Analogue Digital Converter for E-tongue Application was prepared and submitted by Amin Jamain B. Mohd Khairy (Matrix Number: 071010053) and has been found satisfactory in terms of scope, quality and presentation as partial fulfilment of the requirement for the Bachelor of Engineering (Electronic Engineering) in Universiti Malaysia Perlis (UniMAP).

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ANALOGUE DIGITAL CONVERTER for E-TONGUE APPLICATION

ABSTRACT

This work presents a report on designing analogue digital converter (ADC) for e-tongue application. In work for convert an analogue signal from the measurement subject to digital signal which is will be process by another device. In a standard 0.35 μ m-CMOS technology, 3-bits flash ADC is design in Mentor Graphic software. This device are consists of 8 comparator, 1 priority encoder and 3 flip-flop circuit. The proposed ADC is used 2.5V and -2.5V power supply to full operating speed. Minimum output of ADC is 0.0V, while the maximum output is 2.5V.

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PENUKAR ANALOG-DIGIT BAGI APLIKASI E-LIDAH

ABSTRAK

Kajian ini mengenai laporan kepada rekabentuk penukar analog-digit (ADC) untuk aplikasi e-lidah. Di dalam peranti ini ia menukar isyarat analog daripada sumber menjadi isyarat digital yang akan diproses oleh peranti lain menjadi satu sistem. Dengan menggunakan teknologi CMOS standard 0.35 μ m, 3-bit flash ADC direka menggunakan perisian "Mentor Graphic". Peranti ini terdiri daripada 8 pembanding, 1 pengekod keutamaan dan 3 liter flip-flop. ADC yang direka ini menggunakan 2.5V dan -2.5V power supply untuk membolehkan ia beroperasi penuh. Voltan keluaran minimum ADC adalah 0.0V, manakala voltan keluaran maksimum adalah 2.5V.

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ABBREVIATIONS

<i>ADC</i>	Analogue-to-digital converter
<i>MOSFET</i>	Metal oxide semiconductor field effect transistor
<i>CMOS</i>	Complementary metal oxide semiconductor
<i>nMOS</i>	n-channel metal oxide semiconductor
<i>pMOS</i>	p-channel metal oxide semiconductor
<i>SAR</i>	Successive-approximation Register
<i>DAC</i>	Digital-to-analogue converter
<i>T_{discharge}</i>	Time discharged
<i>V_{ref}</i>	Reference voltage
<i>V_{bias}</i>	Bias voltage
<i>I_{ref}</i>	Reference current
<i>V_{OH}</i>	High output voltage
<i>V_{OL}</i>	Low output voltage
ΔV	Voltage difference
<i>V_{DS}</i>	Drain-to-source voltage
<i>V_{GS}</i>	Gate-to-source voltage
<i>V_{TH}</i>	Threshold voltage
<i>W/L</i>	Ratio of width and length
<i>K'</i>	transconductance
λ	lambda
μm	micrometre
<i>nm</i>	Nanometre
<i>PVT</i>	Pressure, Volume, Temperature
<i>A_v</i>	Voltage gain