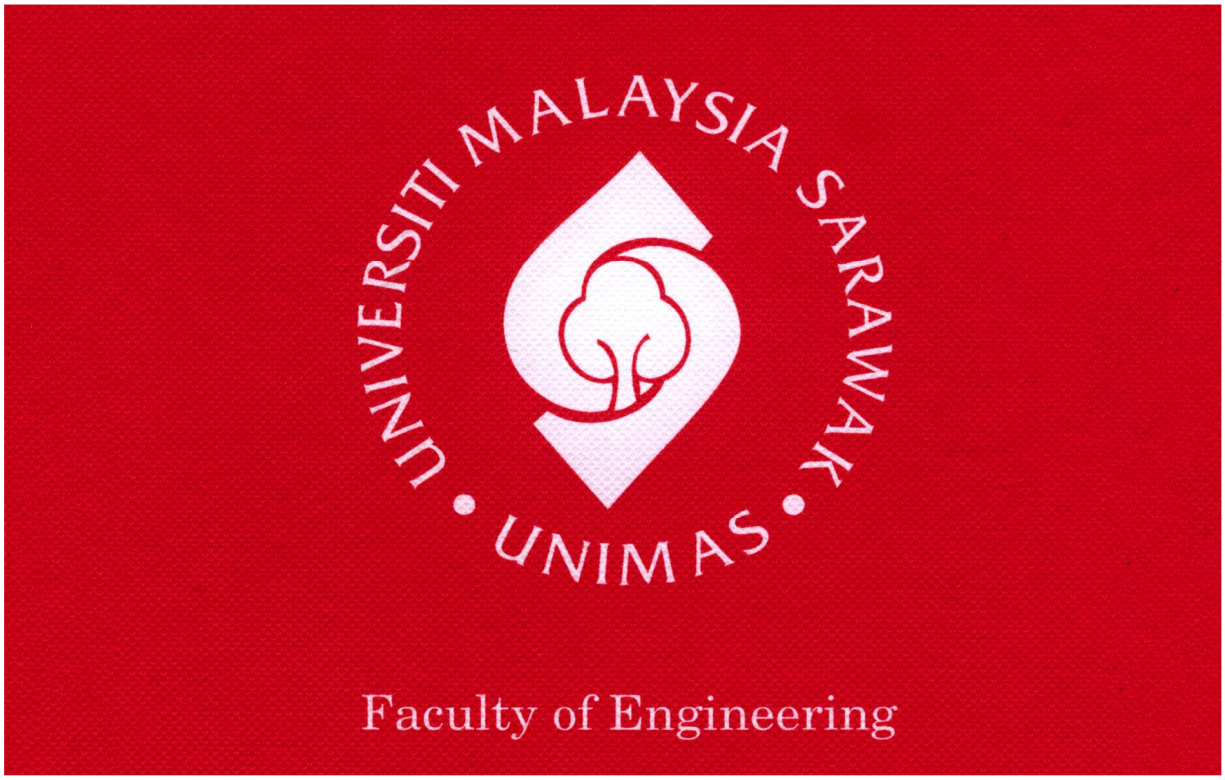

UNDERWATER SENSOR NETWORK FOR MONITORING APPLICATIONS

Kuan Yee Chiang

Bachelor of Engineering with Honours
(Electronics and Telecommunications Engineering)
2009

UNIVERSITI MALAYSIA SARAWAK

R13a

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Student Name : Kuan Yee Chiang

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Date

UNDERWATER SENSOR NETWORK FOR MONITORING APPLICATIONS

KUAN YEE CHIANG

Thesis is submitted to
Faculty of Engineering, Universiti Malaysia Sarawak
in partial fulfilment of the requirements
for the degree of Bachelor of Engineering
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Dedicated to My Beloved Family

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ABSTRACT

The oceans alone cover almost three quarters (71%) of our planet and along with rivers and lakes are critical to our well-being. They must be continuously observed to detect climate changes or pollution of the environment which effects human and animal habitat, especially in this 21st century which global warming is the main issue. Recently, sensor networks have appeared as an important technique for many applications, including monitoring, measurement, surveillance and control. The idea of applying sensor networks for underwater monitoring has become more interests. In this thesis, the development of an underwater sensor that able to perform monitoring applications is described. The systems and technologies of underwater sensor network has been carried out and investigated for a better understanding. Few possible solutions of designing the system are discussed and a more suitable solution for real time monitoring is proposed. By the development of the proposed underwater sensor network monitoring system, any changing on the water quality should be able to monitor instantly by the end user, which consists of related research group or organization and society.

ABSTRAK

Lautan meliputi hampir tiga suku (71%) di planet kita, dengan sungai dan tasik adalah kritikal kepada kesejahteraan kita. Permerhatian berterusan hendaklah dijalankan untuk mengesan perubahan iklim dan pencemaran alam sekitar yang boleh mempengaruhi manusia dan habitat haiwan, terutamanya kepanasan global adalah isu utama pada kurun ke-21 ini. Kebelakangan ini, rangkaian penderia telah menjadi satu teknik yang penting dalam kebanyakan aplikasi, termasuk pemantauan, ukuran, pengawasn dan kawalan. Idea mengaplikasikan rangkaian penderia untuk pemantauan di bawah permukaan air telah menjadi semakin hangat. Dalam tesis ini, pembinaan penderia di bawah permukaan air yang boleh melakukan aplikasi pemantauan akan dibentangkan. Sistem dan teknologi untuk penderia di bawah permukaan air telah disiasat dan dikaji untuk pemahaman yang lebih mendalam. Beberapa penyelesaian yang mungkin untuk rekabentuk sistem tersebut telah dibincangkan dan sistem yang lebih sesuai untuk pemantauan berterusan akan dicadangkan. Melalui pembinaan sistem pemantauan penderia di bawah permukaan air ini, sebarang perubahan terhadap kualiti diharap dapat dipantau segera oleh pengguna, di mana terdiri daripada kumpulan atau organisasi penyelidikan yang berkenaan dan masyarakat.

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ABBREVIATION

A

ACK	Acknowledgement
ADC	Analog-Digital Conversion
ADO	ActiveX Data Objects
AMOUR	Autonomous Modular Optical Underwater Robot
AUV	Autonomous Water Vehicles

B

BAN	Body Area Network

C

CAT 5e	Category 5e
CDMA	Code Division Multiple Access
CSMA	Carrier Sense Multiple Access
CSMA/CA	Carrier Sense Multiple Access with Collision Avoidance
CTS	Clear to Send

D

DAC	Digital-Analog Conversion
DAO	Data Access Objects
DAQ	Data Acquisition
DCE	Data Communication Equipment
DCF	Distributed Coordination Function
DIFS	Distributed Inter Frame Space
DSSS	Direct Sequence Spread Spectrum

	DTE	Data Terminal Equipment
E		
	E-ITRC	Energy efficiency & Innovative Time Reduction Communication
F		
	FCC	Federal Communications Commission
	FDMA	Frequency Division Multiple Access
	FTP	File Transfer Protocol
G		
	GPS	Global Positioning Systems
	GUI	Graphical User Interface
H		
	HDLC	High-Level Data Link Control
I		
	IBM	International Business Machines Corporation
	IDE	Integrated Development Environment
	IEEE	Institute of Electrical and Electronics Engineers
	IP	Internet Protocol
	ISI	Inter Symbol Interference
	ISM	Industrial, Scientific and Medical
	I/O	Input / Output
L		
	LAN	Local Area Network
	LCP	Link Control Protocol
	LR-WPAN's	Low-Rate Wireless Personal Area Networks

M

MAC	Medium Access Control
MAN	Metropolitan Area Network
MIMO	Multiple Inputs, Multiple Outputs

N

NCP	Network Control Protocol

O

OFDM	Orthogonal Frequency Division Multiplexing

P

PAN	Personal Area Network
PC	Personal Computer
PCF	Point Coordination Function
PLAN	Protocol for Long Latency Access Network
PPP	Point-to-Point Protocol

R

RAD	Rapid Application Development
RDO	Remote Data Objects
RF	Radio Frequency
RFB	Remote Frame Buffer
R-MAC	Reservation-based Medium Access Control
RTS	Ready to Send
RTS/CTS	Ready to Send / Clear to Send
RTT	Round Trip Time

S

SIFS	Short Inter Frame Space

	SLIP	Serial Line Internet Protocol
T		
	TCP/IP	Transmission Control Protocol / Internet Protocol
	TDMA	Time Division Multiple Access
U		
	USB	Universal Serial Bus
	UTP	Unshielded Twisted Pair
	UW-A	Underwater Acoustic
	UWSN	Underwater Wireless Sensor Network
V		
	VB	Visual Basic
	VNC	Virtual Network Computing
W		
	Wi-Fi	Wireless Fidelity
	WPAN	Wireless Personal Area Network
	WSN	Wireless Sensor Networks
	2D	Two-Dimensional
	3D	Three-Dimensional