DEVELOPMENT AND EXPERIMENT STUDY OF ELECTRONIC WATER BOAT FOR EDUCATION PURPOSE

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours.

by

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FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING

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Disahkan oleh penyelia:

.....

TS. Wan Norhisyam Bin Abd Rashid

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DECLARATION

I hereby, declared this report entitled development and experimental study of electronic water boat for education purpose is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronic Engineering Technology (Industrial Electronics) with Honours. The member of the supervisory is as follow:

Signature: …….

Supervisor : TS. Wan Norhisyam Bin Abd Rashid

Signature: …….

Co-supervisor: En. Farees Izwan Bin Mohd Sani @ Ariffin

ABSTRAK

Bot air elektronik boleh digunakan dalam pelbagai aplikasi untuk tujuan yang berbeza. Dalam makalah ini, tumpuan utama adalah lebih kepada pendidikan di mana pelajar boleh membina bot mereka yang mesra pengguna, sambungan tanpa wayar (Bluetooth) dan bot autonomi. Bot harus mudah dipasangkan dan memainkan konsep supaya bahagian dapat dilampirkan dan dilepaskan dengan mudah untuk simpanan yang mudah. Selain itu, telefon pintar pengguna boleh disambungkan ke bot sebagai pengawal. Bot ini boleh menjadi autonomi dengan kebolehan mengelakkan halangan dan mengikuti arah yang telah ditetapkan dengan menggunakan sistem Unit Pengukuran Awal (IMU). Arduino Uno R3 akan menjadi otak bot yang mengendalikan dua 180 motor melalui pemandu motor, sensor ultrasonik, IMU dan peranti Bluetooth. Modul juga dibincangkan di atas kertas ini supaya pelajar dapat membina dengan mudah. Akhir sekali, garis panduan ini termasuk pengenalan, kajian literatur, metodologi, hasil dan perbincangan, kesimpulan, lampiran, pengakuan dan rujukan.

Terma Indeks-Sambungan tanpa wayar Bluetooth, bot autonomi, telefon pintar, penghalang mengelakkan kebolehan, IMU.

ABSTRACT

Electronic water boat can be used in many application for different purpose. In this paper, the main focus are more into education where student can build their boat which are user friendly, Bluetooth wireless connection and autonomous boat. The boat should be easy to plug and play concept so that the part can be attach and detach easily for convenient storage. Besides, user's smart phone can be connected to the boat as controller. The boat can be autonomous with obstacle avoid abilities and following the heading which been set with Initial Measurement Unit (IMU) system. Arduino Uno R3 will be the brain of the boat which control two 180 motor via motor driver, ultrasonic sensor, IMU and Bluetooth device. A module also discussed on this paper so that student able to build easily. Lastly, this paper outline include the introduction, literature review, methodology, result and discussion, conclusion, appendices, acknowledgement and references.

Index Terms—Bluetooth wireless connection, autonomous boat, smart phone, obstacle avoid abilities, IMU.

DEDICATION

This project is dedicated to my parents who are Ng Kum Seong and Lik Chee Keon for the knowledge and wisdom that have been taught to me for embrace myself to be better. This dedication to my supervisor Mr. Wan Norhisyam Bin Abd Rashid. Without his mentorship and encouragement, none of this will go on perfectly and smoothly. Lastly, I also dedicate to all my friends on their encouragement during this project.

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LIST OF SYMBOLS

MHz	-	Mega-Hertz
D	-	Dimension
cm	-	Centimetre
mm	-	Millimetre
V	-	Voltage
mah	-	Milli-Ampere-Hours
c	-	Charge
F	-	Forward
FL	-	Forward Left
FR	-	Forward Right
S	-	Stop
L	-	Left
R	-	Right
B	-	Backward
BL	-	Backward Left
BR	-	Backward Right
g	-	Gravity
Y	-	Connected / Detected
N	-	Not Connected / Not Detected
kHz	-	Kilo-Hertz
μs	-	Microseconds

LIST OF ABBREVIATIONS

RC	Radio Control
ARF	Almost Ready to Float
RPM	Revolutions per Minute
STEM	Science, Technology, Engineering and Mathematic
RF	Radio Frequency
IMU	Initial Measurement Unit
DC	Direct Current
GPS	Global Positioning System
PID	Proportional, Integral, and Derivative control
PVC	Polyvinyl Chloride
SPP	Serial Port Protocol
PC	Personal Computer
VCC	Voltage Common Collector
GND	Ground
TXD	Transmitter
RXD	Receiver
DOF	Degree of Freedom
MPU	Motion Processing Unit
MEMS	Micro-Electro-Mechanical Systems
SCL	Serial Clock

SDA	Serial Data
NCS	Chip Selection
AD0	Analog Digital 0
INT	Interrupt
FSYNC	Frame Synchronisation
AUX_CL	Clock Auxiliary Port
AUX_DA	Data Auxiliary Port
I2C	Inter-integrated Circuit
SPI	Serial Peripheral Interface
LSB	Least Significant Bit
GUI	Graphical User Interface
LED	Light Emitting Diode
PWM	Pulse Width Modulation
IOS	IPhone Operating System
QR	Quick Response

CHAPTER 1

INTRODUCTION

1.1 Background

Radio Control (RC) such as plane, drone, cars and trucks, helicopter and trains are famous in the world today but boat has the most popular aspect of RC Modelling for ages and have several form like scale replicas, racing hydroplanes, deep vees, airboats, and sail boats. These may move by either electric motor, glow engines, gas engines, or even steam engines and build by either wood, fibreglass, or moulded plastic.

Wood-made boat are known as the most complicated to assemble as the hull is normally created by numerous pieces of wood fitted onto a structure. So, the boat must be taken well care to make sure the hull is water-tight and the wood is completely painted or resin to protect it from the water. Wooden boats are usually the least high-price boat kits but need the most work to finish. Fibreglass-made boat come along with their hulls preformed with very little assembling require such as establish the deck and install running hardware and radio equipment. Fibreglass kits use to be the most high-price as most work is performed by the manufacturer in set up a fiberglass hull. Boats created from ABS plastic are becoming very famous as they combine the simplicity and easy of unite in very low production costs so the boat that is Almost Ready to Float (ARF) can be obtained for much less price than a fiberglass same goes to with much less job needed to complete. With these boats, both the hull and the deck are formed and usually will be already combine at the manufacture. Nevertheless, many of these equipment come along with motor and running hardware installed which is the radio and decals.