ANTI – NAPPING SYSTEM

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This report is submitted in partial fulfillment of the
requirement for the award of Bachelor of Electronic (Industrial Electronics) With Honours

Faculty of Electronic and Computer Engineering
Univeriti Teknikal Malaysia Melaka

April 2009

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UNIVERSTI TEKNIKAL MALAYSIA MELAKA
FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER

BORANG PENGESAHAN STATUS LAPORAN
PROJEK SARJANA MUDA II

Tajuk Projek : ANTI NAPPING SYSTEM

Sesi Pengajian : 2/2008/2009

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I dedicate this to both of my lovely parents and family, a person that love and need most for giving me a support, all my lecturers, and all my friends.

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ACKNOWLEDGEMENT

I would like to take this opportunity to thank everyone whom had given their support and help throughout the whole period of completing this project.

First and foremost, I would like acknowledge the endless help and support received from my supervisor, Pn. Hazura Binti Haroon throughout the whole period of completing this final year project. Her guidance has really been the main source of motivation and has driven me in completing this project successfully.

Finally, I would like to thank all my fellow colleagues and family for their generous support, assistance and ideas in completion of this project.

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ABSTRACT

The primary purpose of the Anti-Napping Device is to develop devices that can prevent a student from falls asleep in class and stay awake without disturbing their surrounding. In order to accomplish this project, two stages are considered as the solution to this project. The main objective of this project is to develop a pair of devices that eventually detect when a person falls asleep and wake the students through vibration. For the detecting stage, the force sensor is attached at a pen and it measures the user's grip to monitor their state. After the monitoring stage, the collected data is transmitted using RF module to a microcontroller and the microcontroller digitizes the digital data. If the force falls below a certain threshold, the microcontroller makes a decision which alert should be activated. For the alarm system, two DC motors is used as a vibration device. In addition, the project code is developed in C language and then converted to hex code that was readable for microcontroller. This device acts like a portable alarm, simple and user-friendly.

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ABSTRAK

Projek ini bertujuan membina sebuah alat pencegah mengantuk untuk mencegah para pelajar dari mengantuk semasa berada di dalam kelas dan seterusnya memastikan mereka tidak menganggu proses pembelajaran di dalam kelas.Dalam memenuhi keperluan dan menjayakan projek ini, terdapat dua bahagian penyelesaian utama dalam projek ini. Objektif utama projek ini adalah untuk menghasilkan sepasang alat pencegah mengantuk yang boleh menghalang dan mengelakkan para pelajat ini daripada mengantuk semasa di dalam kelas dan seterusnya menggunakan getaran untuk menggerak mereka. Untuk bahagian pengesanan, satu pengesan daya telah digunakan, dilekatkan pada sebatang pen, dan seterusnya pengukur daya in berfungsi mengukur kadar kuantiti genggaman jari pada pen tersebut. Selepas proses pemantauan dilakukan, kesemua data yang dikumpul dan dihantar oleh penghantar and penerima kepada pengawal mikro dan seterusnya memproses data tersebut dalam bentuk isyarat digital. Jika daya yang dikesan berada pada bawah tahap voltan yang ditetapkan di dalam pengawal mikro, maka pengawal mikro membuat keputusan untuk mengaktifkan alat amaran. Untuk memberi amaran, dua buah DC motor telah digunakan sebagai alat untuk memberi amaran kepada pengguna. Selain daripada itu, projek ini menggunakan kaedah perisisan bahasa C dalam menghasilkan dan menukar bahasa kod yang boleh dibaca oleh pengawal mikro. Alat ini bertindak sebagai sebuah alat mudah alih dan mudah digunakan.

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LIST OF ABBREVIATIONS

ABBREVIATIONS	FULL TERMS
PIC	Peripheral Interface Controller
TX	Transmitter
RX	Receiver
RF	Radio Frequency
SAW	Sound Wave Resonance
TTL	Transistor-Transistor Logic
NSF	National Sleep Foundation
DC	Direct Current
AC	Alternating Current
RAM	Random Access Memory
EPROM	Erasable Programmable Read-Only Memory
MCLR	Medium Capacity Long Range
LED	Light Emitting Diode

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CHAPTER 1

INTRODUCTION

Nowadays, evolution of technologies has been assimilation into the entire life without realized it make our life easier. Nevertheless, these technologies have it own advantages and disadvantages that can give good or bad impact depends on how to utilize it. This project is discovered because of this increasingly widespread technology exposure. Furthermore, this project is designed to produce a gadget that very useful to consumer and corresponding to global technology.

1.1 Overview

According to a new study by National Sleep Foundation (NSF), drowsiness cause over than 1,600 adolescent is falling asleep in class at least once a week. Most of adolescents admit to cranky, depressed, and too tired to exercise [1]. In addition, they are often driving drowsy, and half of all teens who drive reported that they have done so at least once in the past year. Kyla Wahlstrom, director of the Center for Applied Research and Educational Improvement (CAREI) at the University of Minnesota told ConsumerReports.Com [2]:

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"*This is 9 to 9 1/2 hours of enforced sleep that a teen's body wants. It is not shift able; it is fixed. Kids sitting in classes before 8 a.m. are biologically, still in sleep mode."*

Drowsiness is a state of decreased awareness or alertness associated with a desire or tendency to fall asleep. Almost everyone has felt drowsiness before, usually due to normal tiredness from a long day or lack of sleep. Several approaches have been developed to detect drowsiness [7]. Also because of that, this project is discovered to develop a device that can detect drowsiness especially in order to prevent accidental napping in the class. In addition, a device that can help prevent accidents due to adolescents' drowsiness in class could realize a great saving in human life.

The system is composed of two devices; one is attached at a pen at the user's hand and the other one is placed inside their pocket. The project is split into the drowsiness detection system, microcontroller and programming, and the feedback warning.

The drowsiness detection is consists of sensor circuit. In order to accomplish the project, the application of force sensor is used to measure their grip. The sensor circuit is designed to detect if the person release the pen by measuring and determining the alertness state of force exert by the user grip. This system communicates wirelessly using RF transmitter and receiver. In order to detect the user's grip, the sensor must have a reasonable range and transmit the signal information to the pocket device. Based on the signal from the handheld device, it can determine if the user nodded off and delay before taking action to wake up them. If there is no action from the user, the PIC will send another signal to increase the vibration. The PIC acquires a digital signal from the receiver and then activates the motors to awaken the user. This device is designed for everyday use, not to bother anyone and be able to help avoid wasting time passed out. Ideally, this system should be easy to use, and the sensitivity settings can be easily adjusted so that it does not constantly trigger the motor.

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1.2 Problem Statement

At some point in a college student's life, they may unintentionally fall asleep in class. Tired students may have a tough time staying alert when they need to be in class or while studying. Consequently, the process of lesson will be slowed down and it can be a distraction to other students. Sleeping in class also can signify another problem that warrants your lecturer attention. This is the motivation by doing this project; to create a system that can help students to stay awake without causing disturbing to their surroundings.

1.3 Project Objective

The objectives of this project are:

1) To design a pair of devices that eventually detect when a person falls asleep and wake the user through vibrations.

2) To integrate between PIC microcontrollers with RF module to create a pen-pocket devices as alarm system.

3) To design a system that does not cause a disturbance to others around.

All the project objectives are elaborately in detail explanation.

1) To design a pair of devices that eventually detect when a person falls asleep and wake the user through vibrations.
   - The aim of this project to develop a pair of devices, one is attached at the pen and the other one in pocket. This device intends to detect the alertness state when the person (student) fall asleep through a sensor and wake the person through motor vibration.

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2) To integrate between PIC microcontroller with RF module to create a pen – pocket devices as alarm system.

   - The integration between PIC microcontroller with RX and TX module in order to create a pen- pocket device as alert device including the sensor must be able to measure the correct user's grip within a specific range, and should be able to send data to the RF transmitter. Besides, the devices should be able to communicate wirelessly up to a distance of 10 feet. The PIC microcontroller should be able to process the signal and be able to activate the vibrator motor following a 6-second delay after the sensor reading falls below a certain range.

3) To design a system that does not cause a disturbance to others around.

   - To create a system that can wake students in drowsiness situation without causing a disturbance to those around them. In addition, the vibrator should be sufficient power to wake the students up.

1.4 Scope of Project

This project is subjected to several scope and limitation that are narrowed down to the study. In addition, the scope of this project is developing a pair of devices, one is a handheld device (pen) and one is a pocket device. The system is consisted of components interfacing with each other. For designing and testing purpose, each component is divided into separate block.

i) Force sensor circuit

a. To detect the amount of force exerted by the user
b. Use RF modules to transmit the signal.
c. This circuit is designed by using PROTEUS software.

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ii) Pocket circuit

a. Use LED as an indicator.
b. Use RF modules to receive signal for sensor circuit.
c. Use DC motor as an output, in other words this motor operates as feedback warning system.
d. This circuit is designed by using PROTEUS software.

iii) Microcontroller and Programming

a. Language to use is C language to develop coding and MicroC Compiler is used as compiler.

The handheld device is composed of a force sensor, op-amp, and RF transmitter which to detect the amount of force exerted by the user's. This signal transmits a digital signal using RF modules to the PIC. For pocket device, it is composed of a receiver, PIC, and two vibration motors. In order to accomplish this project, a force sensor is used to determine the amount of force exerted by the user's grip at the pen. The scope of this project also required studying the force sensor that suitable for the sensor circuit design. The PIC controller is the centre control unit of the pocket device. It acquired a digital signal from the receiver. The simulation for system is done first prior to prove the circuit able to produce the desired output. The project also comprising hardware design rather than just simulation

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