CONTENTS

ABSTRACT i

PREFACE iv

CONTENTS v

CHAPTER 1: INTRODUCTION 1
  1.1 General Introduction 1
  1.2 Definition 2
  1.3 Importance of the technology 2
  1.4 The application of ES 3
    1.4.1 Size & weight 3
    1.4.2 Efficiency 3
  1.5 The Downfalls of ES 4
  1.6 Advantages of the μC based system 4
  1.7 Functional block diagram of an ES 4
  1.8 Types of ES 7
    1.8.1 Standalone ES 7
    1.8.2 Networked ES 7
  1.9 Development of the Technology 8
  1.10 Present Investigation 11

CHAPTER 2: PROPOSED WORK 12

CHAPTER 3: HARDWARE DESIGN AND IMPLEMENTATION 14
  3.1 System Design and Implementation 14
  3.2 Hardware design and Implementation 14
    3.2.1 Component selection and description 15
    3.2.2 The Sensor unit 15
    3.2.3 The ADC unit 16
3.2.4 The µC unit
3.2.4.1 AT89S52 µC unit
3.2.4.1.1 Core features
3.2.4.2 PIC16f877 µC unit
3.2.4.2.1 Core Features
3.2.5 The LCD
3.2.5.1 Enable line
3.2.5.2 The R/W line
3.2.5.3 The RS line
3.2.5.4 The steps in writing data to the LCD
3.2.5.5 The steps in reading data from the LCD
3.2.6 External Memory unit
3.2.7 Real Time Clock unit
3.2.8 Power Supply unit
3.2.9 The Driver unit
3.2.9.1 The ULN2003
3.2.9.2 The MAX232
3.3 Fabrication of the system
3.3.1 8051 based design & fabrication
3.3.1.1 Phase I
3.3.1.2 Phase II
3.3.1.2.1 The operation of four keys
3.3.1.3 Phase III
3.3.1.4 Phase IV

CHAPTER 4: SOFTWARE ASPECT

4.1 Introduction
4.2 Algorithm of the stepwise development of software for the system
4.3 Interfacing ADC0809 with µC
4.4 Interfacing memory to the µC
4.4.1 Algorithm for writing data to the memory
4.4.2 Algorithm for reading the data from the memory