PREFACE

Present day all the test and measurement instruments are handheld and portable that can measure different basic parameters in electronics like voltage, current, and resistance. On the other hand the parameters like capacitance and inductance test instruments are not cheaper as that of others and also they are bulky because of their design and do not have features like digitized reading, storage, ruggedness, transportability.

Several experimenters developed different techniques for the of capacitance measurement and variety of instruments for Capacitance measurement are available. In the present study an attempt has been made by the author to develop a handheld, good features and low cost of microcontroller based capacitance meter. The Capacitance of a capacitor is a measure of the ability to hold charge. The external factors such as temperature, humidity, radiation effects, mechanical action, intensity and frequency of change of an electric field etc. also play an important role in attaining more reliable value of capacitor.

Conventional methods suffer from many disadvantages; these include construction of accurate and more reliable frequency generator and the components that are used as internal reference to arrive at Capacitance value. The present work of Microcontroller based Capacitance measurement offer many advantages, these include digitizing the Capacitance value much prior to display, direct display on LCD with

proper suffixed values, storing the Values in memory and sending the measured values out of the instrument using serial port with personal computer. The work presented in the thesis is divided into four chapters, each chapter being sub-divided into several sections.

The first chapter consists of the preliminary concepts of understanding of the Capacitors, their types and its properties like power factor and impedance. Section 1.3 gives a brief review of different measurement techniques. Section 1.4 and Section 1.5 deals with the old measurement techniques. The final section 1.6 gives the general information of the future of the capacitors.

The chapter 2 is completely dedicated for the detailed study of Microcontroller 89c52. section 2.1 is an introduction to single chip microcomputer. Section 2.2 gives an introduction of different architectures followed for the high level digital design. Section 2.3 tells in detail about the Harvard architecture which is followed in present day microcontrollers. Section 2.4 gives an idea how timing and frequency related issues are implemented in microcontroller. Section 2.5 deals with brief explanation of timers and counters available in microcontroller. Section 2.6 tells us how a serial port is used communicate to external world. Section 2.7 gives and idea how the Harvard architecture is extended and forms different IC that enhance the features including 12 bit ADC and many more.

The chapter 3 tells the hardware designed and developed in detail for the Capacitance Measurement Unit. The section 3.1 gives complete idea of the principle involved in arriving at the Capacitance value. The section 3.2 divides the complete unit into blocks and then the successive sub sections deals with the explanation of each sub section.

Chapter 4 is devoted for software development, discussion of the results. The aim and scope of the system is presented in section 4.1. The section 4.2. deals with the software features supported in KEIL cross compiler. Successive sections 4.3, 4.4 and 4.5 deals in detailed description about the features available for various operations that are generally used by programmers with respect to software design of embedded system. Next section 4.6 is for explaining the flowchat for the software designed. Next few sections 4.7, 4.8 and 4.9 deal with the tabulated results, their deviation with the actual values, the display section of the unit and conclusions.

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