

IN THE NAME OF ALLAH, THE BENEFICENT THE MERCIFUL

LOW COST DIGITAL BASIC MATHEMATICS RULES LEARNER KIT

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Abstract- In this paper, a low cost microcontroller based digital learner kit has been constructed with ATmega128 and its software is written with basic language (Bascom software). This learner kit can help a student to learn the basic mathematics rules. Mathematics rules about algebra, trigonometre, measurement and calculus are included in this device. In third world country the price of paper and pen is more than other developed country. This device also saves paper and pen because a student can justify and examine himself about the mathematics rules by this device. Our device is unique because someone buys this device then he also saves money instead of paper and pen.

Index Terms— 40 * 2 LCD Display, ATmega128, Mathematics rules

1 INTRODUCTION

Education is a backbone of a nation. A nation is so fast where technology is so fast. Technology depends on science. Science has an important relation with mathematics. Mathematics has many rules which need to solve many mathematics problem. It is very important to learn mathematics rules for a student. Now a days we get mathematics rules in a book but the different rules consist in different books. We get all the mathematics rules in a paper which is always hanging on the wall near the student table. After learning the mathematics rules a student justify himself by writing those mathematics rules. Paper and pen are needed for this purpose. We design a digital mathematical learner kit where mathematical rules are displayed on the LCD. In this device gives an opportunity for exam. This exam also MCQ based. Some questions also displayed with option on the LCD. There is an opportunity to give answer. Insha-allah this device also helpful for student and save paper and pen.

2 GENERAL OVERVIEW OF THE SYSTEM

The mathematical based learner kit display system basically consists of four blocks as shown in figure (2). They are AVR microcontroller (ATmega128), key button, display unit, 5v power supply. A detail description of each block has given below.

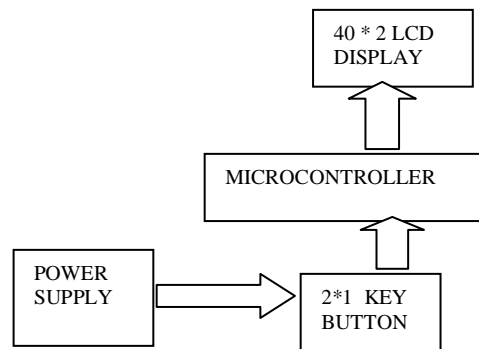


Fig.1 Block diagram of the proposed device.

2.1 MICROCONTROLLER (AT MEGA 128)

AT MEGA128 is one of the most popular microcontrollers used specially in automotive, industrial appliances and consumer applications. High-performance, Low-power Atmel AVR 8-bit Microcontroller. 128 Kbytes of In-System Self-programmable Flash program memory. Besides that other remarkable features are:

- 1) 4 Kbytes EEPROM, 4 Kbytes Internal SRAM, two 8-bit Timer/Counters with Separate Prescalers and Compare Modes.
- 2) Two Expanded 16-bit Timer/Counters with Separate Prescalers and Compare Modes Capture Mode.
- 3) Real Time Counter with Separate Oscillator.
- 4) Two 8-bit PWM Channels. I/O and Packages.
- 5) 53 Programmable I/O Lines, 64-lead TQFP and 64-pad QFN/MLF.

- 6) Reliability Qualification results show that the projected data retention failure rate is much less than 1 PPM over 20 years at 85°C or 100 years at 25°C.

2.2KEY BUTTON

We have only used five key buttons. Buttons are connected to PB0-PB4 sequentially. The first three button use for select option. The fourth button act as a next button .The fifth button is use for continuation. To prevent the debouncing and to balance the current we have used 320 resistors microcontroller pin to ground.

2.3 DISPLAY BUTTON

In our project we used 40*2 LCD (Liquid crystal display). We connect the data port of LCD (D4 - D7) to microcontroller PORTD (PD2 - PD5).The RS and E pin connected to the PORTD.0 and PORTD.1 accordingly .The RW and Vss pin of LCD connected to the ground. 5v power supply also connected to Vcc pin of LCD.

2.4 POWER SUPPLY

For both LCD and microcontroller requires 5v DC supply .The power supply unit is designed which consist 230 v transformer is used with output voltage of 9v. There also used four IN4007 diodes for making bridge rectifier. Bridge rectifier also used to convert AC to DC supply. There used capacitor (1000µF) to minimize the ripple voltage and smooth the DC voltage.

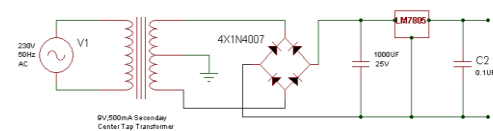


Fig. 2 Circuit diagram of 5V power supply

3 METHODOLOGY

We write a programme in Basic language for operating the device. We have done it by bascom compiler. We load the data in atmega128. By using the key button mathematics rules in different section, question for exam, decision of exam (right and wrong) and score of exam can be displayed. A 40*2 LCD is interface with the microcontroller which can be displayed. There is a next button also .Another Mathematics rule displayed if someone press next button

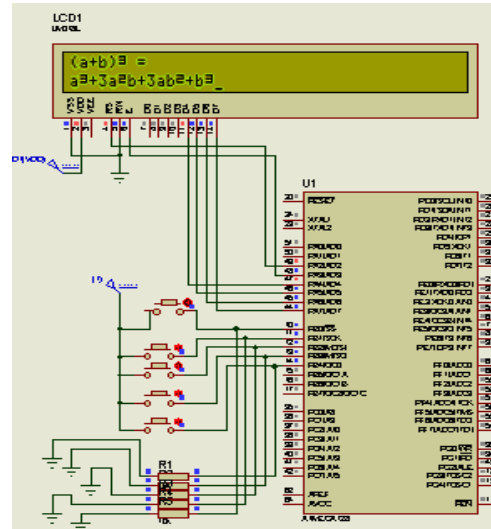


Fig. 3 Proteus simulation of device when rules are displayed

The format of the question as like as multiple choices. There are some selected buttons for giving answer.

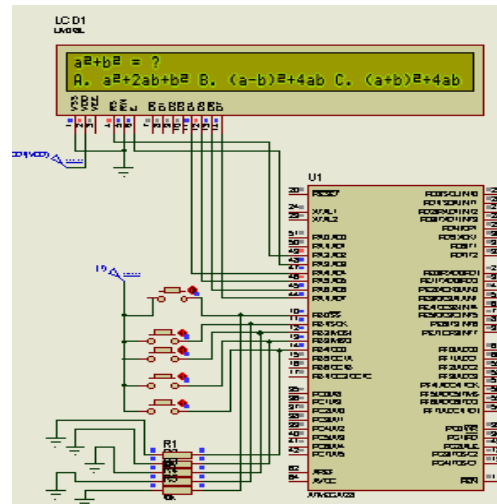


Fig. 4 Proteus simulation of device when question is displayed.

The score of exam formed as like as if the answer is right then it gives 1 point and if wrong then it deducts 0.25 point. There is a continue button also.

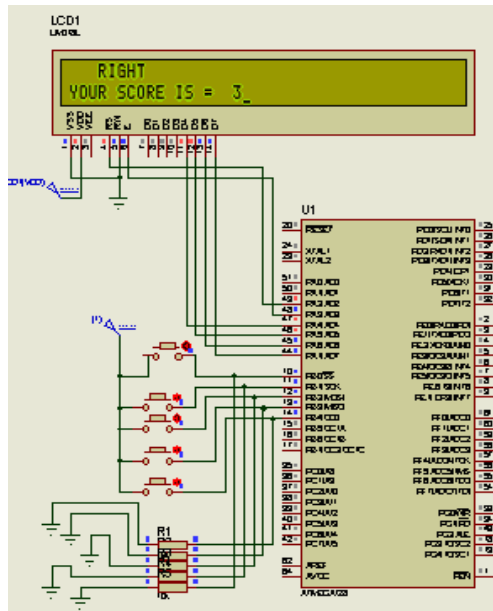


Fig. 5 Proteus simulation of device when decision and score is displayed.

After reaching last rule or last question someone can go option by using this button. All type of instruction is written in Basic language. The flowchart are represents also.

4 ADVANTAGES OF OUR PROPOSED DEVICE

1. Cheap and easily affordable.
2. Easily portable.
3. It can be used as a self learning device.
4. It can be used as a self examined device
5. It is low energy consumption device.
6. The device is attached with rechargeable battery. So it can carry anywhere

5 LIMITATIONS OF OUR PROPOSED DEVICE

1. It can not show fraction as well as written in books.
2. Memory limitations.
3. The mathematics rules for higher study are not available

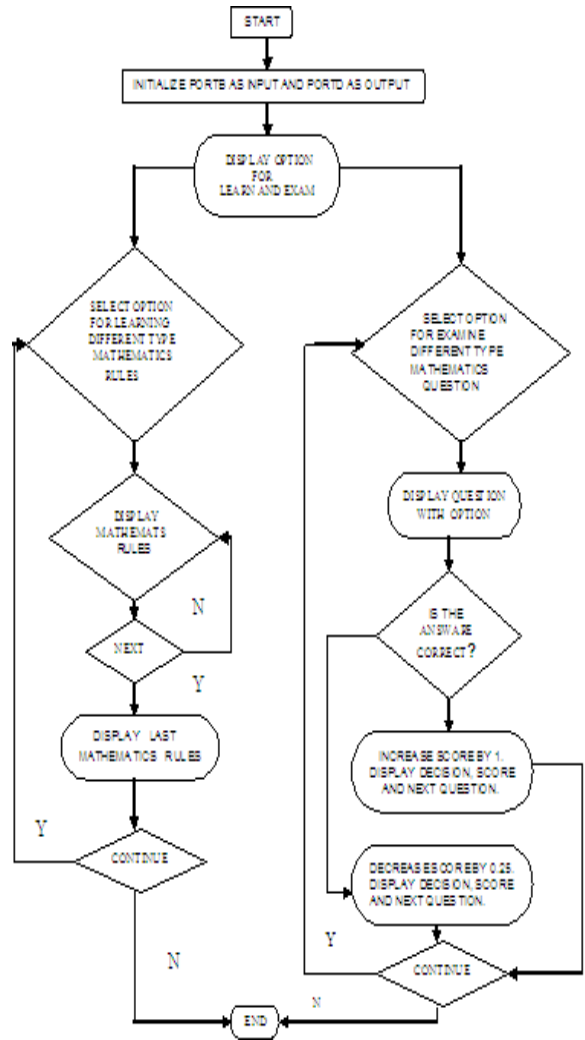


Fig. 6 Flow chart of the software

6 CONCLUSION

This is a microcontroller based mathematics rules learner kit .this system is so unique in the sense that ‘O’ level and ‘A’ level students are benefited by this device. Algebra, Trigonometry, Measurement, Calculus (Integration and Differentiation) based mathematics rules are included in this device. The important feature is that a student can justify himself by giving exam in this device. The exam is so interesting because this device gives number which is like as a game. This device also saves paper and pen. at the end the learning and exam system in this device is so enjoyable.

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