

An Alarm System for Effective and Gentle Brushing Method to Avoid the Mouth Problems

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Abstract - In this Article Researchers introduced a sensible and effective device for easier and harmless brushing. Some people brush our teeth ones or three times a day for minimize oral health issue. But how much time period we should give for teeth brushing? Many more dentists have always been suggested to people the exact time limit required for tooth brushing. But not all people are follow dentist suggestions and some people give undefined time period or some not give defined time period for brushing. when you start brushing too much you can ultimately damage your teeth and neglect on period of brushing time may cause harmful impact remove enamel on teeth, tooth sensitivity, gum irritation, etc. By limiting a brushing period to 2 minutes this problem of teeth can be resolved. This is often done by design a timer circuit which might helps to limit the brushing period within a regular time. Timer device is user friendly. If time limit exceeds an alarm will warn to user by sounding a beep. This study is useful in avoiding a mouth problem associated with tooth and gums. Mostly this device is useful for the kids within an age limit of 5 to 12 year.

Index Terms - Sensitivity, Timer, teeth, brushing.

I.INTRODUCTION

At the end of 19th century miller wrote that to prevent calculus deposits a patient can prepare brushing after meals. For the cleaning of teeth Brushing is the primary mode by which teeth of human can prevent from diseases [3]. Good health of teeth has great important in maintaining the health of the oral as well as general health is well known. To Prevent Oral Diseases, use of fluoride toothpaste, dieting, plaque control can helpful. Such as diet, use of Fluoride, Plaque control are globally known as good oral health behaviors. For all age of groups, it is widely recommended that twice tooth brushing with fluoridated toothpaste. Also great plaque control, prevention of caries, gingival health control are leads by the good oral hygiene practices [4]. For the

measurement of cleaning capacity of teeth there was limited quantitative methods, also it was critical because of variety of size and shape of toothbrush and different tooth brushing methods. In this lack of possibilities considerable data on toothbrush was published in the 20th century. Manual tooth brushing time is not specified. It is point out by Lasslo and Quintana by taking data in clinical trials of brushing. They observed that thoroughness in brushing and frequency of brushing may be more considerable in than the tooth brushing techniques [3].

To reduce plaque accumulation and risk of diseases related to plaque such as caries and periodontitis, a regular tooth brushing is perhaps the single important step can take by everyone. The inconsistency is found in relationship between oral hygiene and brushing time. However significant effect on plague removal observed in research on effect of brushing time on plaque removal. Because of this brushing time is an important determinant of plaque removal during the conventional tooth brushing. [1].

Hirschfield suggested in his investigation that people should brush for 2 minutes and in additional one minute rest of the mouth can clean. In 1946, its found that the average time spent in brushing was 67 second by Robinson. His conclusion was that, the amount of brushing is much less than that generally suggested time [3]. In a single day it is requirement to brushing at list twice with an effective technique for an at least two minute is general consensus oral health care professionals through specific recommendations from national dental association. However in general the brushing time is in between 30 second to just over 60 seconds. This time taken for brushing should affect the teeth and brushing should not be proper and to effects on brushing behaviour. In recent studies it is found that an average of 46 seconds time taken by adult. It is clear that considerably average time is less than 2 minutes [1].

The aim of this research article is to Focus on oral health problem created by over brushing. Using this novel research on required brushing time, human can reduce the teeth and oral health problems. So in this work a timer circuit is designed on brush which will helps to set require time for brushing. This is user friendly system and easy to handle. This study is useful in avoiding a mouth problems associated with tooth and gums. Mostly it is useful for the kids within an age limit of 5 to 12 year old.

II.REGULAR BRUSH

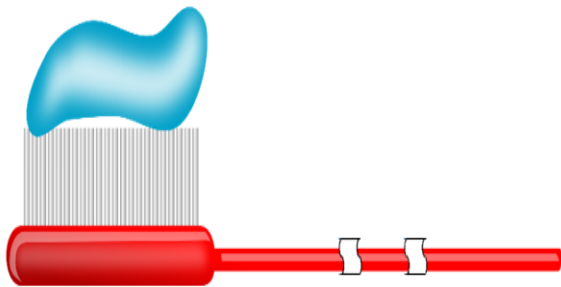


Fig. 1. Schematic diagram of regular toothbrush
 Fig 1. Shows the Schematic diagram of regular toothbrush. Daily brushing of the teeth removes plaque and helps prevent cavities. The main aim of tooth brushing at night and early in the morning is to remove small food particles remaining in the teeth after eating some food and bacteria from the mouth as possible to prevent oral health problems. Every person’s mouth has the bacteria that causes tooth decay in the mouth. When everyone eats sugary foods at that time also the bacteria eat this food and produce harmful acid, this acid damages the tooth surface i.e the enamel. Enamel is the thin outer covering of the tooth. This tough shell is the hardest tissue in the human body. Enamel helps protect your teeth from daily use such as chewing, biting, crunching, and grinding and over brushing. Regularly Brushing is very helpful for healthy teeth but dental experts warn that you can’t do over brushing. If you do over brush as compared to normal brushing time, it has harmful for tooth and tooth may damage i.e coating of teeth will remove and teeth get sensitive. This is called as “toothbrush abrasion”. In this article a novel technology is used to overcome brushing problem by introducing an alert system on brush inbuilt.

III.COMPLETE BLOCK DIAGRAM OF MODIFIED TOOTH BRUSH

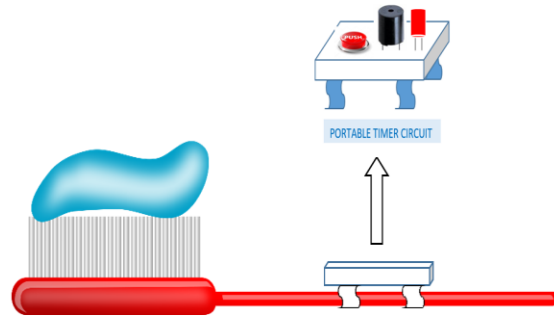


Fig: 2. Complete Schematic diagram of Modified brush

Fig:-2 shows the complete schematic diagram of the brush with gentle alarm system. In this toothbrush 2 Minute inbuilt Timer Circuit is used. It comprises of toothbrush, Ic 555, battery, LED, buzzer. Whose appearing is same as that of normal toothbrush but having LED and IC 555 mounted on the brush. The Timer is made with 2 min Predefined time. It indicates brushing time to the user after the end and User should stop brushing. A smart brush may be a normal brush having IC555 it which generate 2 minutes timer and pass to the buzzer. A tiny low battery is used to convey power to the IC 555 and LED and Buzzer. When timer will reach up-to 2 minutes then LED light will blink automatically as well as Buzzer generate bipbip sound. Once LED light will blink user will know that he needs to stop brushing. This Circuit will solves problem regarding mouth.

IV.WORKING OF TIMER CIRCUIT

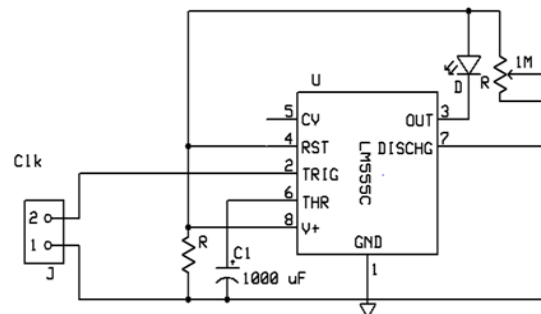


Fig : 3 Circuit diagram of Timer
 Fig: 3 Shows Complete circuit diagram of Timer. In this circuit diagram of timer IC 555, Resistor, Capacitor, LED, and Buzzer are used. For timer building Monostable multivibrator is used. When at

morning before we start brushing turn on this timer device at that time IC 555 Timer starts timer when switched ON. After 2 minute time duration, the LED/buzzer will automatically turn ON. Generally, the time duration for which Pin 3 of 555 Timer IC will remain high, can be derived by the given formula:

$$T=1.1 \times R_1 \times C_1$$

In this Formula there is flexibility for using resistor and capacitor values. In this timer capacitor having with 1000 μf , Resistor with 100 K Ω . After calculation it gives 120 second time theoretically. Practically it is verified and given in Table No. 1. In which multiple observations are taken and 98 % accuracy is given by the timer circuit of Monostable multivibrator with given values of resistor and capacitor. Output time for the circuit for given resistor and capacitor values is in between 115 sec. to 122 sec.. In this timer 5% tolerance may be allowed. Calculation for Timer with R = 100 K Ω and C= 1000 μf is as below.

$$T = 1.1 \times 100 \text{ K } \Omega \times 1000 \mu\text{f}$$

$$T = 120 \text{ Sec}$$

Table 1. Observation Table for Timer Circuit

Sr.No.	Resistor (K Ω)	Capacitor (μf)	Time (Second)
1	100	1000	115
2	100	1000	117
3	100	1000	118
4	100	1000	120
5	100	1000	122
6	100	1000	118
7	100	1000	114
8	100	1000	122
9	100	1000	120
10	100	1000	120

$$120 \text{ sec} = 1.1 \times R_1 \times 1000 \mu\text{f}$$

$$R_1 = 120 / (1.1 \times 1000 \mu\text{f})$$

$$R_1 = 100\text{K}$$

Hence, set the value of potentiometer (Preset) to 100k and timer will be set for 2 minute.

V.FLOW DIAGRAM OF MODIFIED TOOTHBRUSH

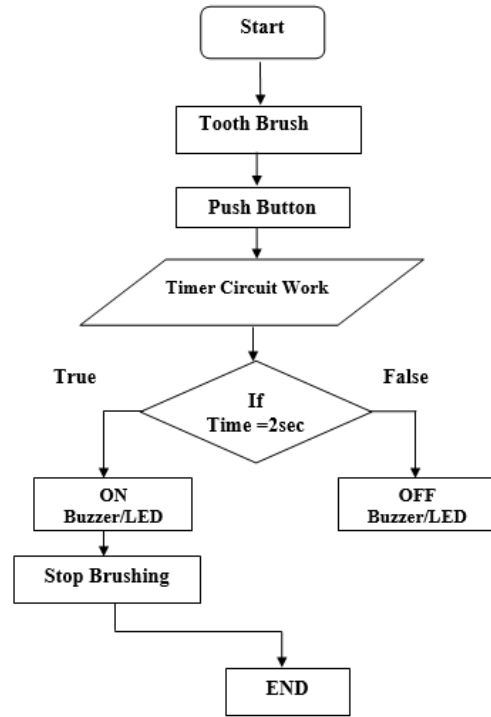


Fig.4. Flowchart for Working of modified toothbrush Fig:- 4 shows working process of smart toothbrush. In this chart condition and time limit is provided with 120 second. After 120 sec process of brushing will be complete and LED will glow with sound of alarm. It is an indication of to stop brushing.

CONCLUSION

An effective alarm system for an effective and gentle brushing method allows obtaining prevention of teeth from oral and teeth health problems by limiting a brushing period to 2 minutes. The observations are obtaining from daily use of brush with timer. An alarm system for effective and gentle brushing method has been suggested to avoid the mouth problems. This is useful to protect the teeth of individuals from Diseases. It is especially suited for implementation with everyone in the globe.

REFERENCE

[1] Andrew Gallagher, Joseph Sowinski, James Bowman, MS; Kathy Barrett; Shirley Lowe; Kartik Patel, Mary Lynn Bosma, DDS; Jonathan E Creeth, The Effect of Brushing Time and Dentifrice on Dental Plaque Removal in vivo

(The Journal of Dental Hygiene Volume 83 Issue 3 Summer 2009)

- [2] Anton Rahardjo¹ , Diah A. Maharani¹ , Bramma Kiswanjaya² , Erik Idrus³ , Julie Nicholson⁴ , Paul J. Cunningham⁴ , Fred Schäfer⁴ Measurement of Tooth Brushing Frequency, Time of Day and Duration of Adults and Children in Jakarta, Indonesia (Journal of Dentistry Indonesia 2014, Vol. 21, No. 3, 85-88 85 doi:10.14693/jdi.v21i3.251)
- [3] R.C.EMLING, K.C.FLINKINGER, D.W.COHE, S.L.YANKEL, A comparison of estimated versus actual brushing time (pharmacology ad therapeutics in dentistry 6: 93-98,1981)
- [4] Paulo Melo^{1*}, Charlotte Fine^{2*}, Sinead Malone³, Jo E. Frencken⁴ and Virginie Horn², the effectiveness of the Brush Day and Night program in improving children's toothbrushing knowledge and behavior (International Dental Journal 2018; 68: 7–16 , doi: 10.1111/idj.12410)
- [5] Himani Goyal "Understanding of IC555 Timer and IC 555 Timer Tester" International Journal of Inventive Engineering and Sciences (IJIES) ISSN: 2319–9598, Volume-3 Issue-2, January 2015
- [6] P. Tuwanut, J. Koseeyaporn and P. Wardkein, "A Novel Monostable Multivibrator Circuit," TENCON 2005 - 2005 IEEE Region 10 Conference, 2005, pp. 1-4, doi: 10.1109/TENCON.2005.300946