Research Paper

Volume : 4 | Issue : 5 | May 2015 • ISSN No 2277 - 8179

# Implementation of Circuits for Making Cost Effective Electronic Toys

Engineering

KEYWORDS : Implementation, Cost Effective and Electronic Toys

**Salma Shaheen** — Associate Professor, Faculty of Engineering and Technology, AMU, Aligarh

**Tazyeen Ahmad** — Professor, Faculty of Engineering and Technology, AMU, Aligarh

## ABSTRACT

*Competition is an inherent part of free or capitalistic economy. To compete with the rival, it is obligatory upon the company to modify their products to cause product differentiation and reduce cost by incorporating new technologies and new materials. This paper suggests implementation and testing of some low cost electronic toys circuit.*

*These toys will be very useful for poor children, especially for those who are desirous to play with electronic toys but not having sufficient money to purchase them. These cost effective toys are although simple and not having many features to play with. However, these toys would be the useful source to provide entertainment to the deprived children.*

## INTRODUCTION

Low cost electronic toys, especially those toys based on sound, need small and cost optimized circuit which can easily fit in the casing or body of the toy. Even if these circuits cannot be customized much by planning and programming, still these circuits will be cheap, quick to design and easy to cut down to a bare minimum and can easily be embedded in a garment of a toy.

For implementing each circuit, various electronic components are used and circuit is implemented on a piece of Printed Circuit Board (PCB) and then tested for its working.

In this section, two different cost effective circuits that can be used in electronic toys are implemented and tested. These circuits are Amplified Greeting-Card Sound Circuit and 7- Segment Display Reference. The total estimated cost involved in the implementation of these circuits are also tabulated and presented in their respective Tables.

### Amplified Greeting-Card Sound Circuit

Although this circuit is small and low cost, but it is capable of amplifying the audio coming from our laptop, computer, or mp3 player ("kobakant"). Figure 1 shows its implementation. For implementation of this circuit, list of items required along with their specifications are shown in Table 1.


**Figure 1. Implementation of Amplified Greeting-Card Sound Circuit By Researcher**

**Table 1 Specifications of Items Required**

| S. No. | Items | Specifications | Qty. | Cost in INR (₹) |
|---|---|---|---|---|
| 1. | Capacitor | 0.1μF, | 1 | 2 |
| 2. | Transistor | Tip122/ BD139 | 1 | 20 |
| 3. | Speaker | 8 Ω , 2watts | 1 | 10 |
| 4. | Battery | 9V | 1 | 15 |
| 5. | Push to on switch | | 1 | 3 |
| | | | | **Total Cost Approx.= 50** |

After implementation of circuit for Amplified Greeting-Card Sound it can be concluded that cost involved in this circuit is approximately ₹ 45 - ₹ 50. However there may be slight variations in the cost because of variation in the prices of the electronic components used.

### 7- Segment Display Reference

**Table 2 gives the details of items required for implementation of 7-Segment display reference circuit.**

**Table 2 Specifications of Items Required**

| S. No. | Items | Qty. | Description | Cost in INR (₹) |
|---|---|---|---|---|
| 1. | R1-R7 | 7 | 470 Ohms ¼ Watt resistor | 7 (1₹ each) |
| 2. | U1 | 1 | 74LS90 TTLBCD Counter IC | 20 |
| 3. | U2 | 1 | 74LS47 TTL Seven Segment Display Driver IC | 20 |
| 4. | D1SP1 | 1 | Common Anode 7 Segment LED Display LT 542 | 15 |
| 6. | Resistor | 1 | 2.2 KΩ | 1 |
| 7. | ON/Off switch | 1 | | 10 |
| 8. | Step down transformer | 1 | 6-0-6 / 500 mA | 32 |
| 9. | Capacitor | 1 | 2200 μF, 16 V | 10 |
| 10. | Capacitor | 1 | 0.1 μF | 2 |
| 11. | Diode | 2 | IN 4007 | 2 (1₹ each) |
| | | | | **Total Cost Approx.= 119** |

For implementation of this circuit it is important that all pulses to be counted are to be (Transistor Transistor Logic) TTL compatible. They should not exceed 5V and not fall below ground.

One can also add more digits by building a second (or third, or fourth, etc.) circuit and connecting the pin 11-6 junction of the 74LS90 and 74LS47 to pin 14 of the 74LS90 in the other circuit. One can keep expanding this way to as many digits as one wants. ("Aaroncake.net").

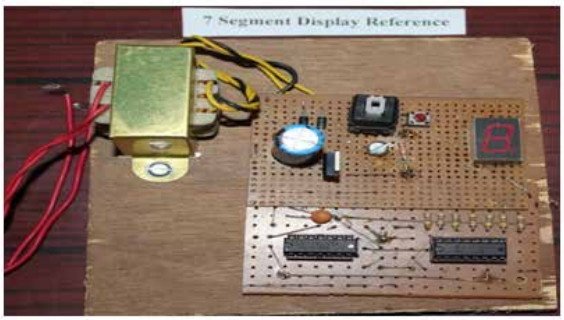


**Figure 2 Implementation of 7 Segment Display Reference Circuit by Researcher**

This circuit is implemented for general purpose counting and not for counting customers at doors of stores. That is why Light Dependent Resistor (LDR) is not used here. This circuit may be used in many educational toys for counting and learning numbers.

By using required items as shown in Table 2, a 7-segment display reference circuit has been implemented for which total cost which includes DC power supply is approximately ₹100 - ₹ 125.

Total cost for circuit of 7-segment may further be reduced by ₹ **7** if small push to ON switch is used in place of common ON-OFF switch. But this will affect the performance in terms of counting. Figure 2 shows the implementation of 7 Segment display reference by researcher.

For implementation of all the above circuits cost for signal source or input and DC power supply, wires, socket and boards is not included unless mentioned and emphasis is only on estimation of total cost of electronic components of each circuit is considered.

**CONCLUSIONS**

It may be concluded from this work that implementation of cost effective electronic circuits without compromising too much on the quality and performance of the toy, would lead to cost optimization. This reduced cost toy would be more useful for the lower strata of the society, particularly the deprived children in rural areas, and would thus lead to its increased popularity and marketing in rural areas.

For this work all the considered prices for calculation of cost are as per unit item and retail prices have been considered.

The wholesale prices of above components used in implementation of the circuits would be much cheaper and hence cost may further be reduced.

## REFERENCE

1. (kobakant) "How to get what you want", Open source hardware. Reterived from | http://www.kobakant.at/DIY | 2. (aaroncake.net) Reterived from | www.aaroncake.net