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Reusable Confetti Gun with Biodegradable Confetti

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Abstract: ***Confetti bombs are a popular way to celebrate special events and occasions, but the waste they generate is harmful to the environment. This research paper introduces a reusable confetti bomb that aims to reduce the environmental impact of traditional confetti bombs. The reusable confetti bomb is made from eco-friendly materials and can be refilled and used multiple times. The paper describes the preparation, usage, and testing of the reusable confetti bomb and presents the results of the tests. The findings suggest that the reusable confetti bomb is an effective and sustainable alternative to traditional confetti bombs***
Keywords: Reusable, confetti bomb, ecofriendly, sustainable, refillable, customizable.

I. INTRODUCTION

The fact that confetti cannons are simple to use, cheap and yet create high surprising moment, has let to its popularization among hardcore party enthusiast and among common people.

Even on a certain occasion party poppers or confetti cannons are not the most important thing but yet they have become so important that if not present you could literally feel its absence. It's not so hard to manufacture and is already so popular therefore companies make a great business out of it, worth noticing is that the design and idea of confetti has more or less never changed among people or the companies.

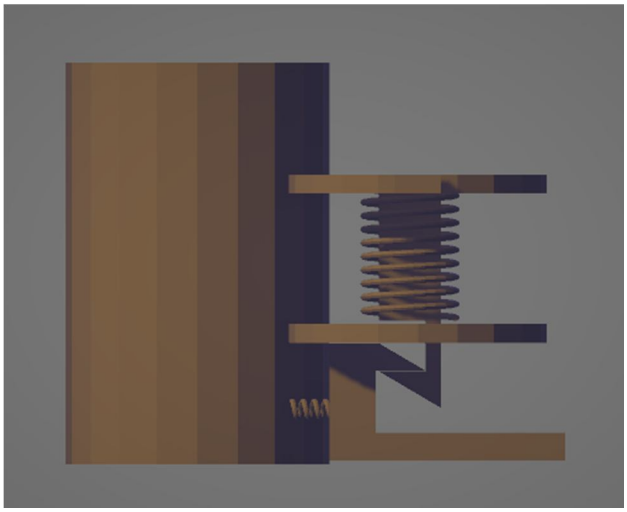
But have you wondered, in the middle of the party or a concert, "*What about these confetti now?*", I'm sure many of us has not thought about it, well at least not at the moment, and hence probably, never after. But thinking over this thought, we came to a new idea, 'Reusable confetti gun with biodegradable confetti', we exactly addressed the two main problems, firstly, reusable – reducing the number of confetti cannons per individual and secondly biodegradable – reducing the negative impact on environment if used in mass and/or outdoors.

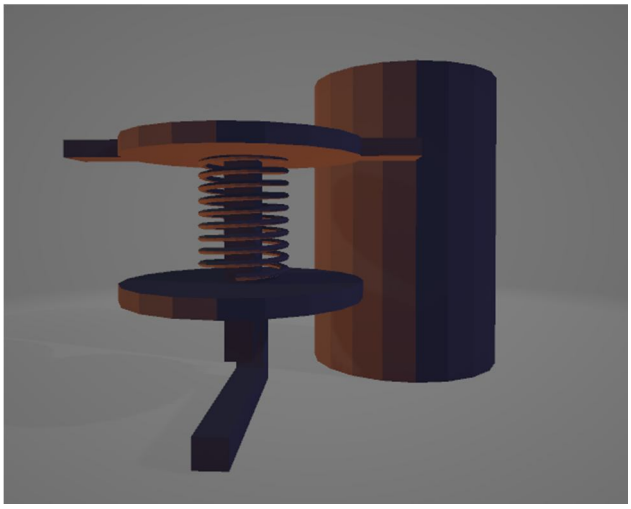
In the end people want 'element of surprise', which in case of confetti cannons and most others is 'sound' + 'visuals',

We made a simple prototype, which uses pull-lock spring mechanism, for pulling the platform on which the confetti rest until shooting in the air, and manually loading confetti into gun, and thus onto the platform and shooting it in air by using the trigger that releases the loaded spring.

In this prototype, we used curled wood shaves as an alternative to the traditional plastic confetti.

3D Model Preview





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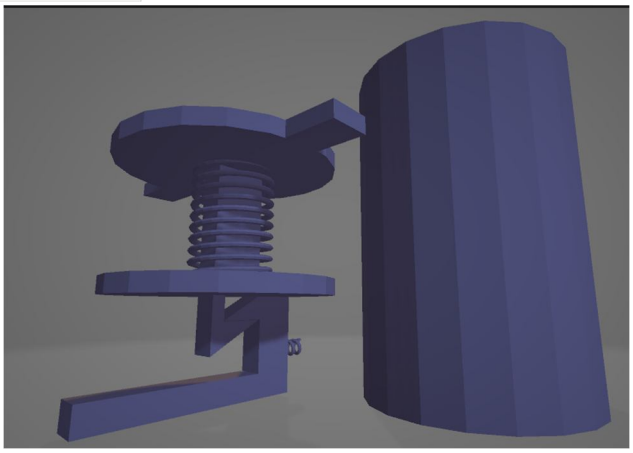

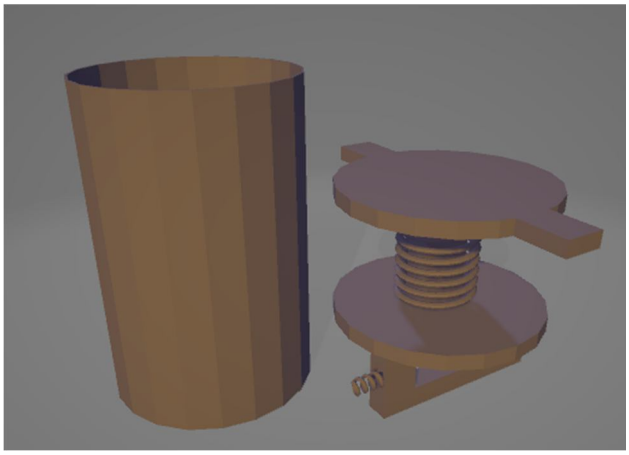

This is the model of overall structure and idea; the prototype is little varied from the model but main functioning is the same. We used free CAD modelling software Tinkercad to create this. Screenshots are taken from Microsoft app 3D viewer.

II. STRUCTURE

The gun (confetti gun), has two main components:

A. Outer Casing

The casing is the main body that support the inner mechanism, and also protects it. It extends than the ending of inner mechanism acting like a tube and is used to fill the confetti in and let rest, and provide trajectory for confetti once launched.

B. Inner Mechanism

Inner mechanism consists of simple spring, a loader, a trigger, and a platform. The required inner mechanism was reverse engineered and was found in a kid's toy gun. We used it for our prototype.

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III. MATERIAL USED & PROCEDURE

A. Components

1) Hollow P.V.C (Polyvinyl chloride) pipe:
Diameter (outer): ~ 4.0 ± 0.1 cm
Thickness: ~ 0.10 cm
Length: ~ 24.0 ± 0.1 cm
P.V.C pipe is used for outer casing.
Symmetric slits were cut into pipe, using jigsaw blade, so that the handle, trigger, and pull of the loader all could slide in pipe and a gap would remain to facilitate their usage.

2) Rubber Bands: For extra support, and clamping the clamps on outer body.
3) Clamps: Clamping outer body, shortening the slits and opening and thus making the whole prototype robust.
4) Foam: To seal the rear end of the pipe and fill the gaps between inside of the outer body and inner mechanism.
5) Hard Cardboard: To create platform on which confetti would rest.

B. Tools

1) Jigsaw Blade: Used to cut slits in P.V.C pipe.
2) Bench Vice: Used to hold pipe while cutting
3) Cyanoacrylate Adhesive (Fevikwik): Used to connect loader tip to the cardboard platform, and to harden some foam bits and pieces.
4) Scale (30.0 ± 0.1 cm), Pencil: Used for measurements and marking.

IV. MECHANISM

A. The Spring

The length of the spring is ~5.5 cm. It is only retracted and expanded along one axis, the unwanted movements of the spring are prevented by the casing from exactly opposite side of the gun and the slit provided for the same reason.

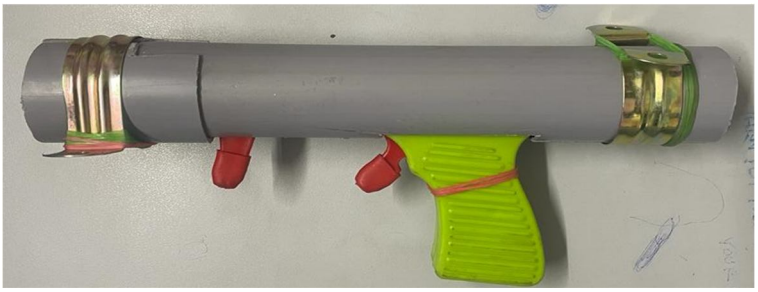
B. The Loader

The direct red rod connected with the spring is loader, when pulled from the yet another little rod connected to the loader, the spring is compressed, and gets locked by the trigger, the confetti is filled from top opening onto the platform and pushed a little to pack it.

C. Trigger

The small red trigger is always in tension in upward direction (anti-clockwise direction), when the loader is pulled the spring compresses, the small trail under the loader keeps the trigger down and when it ends, the trigger is locked and whole system is hold still by the trigger, when pulled down the spring expands to its natural length, the loader moves instantaneously and the momentum is transferred from spring to the tip of the loader to confetti, thus projecting it in the air.

V. FINAL PROTOTYPE (CONFETTI GUN)



Side view.

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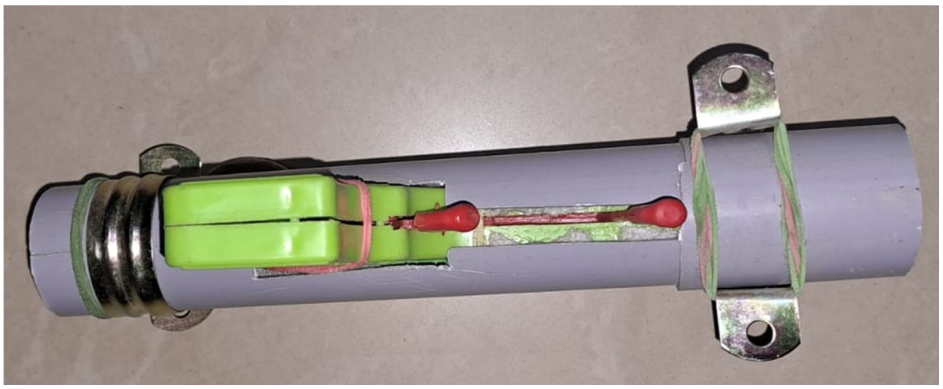
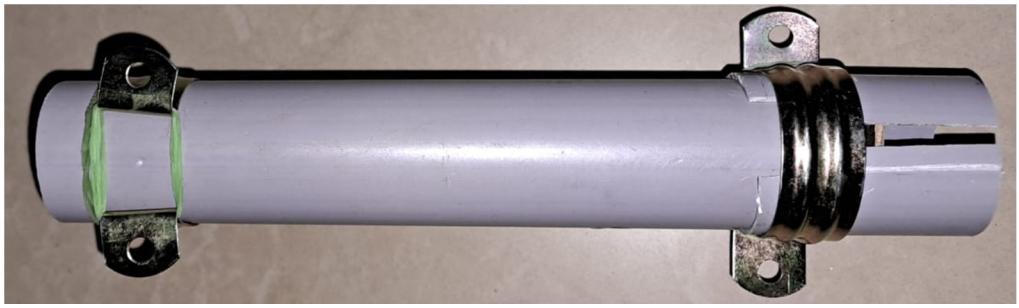
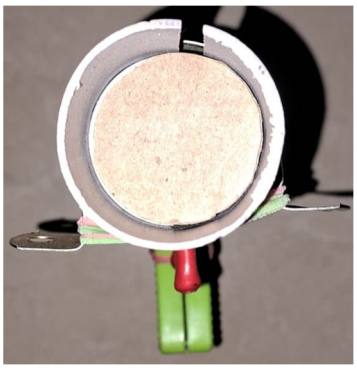


Bottom view.



Top view.



Front view.

Rear view.

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VI. BIODEGRADBLE CONFETTI

The flying confetti is the most important part of popping the party popper, and what catches the eye most is the sparkling colours and glitter of the confetti and plastic is the most widely used material for these reasons. Some papers used are recyclable but they don't always end up in the system and even if they do, the recycling is not easy. We used thin wood shaves which is left after some wood work is done, as the shaves are thin, they take almost 4 ~ 5 weeks to degrade naturally, compared to plastic (300 ~ 400 years) is pretty fast. Most likely the shaves were of pine. Wood shaves don't decompose into any harmful chemicals or other harmful materials. Now the confetti were ready, to make it more attractive we used food colourings to dye the shaves in bright colours. Instead of wood shaves, flower petals, leaves, flowers etc. could also be used to make moment more memorable and eco-friendlier.

Confetti. (Food colour dyed wood shaves)

VII. POSSIBLE IMPROVEMENTS & FUTURE SCOPE

1) Using refill system, hence reducing manual work of filling of confetti after each round is fired.
2) Using airtight platform for much better performance.
3) Changing the shape of the opening front allowing the confetti to spread more radially outwards after the shot, into the air.
4) Deleting the loading action and only keeping the refill and shoot actions.
5) Safety measures for different age groups or possible accidents.
6) Making continuous refills readily available
7) Using auxiliary sound system for providing much better element of surprise of sound, keeping the option for customizable sound as per the customer's request.
8) Customizable prints on the outer body as per customer's request.
9) Keeping the count of number of parts as less as possible for the use of 3D printers and printing them parallelly, fast and on large scale.

VIII. TEST RESULTS & CONCLUSION

1) The current prototype weighs ~ 65.52 ± 0.01 g.
2) Can shoot projectile of ~ 6.5 ± 0.1 g to ~ 0.7 ± 0.1 m in air, to ~ 1.0 ± 0.1 m away, at angle of ~ 45.0° ± 0.1°.
3) Can shoot projectile of ~ 6.5 ± 0.1 g to ~ 1.0 ± 0.01 m in air, radial spread of radius of ~20.0 ± 0.1 cm at angle of ~ 90.0° ± 0.1°.
4) Can produce enough sound to surprise.

From the collected data we can conclude that the first prototype does promises to solve the undertaken problem, and works according to the expectations from it. We also conclude that this is not the perfect execution of the idea but at least the closest thing to the under taken idea.

IX. ACKNOWLEDGEMENTS

We would like to thank our B.R.A.C.T.'s Vishwakarma Institute of Technology, Pune, our teachers and especially Prof. Milind Patwardhan who provided us with valuable guidance regarding analysing the problem as well as possible solutions.

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[4] https://www.youtube.com/watch?v=oWQwTs4dOEc

DECLERATIONS

Ethics approval and consent to participate:
Not Applicable

Consent for publication:
Not Applicable

Competing interests:
The authors declare that they have no competing interests.

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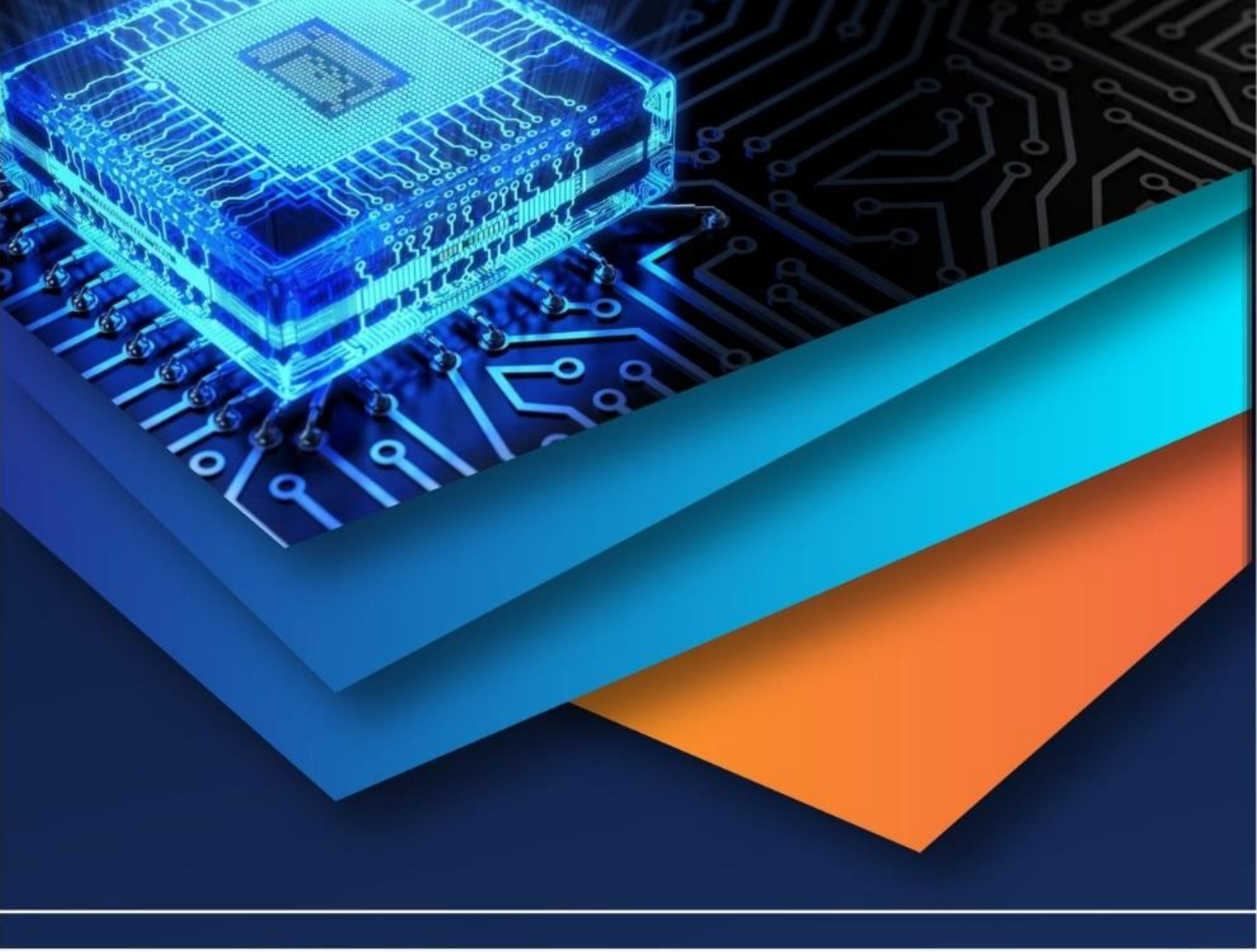
Authors' contributions:
NKK and LKK did all collection of all materials.
KMP and SSK measurements, marking and cutting, KVV 3D model and assembly.



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