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Propagating Sound in Air-Space Via a Threadline Balloon Flight.

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Abstract—With mechanisms of flight control by balloon, this research is describing propagation of sound by a balloon control system in an closed environment or atmospheric environment. Mechatronic means of traditional rope method is also a focus of research. This research is also practically possible to undertake in autonomous vehicle project or autonomous Drone project.

Index Terms—sound, balloon flight, control system, autonomy

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1 INTRODUCTION

The setup of propagating sound by a threadline balloon-flight[5] in airspace consists of a thread or rope to be tied at two fixed ends at the adjacent sides and a pipe attached to an inflated balloon [1,2,3] with also a sound device attached. The pipe creates the suspension and the flight drive created by the force of deflating balloon[4] attached to the rope. The sound device[6,7,8] is a record-play device which activates on pushdown button on the device.

The idea is a simple one, the device is attached to the deflating balloon, sound[9] will propagate in airspace on turn causing the sound to move from one fixed point to the other end. A flight drive is initiated by filling on blowing air into a flat balloon to cause it to inflate from flat-state. This simple setup is usable in physical spaces as a practical means to spread information in closed environment for people to listen to an alarm or quick response environ.

The balloon-pipe-sound apparatus is an attachment on a lose rope/thread tied to one fixed-end. After a balloon-pipe-sound(BPS) apparatus has a rope passed through the pipe then the right/left open-lose thread/rope is the pathway for flying a BPS apparatus. This is also a form a flight entertainment for teens at home. On the current Covid-19 pandemic, it is quite doable to have at home in enjoying sound move from one end to another. The sound of deflating balloon is a source of entertainment. But in the airing of information, deflating sound[8] can interfere with the sound from the sound device. The interference of both sounds experienced from the sound flight is minimized as the distance increases because the flow of air is less from the balloon end.

2 APPARATUS

The flight[5] is already started after a few deflating air-mass. One possible solution is to start sound play after some delay to minimise sound[10,11] interference in the flight. A frictionless pipe is made with a very smooth surface to cause a no-flight stop with less deflating air-mass to push the apparatus to the destination point. A glue is used to attach the pipe and sound device to the balloon. But before that the glue-process is stepped with:

(i) glue pipe to balloon
(ii) glue sound device to pipe or balloon.

3 BALLOON FLIGHT PHYSICS

Mathematically, the balloon flight can be described as

Force (F) = mass(m) x acceleration(a) :Newton Law (Action and Reaction)

$$F = GMm/R^2 \quad \text{:Newton Law of Gravitation.}$$

An action on mass has an equal reaction on other masses. Here a deflating-action on ballooning has a push-style move driven reaction on balloon pipe sound attachment. The F is described to represent the deflating air force. The m represents masses in the action reaction equalisation. Here, m represents mass of inflated balloon, mass of pipe, mass of thread length and mass of sound device. The mass of thread is complex in calculation but the simple one will be to measure the weight at the length of the pipe.

$$Weight(W) = mass(m) \times gravity\ (g)$$

$$m = w/g \text{ where } g = 9.8m/s^2$$

The total weight will be the total length of thread. From a piece of thread length, l will be

$L / l = n$, the number of pieces of length

Hence $w = nmg \Rightarrow mn = w/g$

Let $M = nm \Rightarrow M = w/g$,

estimated weight, $W_T = (m_1 + m_2 + m_3 + m_4)g$

The impact of the mass apparatus can be destructive if a cushion stop is not placed at the flight end to cater for impact force from the acceleration. The cushion should not be too hard to break the setup upon impact on cushion wall. Let this balloon flight drive your recording which plays on a movable-pipe threadline made of rope and pipe. The excitement in watching is also found in the listening of sound in a storage memory. The storage memory[14] is a computer memory either DRAM(Dynamic Random Access Memory) or RAM(Random Access Memory) access type. An audio recorded is transferred by a personal computer onto a memory drive. The removable and erasable memory is ejected from the drive device. The it is inserted back into the audio-attached device before or after flights to give the flight a capacity of several audio sound listening.

4 CONCLUSION

The balloon-pipe-sound Apparatus is now both dynamic and random. The dynamic Bapison is so because :

1. It is movable on rope
2. Several sounds recorded are playable

The random Bapison is so because with RAM memory, sounds (several audios) can play on several audio plays at random.

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