Manual of Rube Goldberg Machine for Study Room

Group Bluebear
Li Songqian
Ruan zhihao
Wu Yinyue
Zhou Ruixing

June 26, 2017

Abstract

A Rube Goldberg machine is a intentionally over-designed complex device, which involve a series of units or "complications" that linked together and then trigger one after another with a simple task finished at the end. Our machine is designed for the study room and for the people who enjoy reading. It is able to switch on the light, flip pages of a book and make tea for the user, with only one trigger. This manual will present you the all the complications in this machines and how to build them.

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Our Rube Goldberg machine consists of following 10 steps.

1. Start the machine by pushing a big steel ball into a plastic cup. This plastic cup is connected by a rope passing through a pulley. The other end of the rope ties to the plug of a vacuum cleaner and the pull switch of a light. When the heavy steel ball goes into the cup, because of its weight, the cup descends and the plug and switch are pulled up.

2. Before the vacuum cleaner stops, it sucks a tennis ball in its air hole to keep the ball from falling. The position of the tennis ball is right above the switch of an electric kettle. When the vacuum cleaner is unplugged, it can no longer suck the ball so the tennis ball falls and bumps onto the switch. Then the electric kettle is turned on.

3. The light which is controlled by the pull switch in the 1st step turns on, triggering the light sensor near it. After that, the light sensor triggers the page flipper.

4. The page flipper is composed of two motors, one rotates a small wheel, the other rotates a pair of chopsticks. The target book is placed under the wheel. Once the page flipper starts, the pages of the book are flipped by the rotating wheel and chopsticks. Meanwhile, the chopsticks knock a long stick that blocks a small steel ball on the space rail above. The long stick is knocked down and then the small ball moves along its rail.

5. The small ball goes along the first segment of the space rail and flies out when the track terminates. Then it falls and bumps a vertical gyroscope.

6. When the gyroscope is bumped, it starts rotating. Then it makes another steel ball close to it move. This steel ball moves along the second segment of the space rail which leads to a lift. The small ball is lifted up and goes into the final segment of the track. Finally, it falls into a paper cup.

7. The paper cup is placed on a weight sensor. As soon as the small steel ball falls into the cup, the sensor sends a signal to a servo motor elsewhere.

8. The servo motor controls a wooden board holding a small cable car. The wheels of the cable car are placed on a ropeway and a tea bag is put on the cable car. When the servo motor receives the signal, it turns 90 degrees downwards, losing control over the cable car. Then the cable car goes down along the ropeway. At the end of ropeway, the cable car is blocked by two steel tubes, which are used to fix the ropes. The cable car suddenly stops but the tea bag, due to the inertia, flies out and falls into a cup to make tea.

9. 30 seconds after the first step begins, the stepper motor starts working. It pushes a hydraulic device. This device consists of two syringes and one connecting tube. The first syringe contains water and is pushed by the stepper motor. When being pushed, as the result of hydraulic pressure, the water will be pumped into another syringe. For another syringe, the pumped water pushes the cylinder, and, in turn, the cylinder pushes a big steel ball in the other end.

10. Being pushed, the big steel ball falls into a plastic cup attached to a vertical bicycle wheel. On the other side of the wheel, the electric kettle in the 2nd step is attached to it. Because of the weight of the steel ball, the bicycle wheel starts rotating. The electric kettle rotates with the wheel and the water in it pours out into the cup below, in which there is a tea bag in the 8th step. Now tea is prepared. The Rube Goldberg machine finishes.