

# ASIBO

Yuichiro Katsumoto

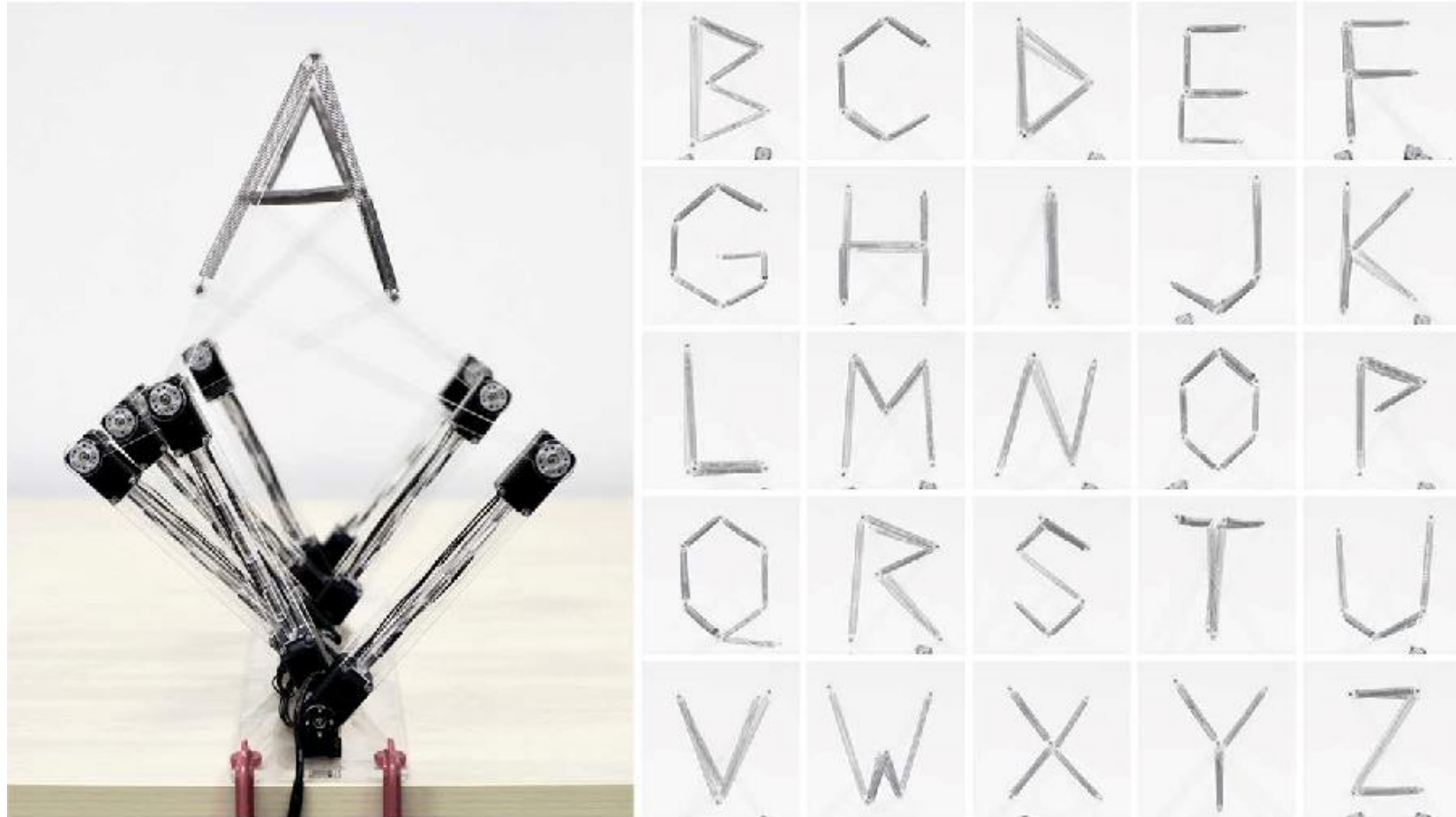


# 關於作者

- 勝本 雄一朗
- 1981年生，2010-2018于新加坡國立大學任教，成立獨立工作室 KATSUMOTOY，2019年起在東京電機大學理工學部執教。
- 從學生時代起不斷發明新型各類電子玩具。

# Robotype

- 發表于2018年Siggraph Art Gallery



# ASIBO



# ASIBO

## • “Expression Device”

作者寫道ASIBO是一個表達裝置，根據調整螺綫管的轉動頻率和時間產生的活動作為表現行爲。

該裝置由管狀螺綫管、一卷彈簧、玩具輪胎和一些亞克力板材組成。可手動控制或是用電腦控制

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ASIBO

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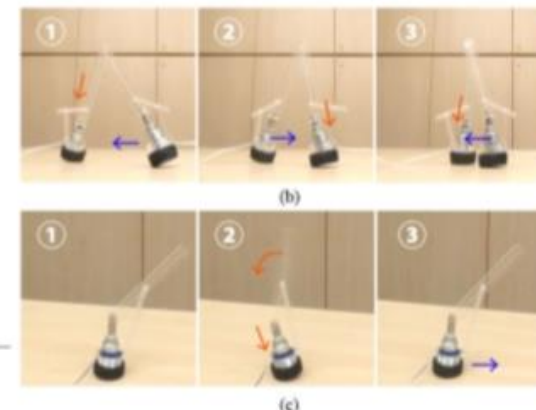
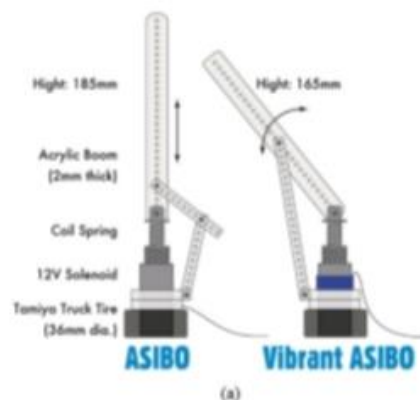


Figure 1 (a) Design of ASIBO, (b) Closing legs of Double ASIBO, (c) Walking of Vibrant ASIBO (240BPM).

### 1. Introduction

ASIBO is an expression device that shifts its behavior in accordance with the switching frequency and timing of the solenoid. ASIBO looks like a pile driver and behaves like one. However it changes this behavior when the user/system switches its solenoid rapidly. ASIBO is designed as an actuator of a toy, robot, marionette and drum machine.

### 2. Exposition

ASIBO itself consists of a 12VDC tubular pull solenoid<sup>1</sup>, a coil spring (approximately 10 mm in length), a toy car or truck tire, and some acrylic booms (2mm thickness). The solenoid of ASIBO can be switched manually or by a computer.

#### 2.1 Double ASIBO

Double ASIBO is a tap dancing marionette with which two sets of ASIBOs<sup>1</sup> are connected at their upper point. This tap dancer shakes its body from side to side by the alternate switching of each solenoid, and stamps the ground. Moreover, this tap dancer can open its legs according to the resultant force gained by the simultaneous switching of the solenoids. Its legs spread faster depending on the raising of the switching frequency. When the user/system switches the solenoid at a certain high speed and alternately, the tap dancer shifts to close its legs. We estimate that the frequency and the moving distance of its center of gravity caused by the switching speed are related to this behavior shift.

#### 2.2 Vibrant ASIBO

By changing the composition of the acrylic booms to shake its tip, ASIBO can move forward by the inertial force of the shaking. For example, ASIBO walks lightly when the switching frequency by the computer is 240 BPM (ON: 50ms OFF: 200ms). And ASIBO walks faster with the increasing pace of the frequency. When the frequency reaches approximately 800 BPM (ON: 50ms OFF: 25ms), ASIBO begins to glide over the floor due to the heavy vibration. ASIBO shifts to go astern as the frequency is raised to approximately 1760 BPM (ON: 16ms OFF: 18ms). Although these BPM and interval times are dependent on the length and strength of ASIBO's spring etc., it is clear that ASIBO shifts in the direction that it moves with the switching speed. We estimate that the micro-vibration of the acrylic booms causes this behavior shift.

### 3. Future Work

We are planning to improve ASIBO in two ways.

1. Creating art works, an attractive toy, a marionette play, and exciting music can be created by using ASIBO as an expression device.
2. Investigation into the cause of ASIBO's shift. The data needs to be taken in order to explain this principle.

### Acknowledgement

This research is supported by the Singapore National Research Foundation under its International Research Centre @ Singapore Funding Initiative and administered by the IDM Programme Office.

<sup>1</sup> Diameter: 19.56mm, Length: 39.37mm, Magnetic Force: 22.5N, Maximum Stroke: 17.8mm.

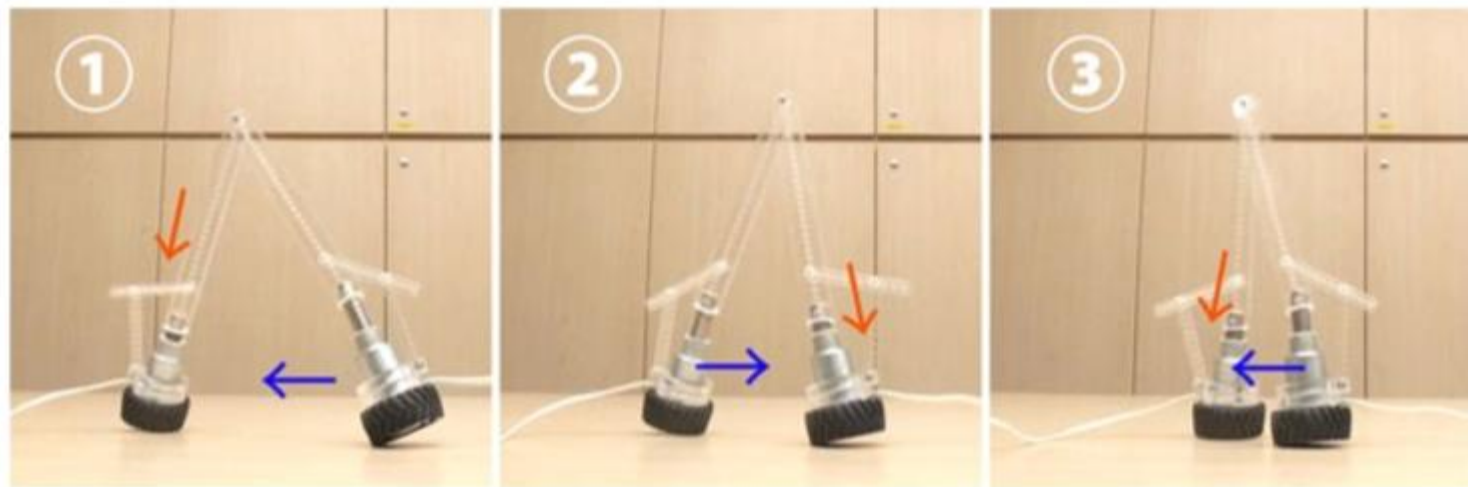
# ASIBO

- Double ASIBO

將兩個ASIBO的頂點連接在一起，踢踏舞人偶。

通過交錯控制兩個裝置使整體左右搖晃，並作出踏地的動作。同時打開兩個裝置，在合力的作用下使兩腿分開，開關頻率越高，動作的速度也越快。

當頻率高到一定數值，動作會改為合攏兩腿。作者預估裝置的重心的移動與動作頻率在動作速度加快中發生了偏移，使得兩腿由遠離改為靠近。

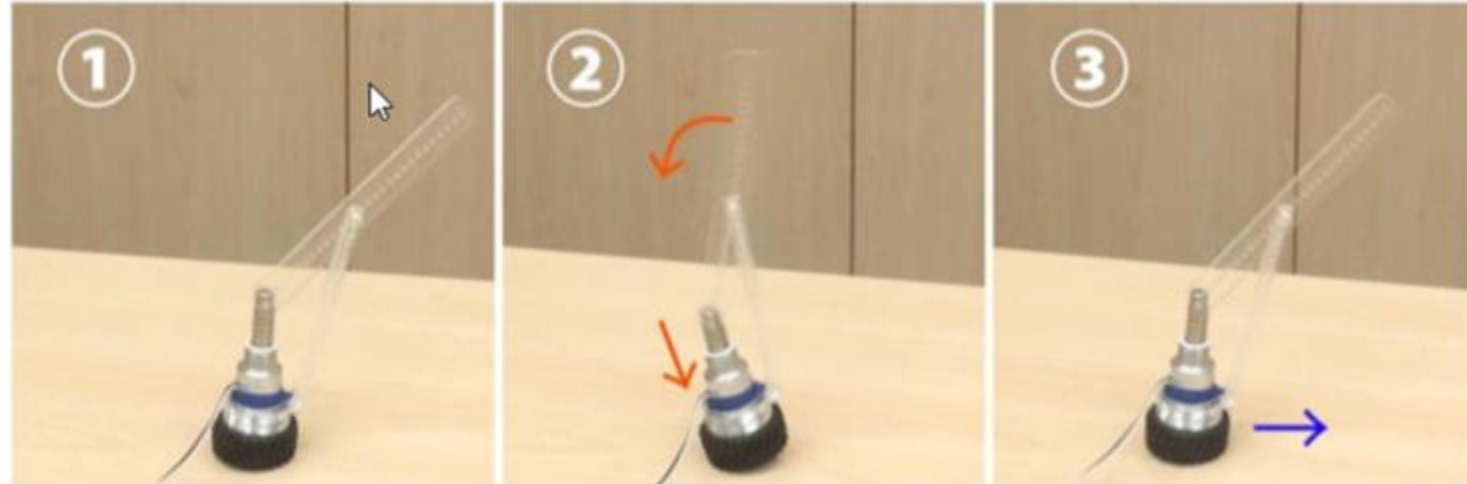


# ASIBO

- Vibrant ASIBO

在僅控制一個裝置的情況下，抖動帶來的慣性會使其向前移動，而當這個抖動的頻率足夠高時，裝置會呈現出浮在桌面上的移動，頻率繼續升高達到某一個節點時，裝置又會改為後退移動。

作者預估這個方向上的改變，是裝置的運動速度發生變化后使裝置上的亞克力板材發生微震引起的。



# ASIBO

- 未來工作
  1. 利用ASIBO製作藝術作品，玩具，人偶劇，或是作為樂器製作音樂。
  2. 深入研究ASIBO動作時各種變化的原因，收集數據來解釋這些變化（前進方向變化，兩腿開合變化）