Two-footed Walking Robot Whose Power Is Electromagnetic Induction

Hyogo Prefectural Kobe High School　1st Grade　Group Of Robot

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1Motive

We made a team because of the curiosity that we want to make a two-footed walking robot.
However, there are many problems about existing two-footed walking robots.
For example, they are stability, but they made much consumption of energy, stability is lost to save energy, and much consumption of energy occurs to use miter.
Therefore, we found that it is difficult to balance consumption of and stability.
So, we decided to product a two-footed walking robot which has both stability and energy saving.

2Policy

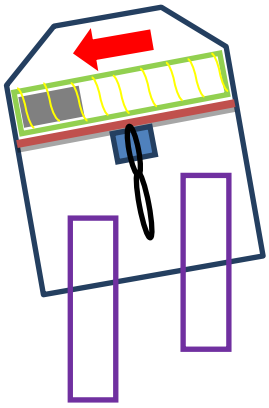
- The power is inductive current occurred by electromagnetic induction.
- We don't make the arm and the knee joint.
- We use aluminum for the main part and pile the acrylic panel in the inside of it.(To consider electrical conductivity.)
- We fasten the acrylic panel with tapping screws after sticking it with metallic adhesive.
- We make inductive current to use left and right shaking of upper body when the robot changes its legs.

3Structure

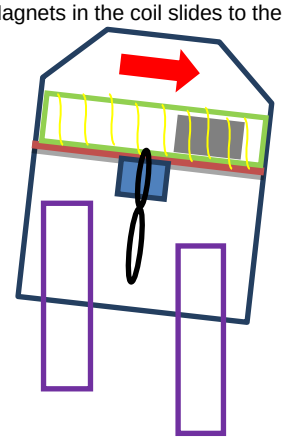
①Transfer of Center-of-gravity and occurrence of inductive current

Inductive current is occurred by slide of magnets caused by left and right shaking of upper body.
The robot takes a step forward on its other leg.

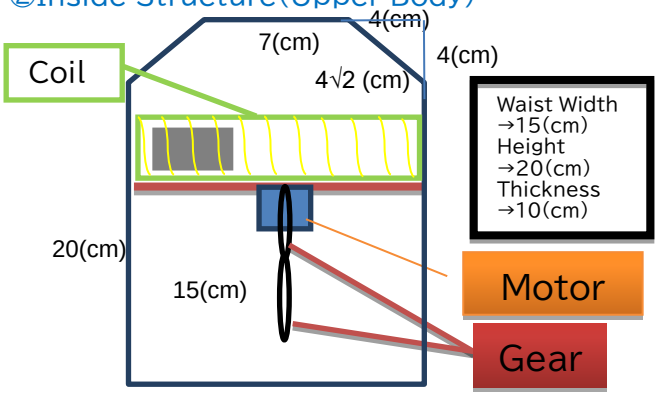
(i)When center of gravity slants to the left
→Magnets in the coil slides to the left



(ii) When center of gravity slants to the right
→Magnets in the coil slides to the right

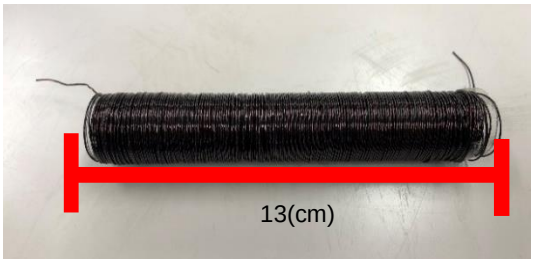


②Inside Structure(Upper Body)



③About The Coil

We used the coil made by ourselves.
We cut the acrylic pipe to 13cm, and we wrapped the enamel wire 1lap (200times).
Moreover, the acrylic pipe is Φ18mm,　and the magnet is Φ15mm.



4Results

Inductive current is occurred, but the robot did not move.

5Consideration

①The reason why the robot did not work

The current occurred by electromagnetic induction was too small.
→The current consumption of the motor we use is 700mA.
On the other hand, the current occurred by electromagnetic induction was about 5mA at most.

〈The reason why the current was small 〉

- We were not able to create a mechanism that could make the magnet or coil move faster.
- The number of coils per unit length was small.

→When the number of turns of the coil was tripled, the length of the enamel wire was also tripled, and as a result, the current was also reduced to one-third.

☆When increasing the number of turns, it is necessary to calculate the length and thickness of the enamel wire, the magnitude of resistance, etc.

②Improvements to increase the current

- Increase in the number of turns of enamel wire
- Speeding up the loading and unloading of magnets
- Strengthening of magnets force

☆As the number of turns increase, the weight of the entire robot becomes heavier, so it is necessary to make adjustment with a view to reducing the weight at the same time.

6References

- Bipedal walking robot using left-right center of gravity shift (https://www.google.com/search?client=firefox-b-d&ei=Md8HYIu_F9asoATY54WADw&q=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DAPhm8aAKYEE&oq=https%3A%2F%2Fwww.youtube.com%2Fwatch%3Fv%3DAPhm8aAKYEE&gs_lcp=CgZwc3ktYWIQAzIFCAAQzQIyBQgAEM0CUIvxAliL8QJg5fMCaABwAHgAgAGpAYgBxwKSAQMwLjKYAQCgAQGqAQdnd3Mtd2l6wAEB&sclient=psy-ab&ved=0ahUKEwjLm53rgaruAhVWFogKHdhzAfAQ4dUDCAw&uact=5)
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