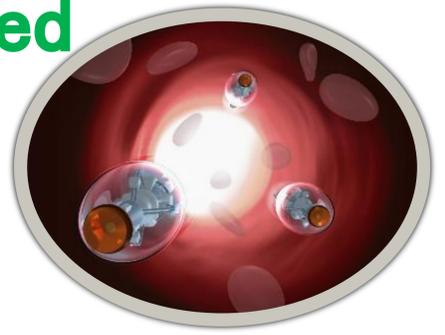




# Magnetically Driven Bio-Inspired Swarm Microrobot

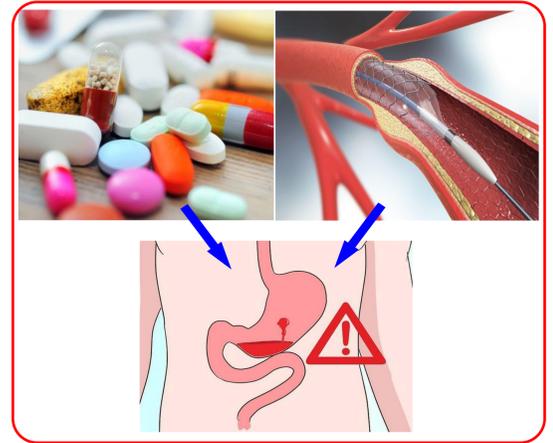
Ziheng Xu

Pui Ching Middle School, Macau



## Motivation:

- According to WHO report, vascular disease is **No. 1** killer in the world. Nowadays, there are two standard treatment methods for vascular diseases: medication and surgery.
- Both existing methods will cause drug waste and induce patients' discomfort.
- Inspired by swarm animals in nature, **swarm microrobot** is proposed for **targeted delivery** in blood vessels toward precision medicine.

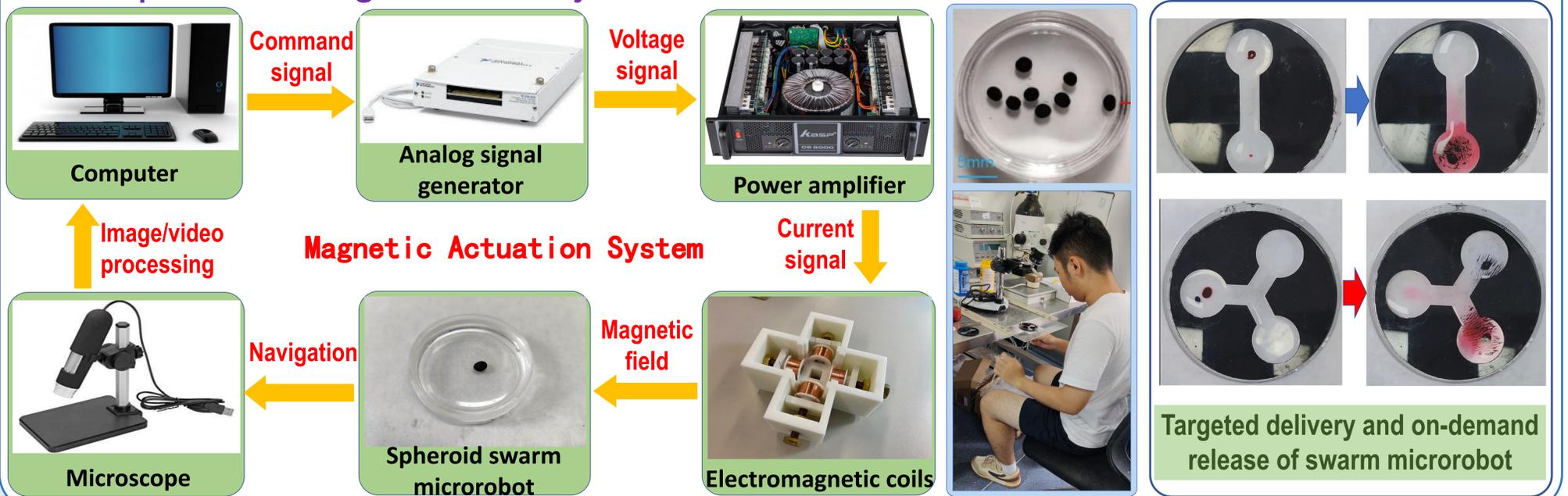


## Why Spheroid Swarm Microrobot?

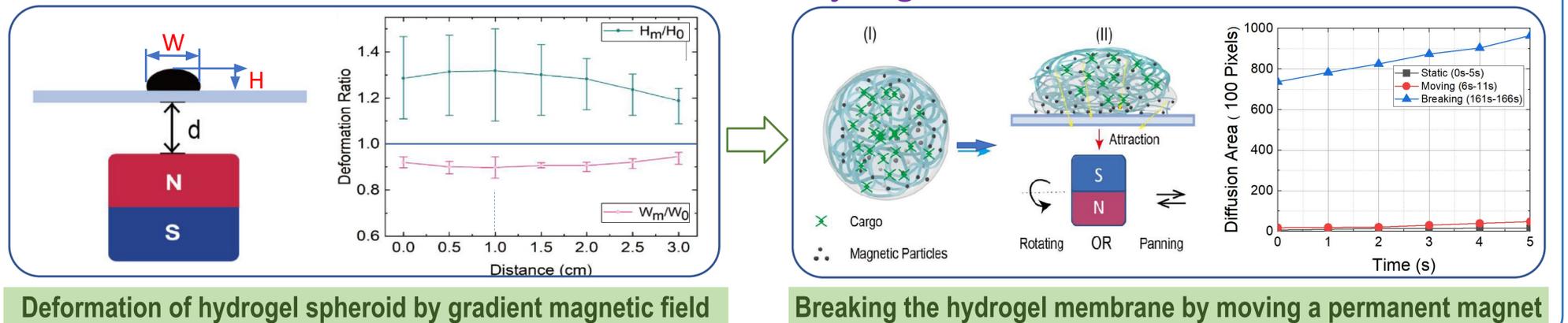
- As compared with a single microrobot, the spheroid swarm microrobot has the advantages:
  - Containing the microrobots in a spheroid allows precise delivery without individual loss.
  - Spheroid is easier to move by rolling motion.
  - Swarm improves the drug delivery capability.



## Development and Targeted Delivery of a Swarm Microrobot



## On-demand Release of the Swarm Microrobot from Hydrogel Membrane



## Potential biomedical applications

- Compared to existing work, the designed magnetic swarm microrobot has comprehensive treatment of vascular diseases for next-generation biomedical applications.
- It can remove the side effects on the patients and enable a better life for patients.
- In the future, more experimental tests will be done to examine the capability of swarm microrobot.