K. Harada, E. Susilo, N. Ng Pak, A. Menciassi, P. Dario. Design of a bending module for assembling reconfigurable endoluminal surgical system. Gerontechnology 2008: 7(2):118.
ARES (Assembling Reconfigurable Endoluminal Surgical) system has been proposed as surgical procedures of the future[1]. In the procedures, a patient swallows some capsules that contain tiny robotic modules necessary for diagnosis and intervention in the gastrointestinal (GI) tract. The modules are assembled in the stomach, and then the robot changes its configuration according to the target pathology and task (*Figure 1*). The first prototype of ARES system is being designed targeting gastric cancer in the upper side of the stomach. Gastric cancer is the second leading cause of cancer death worldwide. In Europe, the annual incidence is 12-15 per 100,000. A delay in diagnosis may lead to the poor prognosis; therefore, advanced endoluminal techniques could be useful for earlier detection of the cancer. In this abstract, the design of bending modules for ARES configuration is presented. **Methods** A module with 13 mm diameter by 23 mm height was designed containing a Li-Po battery (LP2-FR, Plantraco Ltd.,Canada), a motor of 2.4mm in diameter(SBL02-06H1PG337, Namiki Precision Jewel co.,Ltd.,Japan) and a custom-made motor control board capable of wireless communication. The two identical modules can be attached using a magnetic sphere and metal plates in each module to achieve 2 D.O.F of bending of 30 degrees in any direction (*Figure 2*). The bending mechanism was demonstrated by fabricating the prototype. **Results and discussion** The first prototype of the bending module for ARES system was designed and demonstrated. The next step is to explore robotic configurations by integrating the bending modules, locking/unlocking modules and self-assembly strategy[2]. The developments of sensor modules and interventional tools are also under development considering total system integration.

References

1. www.ares-nest.org
2. Nagy Z, Abbott JJ, Nelson BJIEEE/ASME International Conference on Advanced Intelligent Mechatronics 2007

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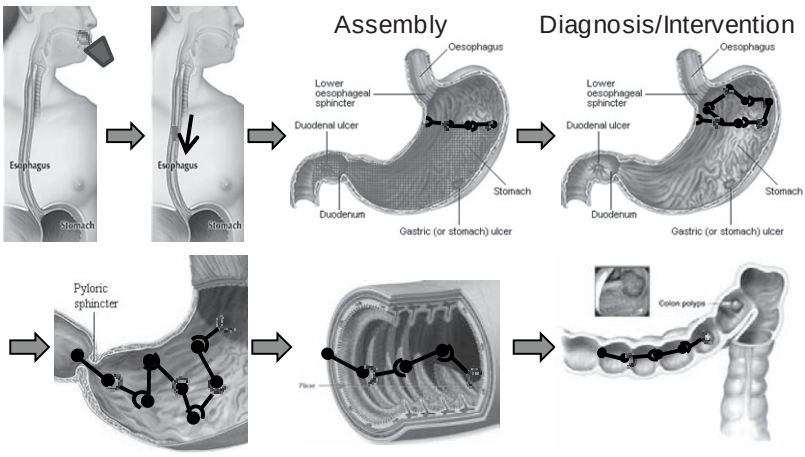

Figure 1 ARES system

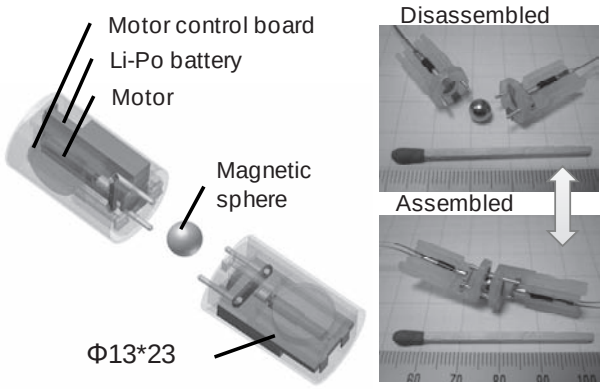

Figure 2 Bending module