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Singapore offers hope to patients with underactive bladders

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NUS researchers' novel device can be attached to the bladder to provide real-time volume detection and efficient voiding capabilities

Individuals with an underactive bladder, for example following a spinal cord injury, often cannot sense bladder fullness or are unable to empty the bladder completely. This distressing symptom can seriously affect one's quality of life. A dysfunctional bladder may also lead to medical complications such as urinary tract infection, as well as physical discomfort and potential for personal embarrassment.

Dr Faezeh Arab Hassani, a researcher from the National University of Singapore (NUS), has recently invented a device that can monitor bladder volume in real time and effectively empty the bladder. This innovation may open up a new treatment option for patients with underactive bladders in the near future.

Dr Arab Hassani worked closely with researchers from the NUS Department of Electrical Engineering and Computer Engineering, the NUS Department of Biomedical Engineering, as well as lead collaborator Professor Takao Someya and his research team at the University of Tokyo, and took more than a year to develop the novel bladder system. This breakthrough was first reported in the journal *Science Advances* on 1 May 2020.

Dr Arab Hassani's novel system comprises a sensor integrated with an actuator. The soft and thin sensor monitors the bladder volume continuously while the actuator is equipped with strong emptying force to clear the bladder. The actuator contains a shape memory alloy (SMA) spring, which keeps the sensor in contact with the surface of the bladder at all times for precise volume detection.

Moving forward, the NUS research team is working to improve the functionality of the device, and looking into making the system wireless for ease of use and movement.

The team's advances in soft materials and their fabrication techniques also hold other potential applications in the medical field.