Accessible Incontinence
Control Device

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Competition
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Introduction

- Summary
- Background
- Project Goals
The brain recognizes the signal, this signal can be ignored for about 1-2 hours until there is an opportunity to empty the bladder.

The bladder reflex centre sends the message to the brain.

When the opportunity to empty the bladder occurs the brain sends a signal to the reflex centre.

The reflex centre then sends the message to the bladder causing it to contract and the urethral sphincter muscle to relax.

As the bladder reaches a certain level nerve endings in the bladder wall are stimulated to send a signal to the bladder reflex centre.
Clients

- There are three clients who could benefit from the use of an accessible incontinence control device.
  - Keisha is an 84 year old female stroke victim with hemiplegia on the right side of her body.
  - Jerry is an 82 year old male Parkinson’s patient.
  - Jamie is a female 44 year old who suffered a T11 spinal cord injury. She is confined to a manual wheelchair and she wants better urinary control when she is playing basketball.
Project Goals

- Be accessible to both male and female patients
- Assist any patients with dysfunctional bladders by controlling the flow and release time of urine from the body
- Discrete, light weight, cost efficient, environmentally friendly and user friendly
- Provide the patient with accurate readings of the bladder status and displaying the status for the patient and provide an indication to the patient when the bladder needs to be emptied.
- The implantable device:
  - not cause any adverse effect
  - no toxicity to cells
  - no absorption of proteins
  - biocompatible with body fluid, pH, and temperature
  - remain in the human body for at least 30 days
Previous Work Done by Others

- Products
- Student Design Projects
- Patents
Previous Work: Products
Previous Work: Student Design Projects

- AssureFlow - 2007 - Australia Student Design Competition
- Micturition Alarm - 1990 - NSF
Previous Work: Patents

- US Patent #5030199: July 9, 1991. Similar to patent #5234409 above, but with a magnetic valve that can be controlled with a portable magnet.
- US Patent #4932938: June 12, 1990. Indwelling catheter with a valve which allows either continuous or user-controlled drainage.
Previous Work: Patents

- **US Patent #7160277**: January 9, 2007. Sheath encircles penis and has a tube attachment to discharge urine. (Viscous gel and elastic strap used to hold sheath in place and seal against leaks).


- **US Patent #7128707**: October 31, 2006. Artificial urinary sphincter cuff made of electroactive polymer which can be expanded or contracted by an external electrical actuation device.

- **US Patent #6319208**: November 20, 2001. The device floats in the bladder and telemetrically relays information to an external receiver regarding urinary tract pressure.
Bladder Status Indicator

- Bladder Not Full → Patient or care-taker keeps device engaged to prevent urine flow.
- Bladder Full
  - Bladder Empties → Patient care-taker reengages device to prevent urine flow.
  - Patient or care-taker disengages device to empty bladder.
**Bladder Status Indicator**

- Ultrasound scanner
- Pressure Transducer
- Electrical Impedance
- Float Sensor/Liquid Level Sensor
Design

- Urine flow control device
  - Sacral nerve stimulator
  - Indwelling catheter
  - Valve device
Advantages:
- Males and females can use
- Status Indicator and control components combined into one device
- Can remain indwelling for 30 days, as opposed to currently available short term options
- Status Indicator gives patients more control in managing their incontinence
- Discrete
<table>
<thead>
<tr>
<th>Product</th>
<th>Cost</th>
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<tr>
<td>UCL-210 - Continuous Ultrasonic Sensor</td>
<td>$589.00</td>
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<td>BladderScan</td>
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<td>Miscellaneous Parts</td>
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<td>Pressure Transducer</td>
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Conclusion

- Our device is cost effective and well under budget
- Our device is better than current device because of the continuous and easy to understand status indicator
- Our device is easy to operate, discrete, and accessible to patients with disabilities


http://www.umm.edu/patiented/articles/what_devices_used_stress_incontinence_blocking_ureine_outflow_000050_11.htm


www.medtronic.com/servlet/contentserver?pagename=Medtronic/website/conditionstage&conditionname=urgency-frequency&stage=treatment


www.emedicine.com/med/topic3019.htm

www.verathon.com/uk/urologyspecial.asp

www.student.design.awards.com/au/application_detail.jsp?status=4&applicationID=922
Works Referenced

- Pictures:
  - http://es.oncolink.org/experts/article.cfm?c=3&s=26&ss=74&id=2393
Questions?