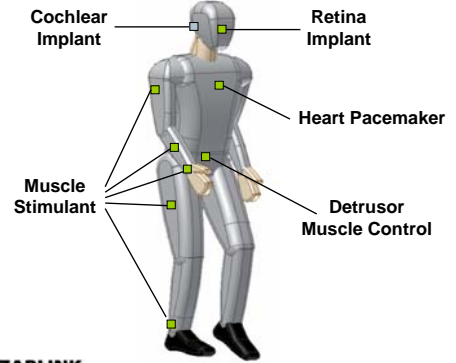




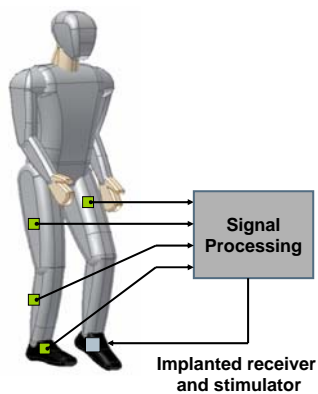
Radio Frequency Technology and
In-Body Communications Systems

Henry Higgins
Microelectronics Division

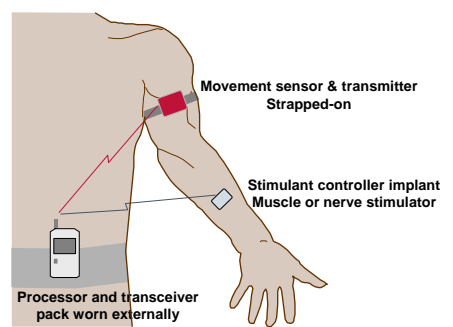
THERAPY AND FUNCTION RESTORATION

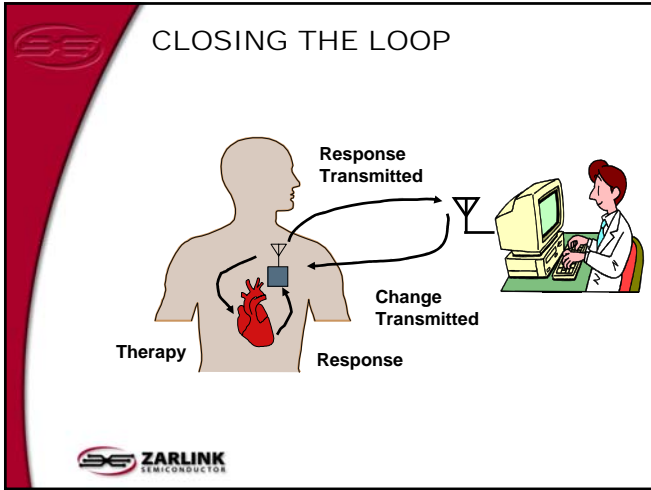


DROP FOOT STIMULATION

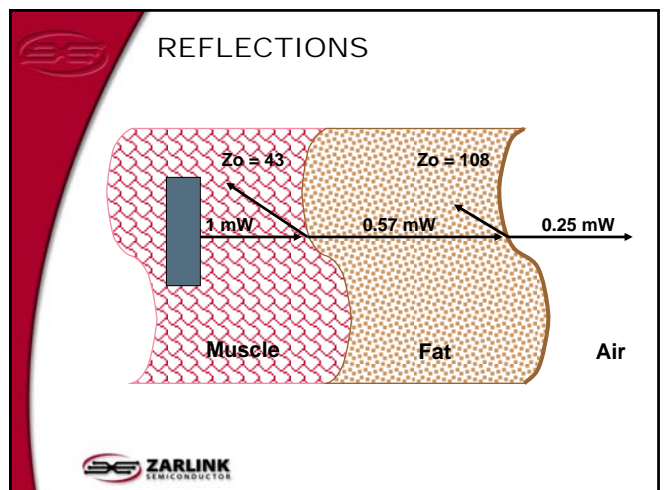
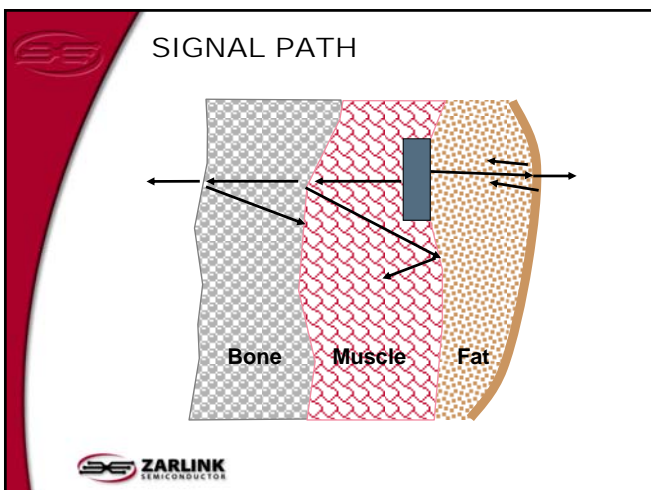


MOVEMENT RESTORATION





- ### THROUGH BODY COMMUNICATION
- MICS Frequency 402 to 405MHz
 - RF Power Limit 25 μ W
 - Human Body Is Not Air!
 - Very Limited DC Power
 - Challenges and Advantages
- ZARLINK SEMICONDUCTOR



403MHz ANTENNA IN THE BODY

Dipole in air Dipole in body

MATERIALS

Impervious to body compounds

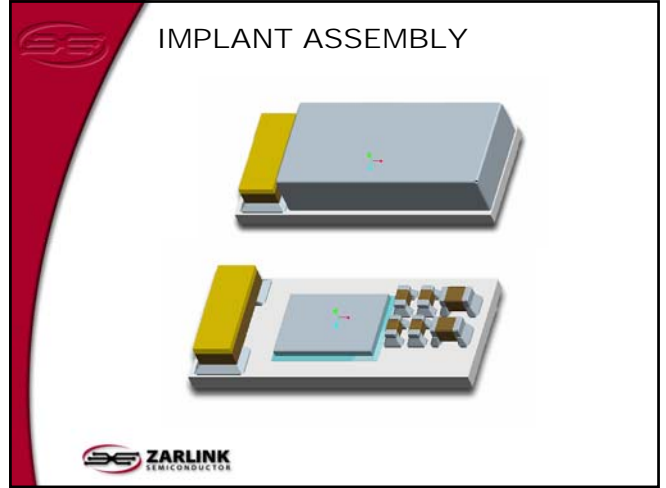
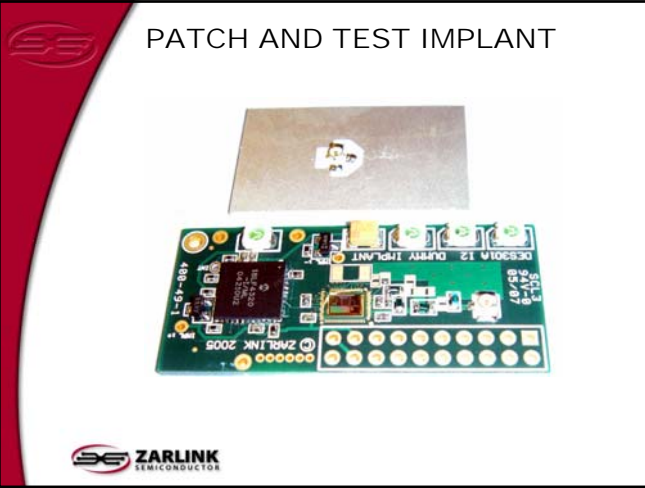
Non-toxic

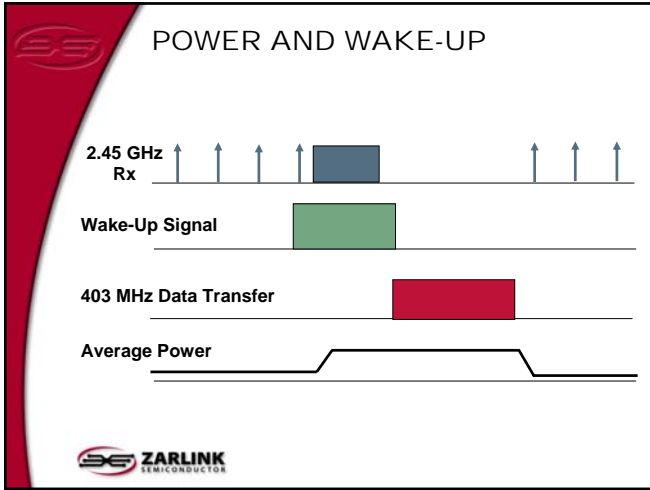
Mechanically stable

CONDUCTOR AND SUBSTRATE

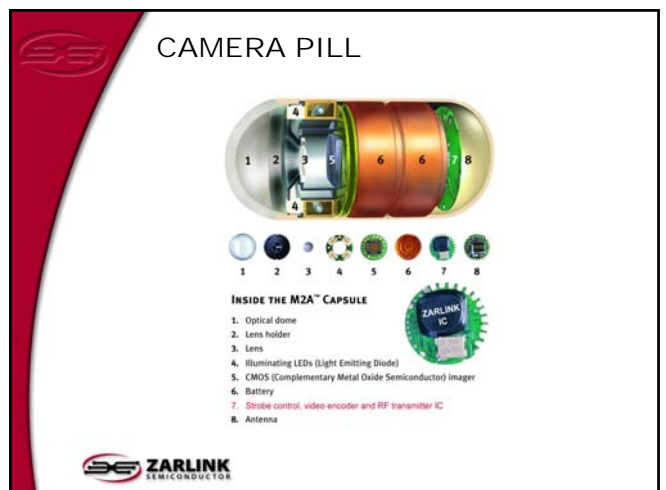
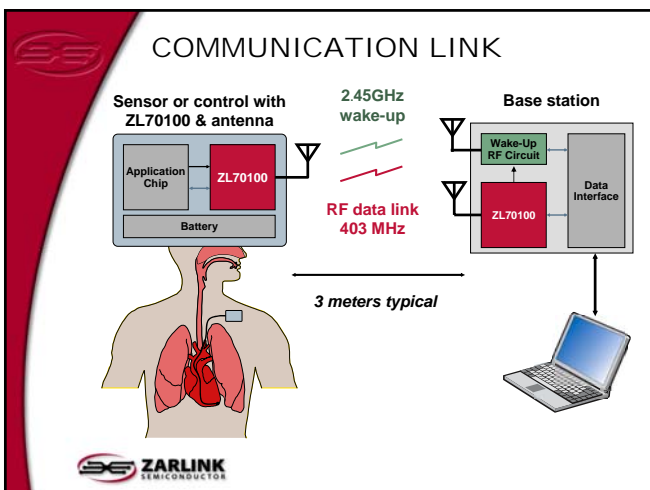
- **Substrate**
 - Alumina, zirconia or titania
- **Composite Substrates**
 - Alumina, ferrite and titania
- **Conductor**
 - Platinum or platinum/iridium
- **Passive coating will not last**

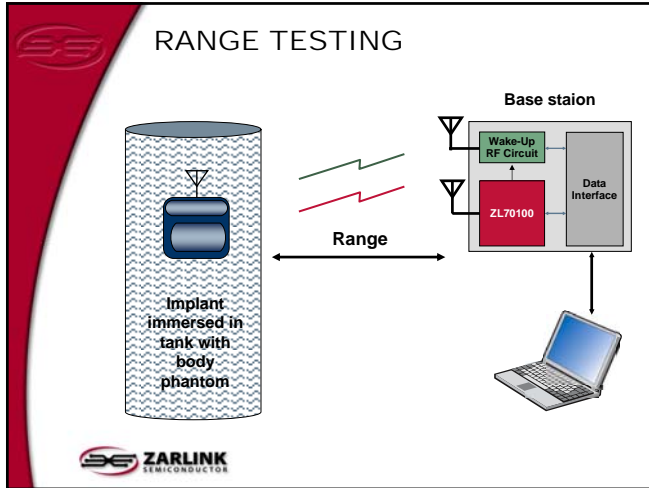
SMALL ANTENNAS





- ### DATA RATE
- ➔ **Higher Data Rate Communication**
 - Decreased transmit time
 - Lower battery drain
 - Less surgery
 - Lower cost and discomfort
 - ➔ **ZL70100 250kb.s⁻¹ user data typically**
- ZARLINK SEMICONDUCTOR**





EU FUNDED HEALTHY AIMS

- ➔ Healthy Aims is a new EU Framework 6 project
- ➔ The project is funded under the IST Microsystems programme and combines expertise from a wide range of disciplines
- ➔ There are 26 partners, including six SMEs, across nine EU countries
- ➔ These partners will develop a range of medical implants to help the aging population and those with disabilities

ZARLINK SEMICONDUCTOR

CONCLUSION

- ➔ Design communication system and implant together
- ➔ Power conserved using wake-up technique
- ➔ Antenna shape to fit application
- ➔ Each body is different and changes with posture and time
- ➔ Perform measurements in body substitute
- ➔ Many potential applications
- ➔ Benefits for health providers, tax/insurance payers AND patients

ZARLINK SEMICONDUCTOR