

# A Tri-Axial Accelerometer Interface For The Transmission Of Impact Measurements

Figure 1 [1]



Figure 2 [2]



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# General Athletic Accelerometer Applications

Figure 3 [3]: Rowing Application

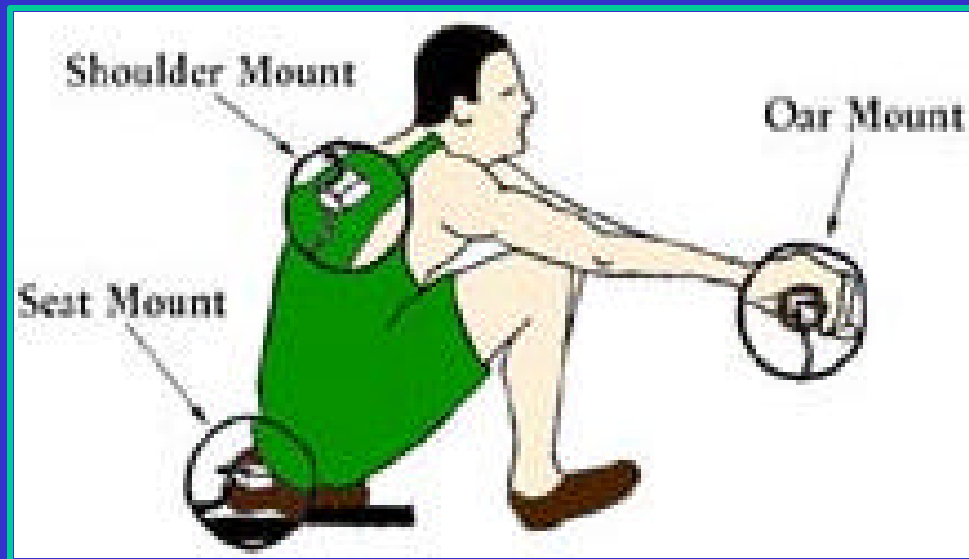


Figure 4 [4]: Hockey Application

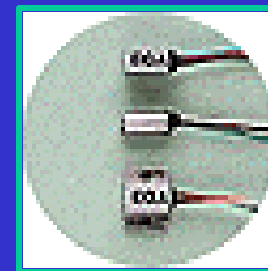


# The Accelerometer

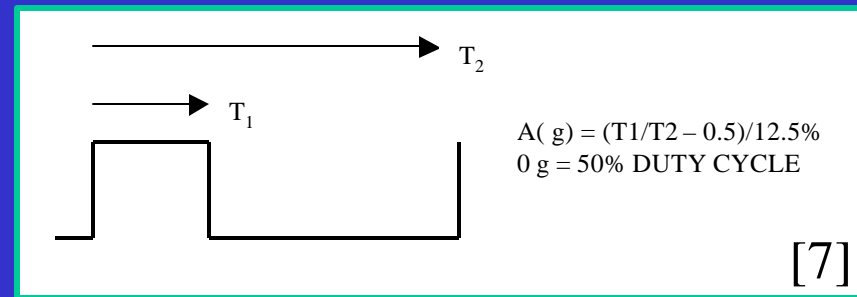
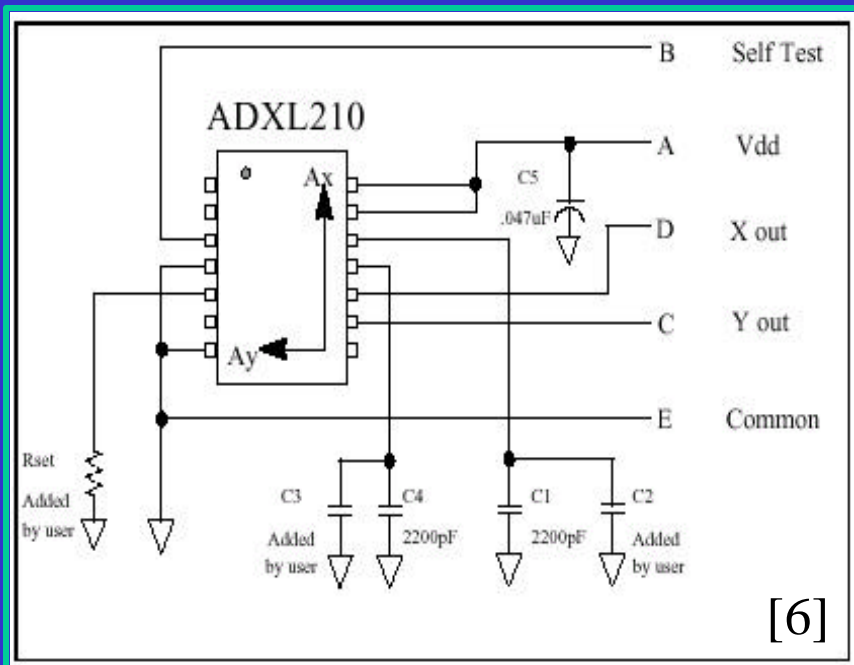
- What is an accelerometer?
- Defining Characteristics
  - ‘g’-rating
  - sensitivity
  - axes
- Choosing the proper accelerometer

Entran Devices [5]

EGA Miniature Accelerometers  
(3.56 x 3.56mm to 12.7 x 12.7mm)



# The Evaluation Board



$$A(g) = (T1/T2 - 0.5)/12.5\%$$

$$0g = 50\% \text{ DUTY CYCLE}$$

[8]

$$\text{Period} = \frac{R_{\text{set}}(\phi)}{125M\phi}$$

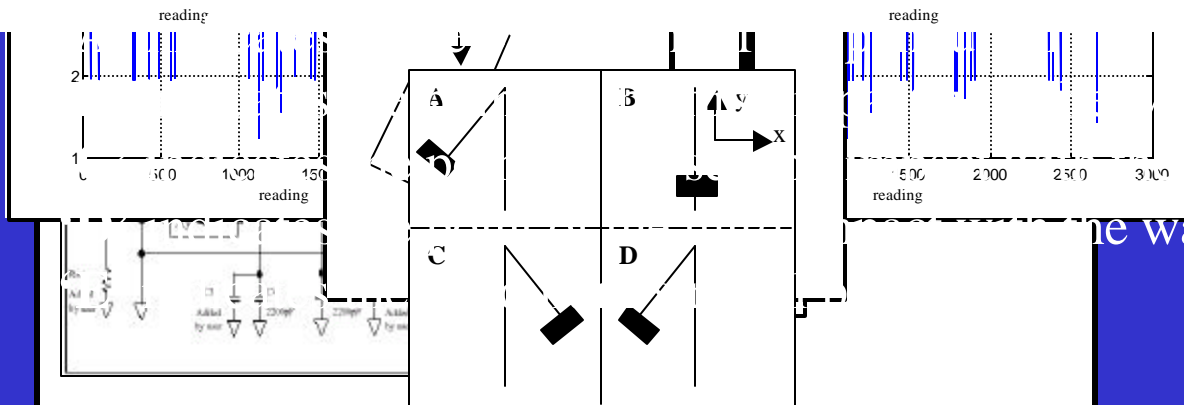
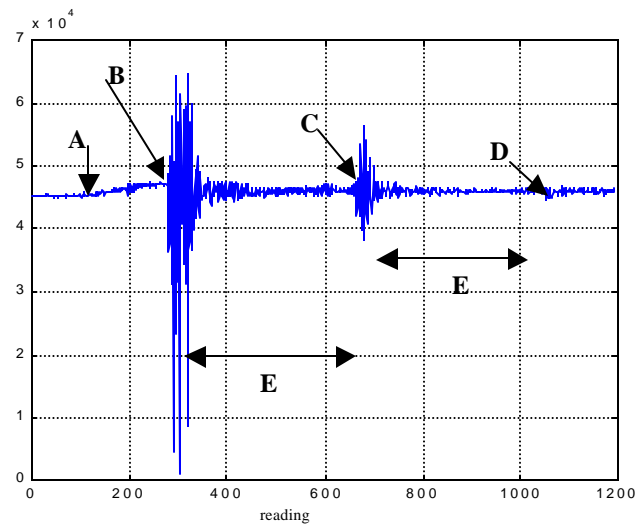
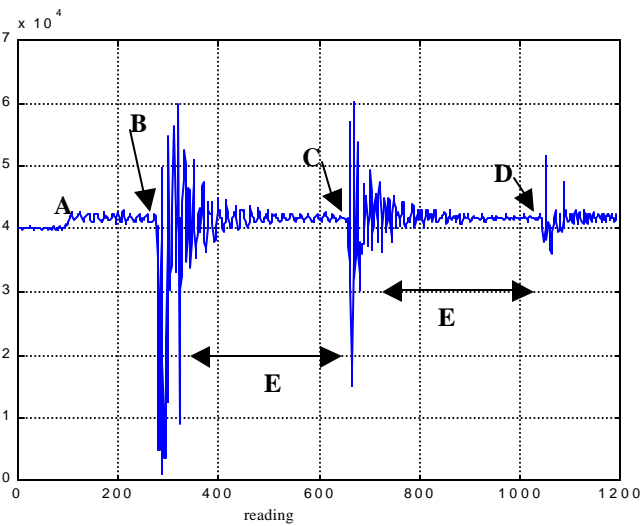
[9]

$$\text{Noise(rms)} = \frac{d^{500g}}{\text{Hz}} \times \frac{1}{\sqrt{BW \times 1.5}}$$

[10]

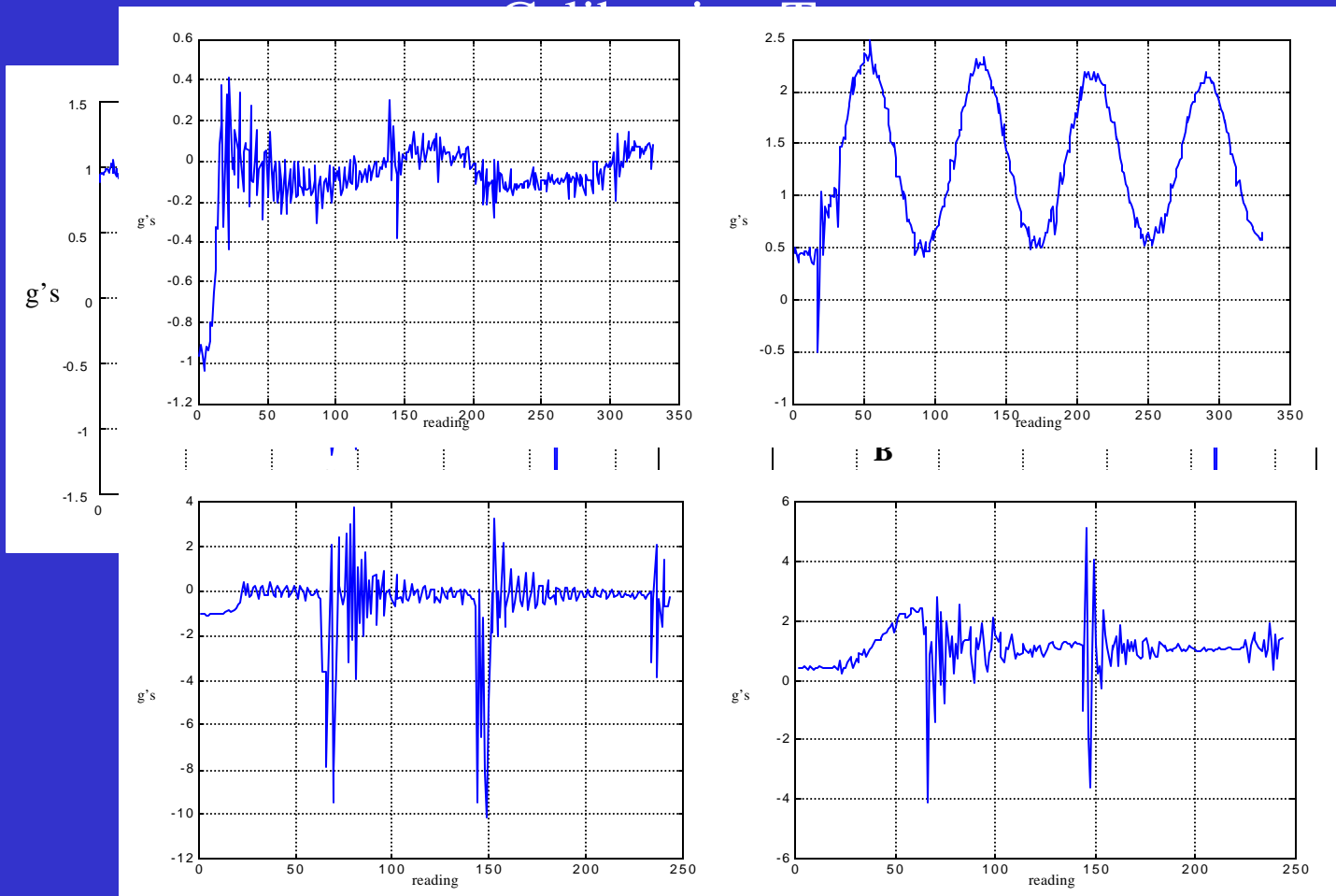
$$F(3dB) = \frac{1}{(2 \times 32k\phi) \times C(2,3)} \times \frac{5\phi}{C(2,3)}$$

# Accelerometer Data Evaluation



the wall  
the wall

# Accelerometer Data Evaluation (cont.)



# Display Mechanism

## Acceleration Display Mechanism

Display	Acceleration Range (g's)
0	0 to .25
0*	.25 to .75
0**	.75 to 1.25
“	“
0*****	9.75 to 10.25
Overload	> 10.25

# Transmission & Reception

## Linx Technologies LC Series Wireless Data Modules

*315 Hz Transmitter:*



[11]

*315 Hz Receiver:*



[11]

### Benefits:

- low cost
- low power consumption
- very compact



[11]



# Other Transmission Considerations

- Choosing an Antenna

The “Splatch”

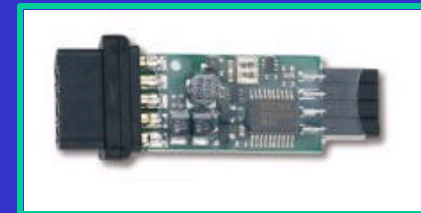
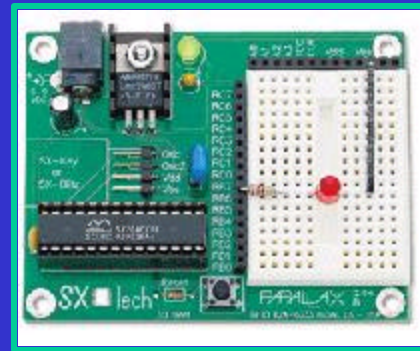


[12]

0.062” thick  
(easily concealed)

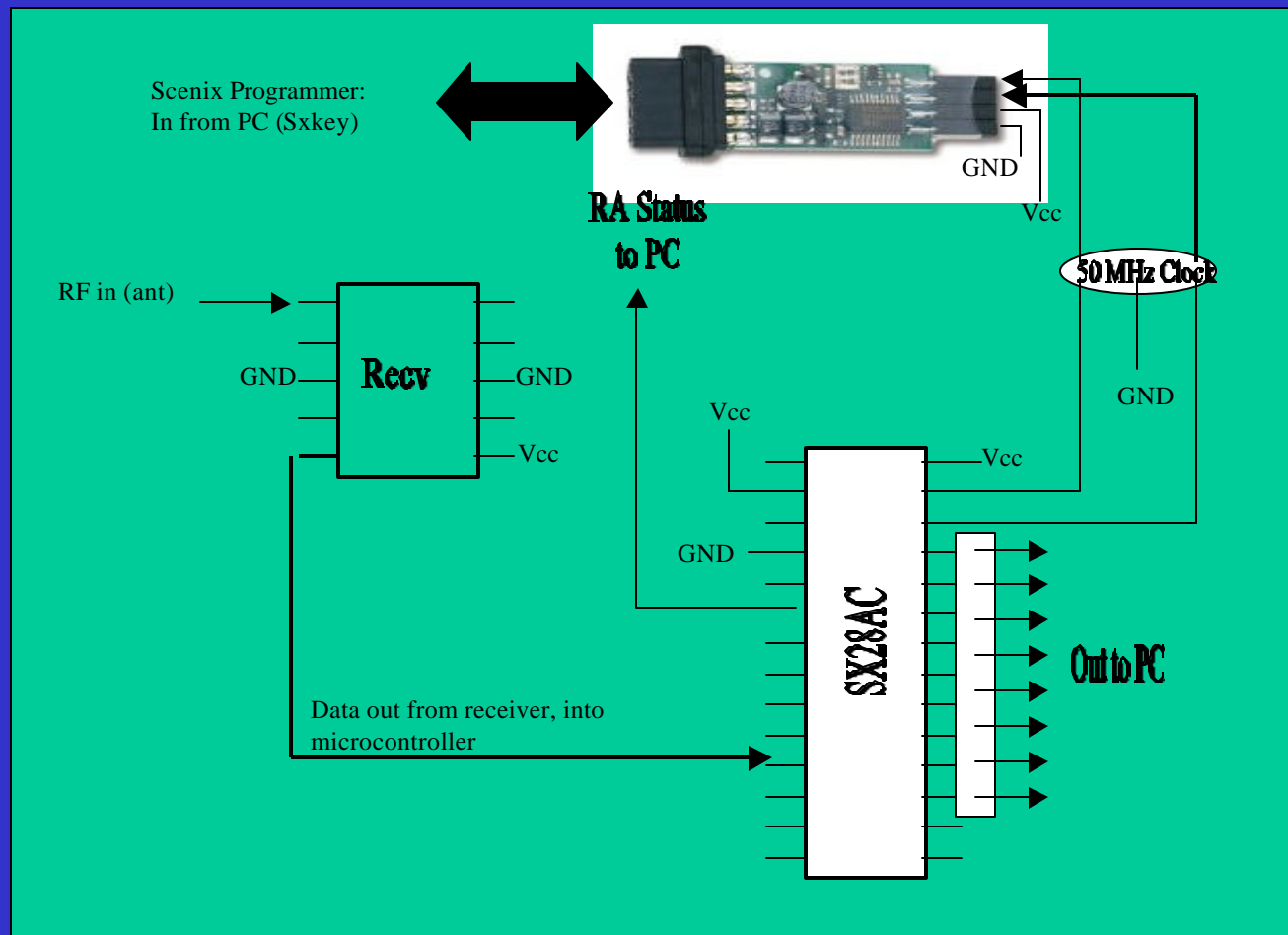
- Data Encoding

The Scenix  
Microcontroller



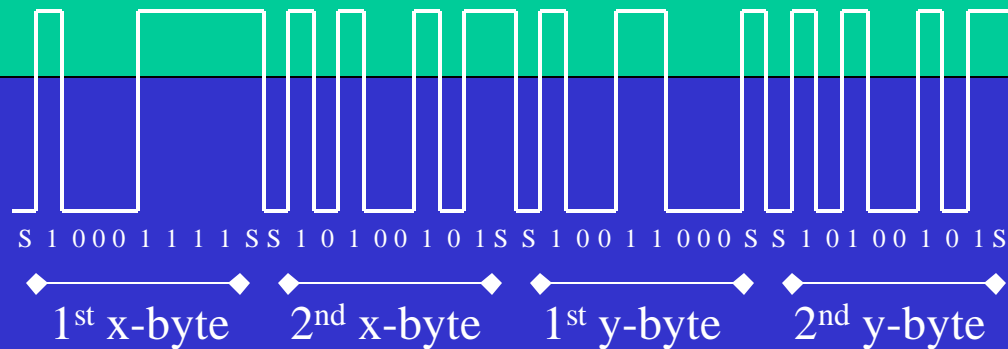
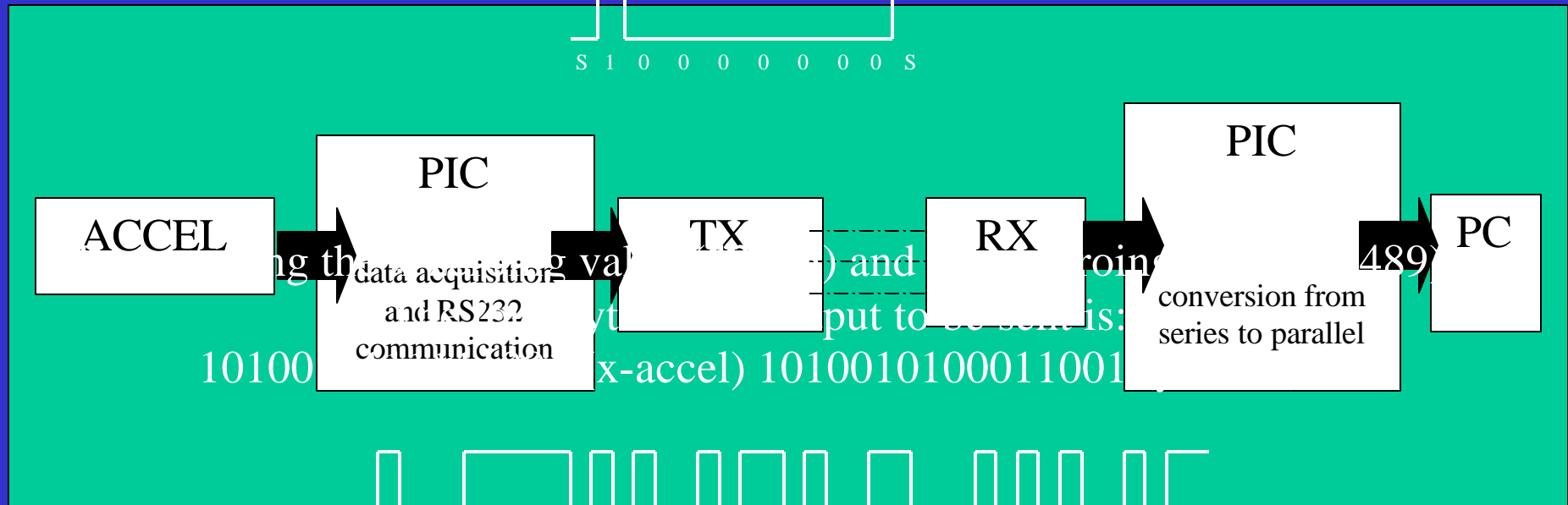
[13]

# Transmission/Reception Eval Boards



# RS232 Communication

Transmitting the #1:



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# Conclusions

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- Preliminary filtering, scaling, & display mechanisms completed
- LC Series transmitter and receiver of sufficient caliber
- Transmission board capable of sending RS232 data across RF link
- Reception board capable of converting series to parallel
- Link must be established between the transmitter and receiver

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# The Future

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Accelerometer applications within impact monitoring systems are numerous. I believe the future of this device lies in the development of wireless interface system compatible with each of the applicable environments - a universal accelerometer interface requiring only minor alterations when switching from one application to the next.

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# References

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2. [http://members.tripod.com/Yale\\_Football/yale.html](http://members.tripod.com/Yale_Football/yale.html)
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