

Objective:

This capstone project entails a team-based effort to develop, construct and validate a prototype for an electronic instrumentation system for **sports monitoring** using available sensor technologies in order to demonstrate students capability to integrate concepts from AP 185.

Constraints:

Total project bill of materials cost should be less than 2,000 pesos. The group should develop additional design requirements; investigate tradeoffs for performance, cost and size. Furthermore, they should consider use cases and failure modes. The project is required to use at least ONE transducer. Safety (electrical, mechanical, etc) should be paramount in their design.

Documentation:

The project should be well documented and should highlight concepts from AP 185 (including AP181/182/183). All circuits should have complete block and schematic diagrams. Design requirements should be listed and discussed. Transducers should be well characterized and justified as to the application use case.

Validation:

The group should validate their work in actual situations. They can be their own subjects within safety limits. Documentation of the validation segment is crucial. Actual data and their analysis should be included in the report. Video documentation is encouraged but not required.

Examples:

- 1) 3D accelerometer for movement monitoring
- 2) Hand movement in tennis
- 3) Tennis racket force sensors
- 4) Foot mat for weight distribution while standing
- 5) Temperature monitor for athletes
- 6) "Sweat" monitor
- 7) Aerobic capacity/Breathing rate
- 8) Jump force/impulse plate
- 9) Grip sensors

		Sensor Type							
		Humidity	Piezo Film	Pressure	Temp	Photo Optic	Vibration	Force	Position
Sport	Tennis		Motion & Electrical Impulses	Grip			Stroke		
	Swimming			Motion & Touch			Stroke		
	Running & Fitness Bands		Activity Level	Plantar Pressure		Pulse Oximetry & Respiratory	Acceleration	Ground Strike	
	Fencing		Impact Location & Intensity						
	Diving, Water & Gymnastics			Dive Depth or Altitude	Water temperature		Acceleration on Springboard		
	Fitness			Altitude				Pedal Force	Ramp Incline
	Watches	Sweat Humidity		Altitude & Calorie Estimation	Air or Skin Temp	Heart Rate			
	Bike Computers			Energy Consumption or Altitude			Dynamic Comfort	Pedal Force	Seat Position
	Helmets		Impact Location & Intensity	Concussions	Heat Stroke		Impact Orientation & Intensity		
TE Connectivity sensor products and their applications in sports									

<https://www.sporttechie.com/sensors-are-taking-over-sports/>

