## ****Biometric Systems****

**Project Type: Entrepreneurial**

**Problem Statement**

Engineering can be applied to people, plants and animals in a large number of ways. For example, as people age, our ability to maintain balance decreases. This places our elderly at risk of injury from a fall triggered by a loss of balance. Athletes benefit from bio-feedback as they exert themselves in their given sport. For most individuals, an increased awareness of their health and body can increase their standard of living. Ecosystems for plants and animals can be monitored and controlled either to stimulate growth or to protect various species, such as in a zoo or aquarium.

The objective is to develop a systems approach to an application that interacts with or supports living things. In general, such a system might be engineered to improve or maintain a given quality of life. Systems may be designed specifically to benefit children or the elderly by extending their reach or strength.

The systems or devices may include any or all of: man/machine interfacing, mechanical apparatus, electrical sensors and controls and/or special usage of materials to accomplish its purpose.

The overall approach would include:

* Identifying the biometrics to be monitored / controlled
* Identifying the sensors required to capture the data.
* Determining the method and type of interaction.
* Determining the appropriate actions to be taken (stimulus / response).

**Requirements / Specifications**

* The system must interact with the target population.
* The system may capture and record data.
* The system may include a way to visualize the recorded data.
* The system should take some action in response to a provided or observed stimulus.

**Technology / Skills**

* Biomechanics
* Ergonomics
* Anatomy and Physiology
* Programming in C / C++ / Visual Basic / LabVIEW
* Electronics / electrical integration of the various system elements
* Sensors and sensor interfacing / mounting
* Packaging / mounting of systems / devices
* Gears / motors / actuators
* Strength of materials

**Example Project Ideas**

* Human performance measurements, e.g. power output
* Breathing studies while using exercise equipment – measure air volume / pressure
* Animal / plant studies – growth, reaction to sun/dark, watering, etc.
* Aquarium / terrarium management / control - local or remote
* Human reaction time measurements / comparisons
* Aid devices for physically challenged individuals
* Assistive technologies for the elderly or the young
* Exercise ‘partners’ that extend the typical ‘ball return’ devices (e.g. spring-back netting, golf putting practice devices, etc.)