A Survey of Physical Monitoring Devices to Aid in Motivating Exercise

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Problem
1. Our society has a weight problem. Americans spend $30 billion a year on weight-loss products and services, but more than half of US adults remain overweight or obese.
2. Our lives are increasingly monitored by computing technology and services, but the collected information is rarely used to help us.
3. How can we use computing technology to increase awareness of physical health to motivate and help users tailor their physical activity?

Relevance
1. Redirecting the use of information retrieved from monitoring devices to empower users.
2. Leveraging the benefits of context-awareness to help in the problem of health can provide immediate impact and benefit to users.
3. Exploring the space of existing physical monitoring devices will reveal what is currently possible to be monitored and what needs more work.
4. More informed selection of monitoring device to develop monitoring-feedback system.

Approach
1. Search in commercial and research sources for physical devices that are used to monitor people:
   - Online stores (Amazon, Wal-Mart, CoolRite)
   - Online news (Wired, Engadget, Medgadget)
2. Medical supply companies (Cardguard, Almedig)
3. Research papers

Organize found devices in a matrix to facilitate comparison of attributes.

Results
This is the matrix of devices included in the survey mapped to their corresponding attributes. The matrix is sorted by the attributes: Monitoring category, Continuous vs. user-initiated monitoring, and Machine learning vs. heuristic.

Modeling Complexity
The level of complexity of detection and system components depending on type of monitored information: information about physiology, physical activity, and danger do not need inference nor combinations of smaller sensors. On the other hand, affect, location, nutrition, and activity context require inference and integrated systems of sensors.

There is no device that uses a person’s historical information to infer long-term trends.

Future work
1. Explore in greater detail generic devices such as pedometers and heart rate monitors.
2. Create sub-matrices from identified attributes to make patterns and trends immediately apparent.
3. Integrate findings with lessons learned from ethnography of people who are trying to lose weight.
4. Create models from devices that can be used to provide valuable feedback to users.