# IOWA STATE UNIVERSITY
**Department of Electrical and Computer Engineering**

Dec15-07    Advisor: Tirthapura

**Senior Design Project Proposal Form**

**Client/Company/Organization**: UnityPoint Health, Des Moines, Iowa

**Submitter** (name): John Hendricks, CTO, VP    **Email**: John.Hendricks2@unitypoint.org

**Project Contact**: John Hendricks, CTO, VP    **Email**: John.Hendricks2@unitypoint.org

**Project Title**:

Aggregation and analysis of healthcare data generated by wearable devices

**Project Abstract** (include **ALL project goal(s)**, design constraints, and technical approaches and tools):

Technology platforms associated with the "Internet of Things" are driving much growth in healthcare applications. Wearable devices that generate exercise and health data are becoming a new and exciting area for collecting "patient data" that can help healthcare providers improve patient care.

UnityPoint Health (UPH) is a multi-state healthcare provider based in Des Moines, Iowa and manages many hospitals and clinics (http://www.unitypoint.org/Default.aspx). UPH has a proprietary patient portal called "MyChart" and uses Electronic Medical Records (EMRs) to help engage patients and manage patient health data.

UPH would like to develop a proof-of-concept to help collect, aggregate, and analyze new "patient data" generated by wearable devices so that UPH can conduct subsequent data analyses to help improve the health of patients. This project will have the following attributes:
- Target the Apple mobile platform and the Apple HealthKit development framework and wearable devices compatible with Apple.
- Research data parameters and requirements of the data AFTER it has been collected via the wearable device. Focus on the data collection and aggregation applications that can be developed within the HealthKit environment.
- Use sample data set(s) to develop a data warehouse architecture that is also compatible with UPH's MyChart and their existing EMRs.
- Research, develop, and test various data analyses on the patient data. These analytics will be driven by UPH's goals to improve patient healthcare. These analytics will be developed in the second semester.

**Expected Deliverables** (include expected schedule, cannot be open-ended, **must list at least one deliverable**):
- A basic framework for creating a data warehouse based upon the Apple HealthKit environment that collects and aggregates patient data to be analyzed.
- A set of tools to analyze the patient data that is compatible with UPH's MyChart and existing EMRs.
- Demonstrations showing the potential of the tool in analyzing data obtained from wearable devices.

**Specialized Resources** Provided by Client (be as specific as you can):

UPH will provide necessary hardware, developer kits, etc.

**Anticipated Cost**: $500    **Financial Resources Provided by Client** (if any): $500

*NOTE: General Resources Provided by ISU/ECpE:  MSDNAA software, and access to resources in ECpE teaching and research labs, e.g., electronics, embedded systems, etc.*

**Enter # Students Preferred/Required**:
- ◯ Electrical Engineering
- ②  Computer Engineering
- ②  Software Engineering
- ◯ Other (specify):

**Special Skills Required of Students** (be specific):
- Solid programming background and interest in developing robust, usable software
- Familiarity with Mobile APIs
- Experience with databases is helpful, but not required

*Complete reverse side of form*

**Anticipated Client Interaction (estimate):**

☐ 1 meeting per week

    ☐ phone, ☐ internet, ☐ live

☐ 1 meeting per month

    ☐ phone, ☐ internet, ☐ live

☐ 2 or more meetings per month

    ☐ phone, ☐ internet, ☐ live

☐ 1 meeting per semester

    ☐ phone, ☐ internet, ☐ live

**Meeting ABET Criteria**

Please rate the following statements as they relate to your proposed project:

*0 – Not at all        1 – A Little        2 – Somewhat        3 – A Lot        4 – Completely*

| Statement | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| On this project, students will need to apply knowledge of mathematics, science, and engineering | ☑ 0 | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| This project gives students an opportunity to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability | ☑ 0 | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| This project involves students from a variety of programs, i.e., SE, EE, and CprE | ☑ 0 | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| This project requires students to identify, formulate, and solve engineering problems | ☑ 0 | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |
| This project gives students an opportunity to use the techniques, skills, and modern engineering tools necessary for engineering practice | ☑ 0 | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 |

**Project Approval – *for use by ECpE Senior Design Committee***

☐ Approved        ☐ Not Approved

☐ Faculty Advisor Assigned: _____

☐ Project Number Assigned: _____