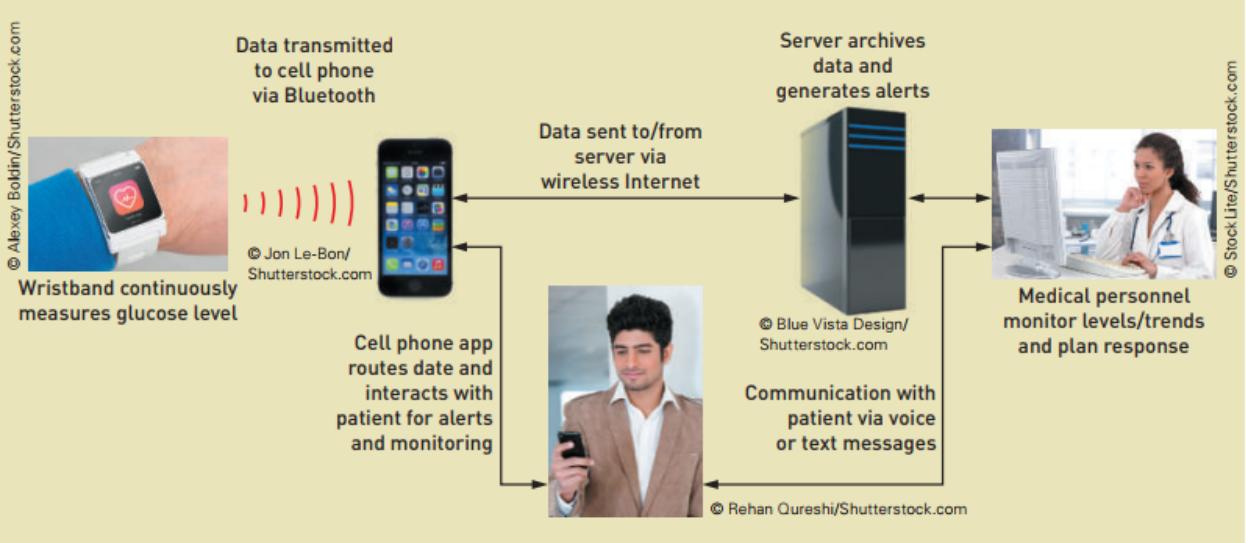
Commitment to Ethical Academic Integrity: "(i) Every student should exercise ethical integrity by keeping their exam papers confidential & never share the test with other students. (ii) Students' results are only recognized to the extent that they're allowed to be copied, limited to the internet resources. We will perform a random test of the test on the "plagiarism" system. If the student violates the above two items, the report will be sent to the evaluation board, their marks will be deducted and handled according to the University's regulations."

Read the following case study:

Medical monitoring technology has advanced significantly in the last decade. Monitoring that once required a visit to a health-care facility can now be performed by devices located in a patient's home, or carried or worn at all times. Examples include measures of glucose level (blood sugar), pulse, blood pressure, and electrocardiogram (EKG).

Measurements can be transmitted via telephone, Internet connection, and wireless data transmission standards, such as Bluetooth. A particularly powerful technology combination is a wearable device that records data periodically or continuously and transmits it via Bluetooth to a mobile app. The mobile app can inform the patient of problems and can automatically transmit data and alerts to a central monitoring application as following picture:



Health-care providers and patients incur significant costs when glucose levels are not maintained within acceptable tolerances. Short-term episodes of very high or very low glucose often result in expensive visits to urgent care clinics or hospitals. In addition, patients with frequent but less severe episodes of high or low glucose are more susceptible to such expensive, long-term complications as vision, circulatory, and kidney problems.

Let's say that your group is a manufacturer of portable and wearable medical monitoring devices, has developed a glucose monitor embedded in a wristband. The device is powered by body heat and senses glucose levels from minute quantities of perspiration. Your group is developing the **Real-Time Continuous Glucose Monitoring** (**RTCGM**) device in partnership with P.T.K.T Corp Health Systems, a comprehensive health delivery service with patients throughout Asia. The system's vision statement reads as follows:

- "***RTCGM*** *will enable patients and their health-care providers to continuously monitor glucose levels, immediately identify short-term and long-term medical dangers, and rapidly respond to those dangers in medically appropriate ways."*

Your group will develop the initial prototype software for smartphones with Bluetooth capability running the Google Android operating system. If successful, P.T.K.T Corp Health Systems and its patients will have free use of the software and your group will resell the software to other health systems worldwide.

As the project began, interviews with patients and physicians about potential RTCGM capabilities and interaction modes identified several areas of concern that will need to be incorporated into the system requirements and design.

- The relevant patient concerns include:
    - Viewing and interpreting data and trends. Patients want to be able to view more than their current glucose level. They would like to see glucose levels over various time periods, with a specific focus on time periods during which their glucose was within and outside of acceptable ranges. A graphical view of the data is preferred, although some patients also want to be able to see actual numbers.
    - Entering additional data. Some patients want to be able to enter text notes or voice messages to supplement glucose level data. For example, patients who see a high glucose alert might record voice messages describing how they feel or what they had recently eaten. Some patients thought that sharing such information with their health-care providers might be valuable, but others only wanted such information for themselves.
- Physicians expressed these concerns:
    - They do not want to be the "first line of response" to all alerts. They prefer that nurses or physician assistants be charged with that role and that physicians be notified only when frontline personnel determine that an emergency situation exists.
    - They want to be able to monitor and view past patient data and trends in much the same way as described for patients.
    - They want all their actions to be logged and for patient-specific responses to be stored as part of the patient's electronic medical record.

After consultations with system stakeholders, the following potential changes to the requirement are being considered:

- Include additional medical personnel (nurses and physicians' assistants, at a minimum).
- Include alerts sent by the system to medical personnel and messages sent by medical personnel to the patient.

The **Real-Time Continuous Glucose Monitoring (RTCGM)** system will include processing components on servers and on mobile devices with data exchange via 3G and 4G phone networks. Users may include patients, physicians, nurses, and physician assistants.

In some countries mandate certain responsibilities regarding the privacy and security of **electronic protected health information (ePHI).** The law applies to what are collectively called covered entities—that is, health plans, health-care clearinghouses, and any health-care providers who transmit health information in electronic form. In general, covered entities should do the following:

- Ensure the confidentiality, integrity, and availability of all ePHI they create, receive, maintain, or transmit.
- Identify and protect against reasonably anticipated threats to the security or integrity of the information.
- Protect against reasonably anticipated, impermissible uses or disclosures of the information.
- Ensure compliance by their workforces.

Specifically, covered entities should implement policies, procedures, and technologies that do the following:

- Specify the proper use of and access to workstations and electronic media.
- Regard the transfer, removal, disposal, and reuse of electronic media to ensure appropriate protection of ePHI.
- Allow only authorized persons to access ePHI.
- Record and examine access and other activity in information systems that contain or use ePHI.
- Ensure ePHI isn't improperly altered or destroyed.
- Guard against unauthorized access to ePHI that is being transmitted over an electronic network.

Based on the discussion of hardware, Internet, and software technology trends, it should be clear to you that the **Real-Time Continuous Glucose Monitoring (RTCGM)** system is an interesting combination of older and newer technology. Except for the interface to software and data on mobile phones, the server-side portions of the system are a relatively traditional business-oriented application that can be implemented by using old-fashioned technology. What makes the **RTCGM** system "new" are its client-side functions, including the automated collection of glucose levels, the regular transmission of that data to servers, the integration of communication between patients and health-care providers, and the integration of those functions within software installed on a portable device that can be carried in a user's pocket. *Your group may need to do some additional research to fully address them.*

Additional Information:

- Your group and P.T.K.T Corp Health Systems are developing the system jointly. Project staff will include analysts, designers, and programmers from both organizations. Three technical staff members from each organization have been assigned initially, and the budget includes sufficient funds to add other personnel for short-term assignments as needed. In addition, P.T.K.T Corp Health Systems will assign a physician and a physician's assistant to the project one day per week.
- It is anticipated that your group's personnel assigned to the project will work primarily at P.T.K.T Corp Health Systems facilities in office space and with computer equipment dedicated to developing the Real-Time Glucose Monitoring (RTGM) system.
- P.T.K.T Corp Health Systems anticipates recruiting a handful of its own diabetic employees to provide requirements and to test the prototype RTCGM software.
- Your group and P.T.K.T Corp Health Systems anticipate a six-month development schedule for an initial version of the server software and Android-based client-side software. That will be followed by a three-month period for evaluation and another three-month period for development of improved software versions and support for a wider range of mobile phone operating systems.

Your final project deliverables:

P1. Initial activities (System Vision Document, Obtain Approval,..) (1points)
P2. Plan your project (1points)
P3. Discovery and Understanding the details (3points)
P4. Design System Components (3points)
P5. Build, Test, Integrated System Component (2points)
P6. Complete System Testing and Deploy the System (1 points)

Each student works at least **2 use cases** for final project (50%)

Each student submit one more separately use case for Analysis and Design (same P2 & P3 above) for Process Grade 2 (20%) by PowerPoint file.