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## Offering an Expert Electronic Roll Call and Teacher Assessment System Based on Mobile Phones for Higher Education

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### Abstract

In this paper, we propose an expert electronic roll call for class attendance of students and teacher assessment system. The goal of this system is to design and develop a fully functional automated class attendance Register and assessment system, including hardware and application software. After the teacher initiates the roll call procedure, students in class check their own attendance simultaneously, and then the attendance data are collected into a database automatically. Also after ending a roll call procedure, a procedure of assessment of teacher becomes active and all presence student. We have employed Qt framework for web programming and SQL server database in proposed system. One questionnaire was used in assessment system to assess teacher performance at ending of class. In this system data obtained the questionnaire is collected into a SQL database of assessment system. Finally we use the data collection for assess each teacher in one semester. We also could utilize MATLAB software for exhibition the teacher performance resultant of evaluation and RATIONAL ROSE software for depictions.

**Keywords:** Qt, PDA, Roll call, Assessment.

### 1. Introduction

Due to the rapid development in computer and network technology, the use of the Internet has been expanding exponentially. It is now extensively used as a reference tool for personal, educational, commercial, and industrial use. For many years the Internet has been used extensively in browsing homepages, searching for information, chatting, downloading and uploading information. The rapid development of new technologies such as Java, PHP, Qt and Asp technology made the Internet an efficient medium that allows monitoring, control, and interaction with machine and devices.

Class attendance is an important part of the academic program in the school. Attendance provides possible that interaction between student and teacher which is the base of the educational system. However, the process of calling the roll will waste much extra time for large-classroom teaching. An instructor has to

check the absence of each student with the class roster one by one. Thus, a quick roll call system is necessary. The student attendance System provides a solution that improves data collection and accuracy. These software modules reduce staff workloads and expedite the movement of students through the office. It is flexible and easily tailored to your school environment: Every school has different priorities, needs, and requirements. The Academy Attendance System includes electronic roll call processing and attendance reporting and monitoring. Additionally, using our web and PDA/Mobile modules, schools can access attendance data online or via hand-held devices.

In Traditional roll call with a roll book an instructor must call off names one by one in each class. Thus such roll call is time-consuming. On the contrary, it is more efficient that students sign their names in a sign-up sheet. For quick roll call, we develop an online system in this paper. We wish the proposed system can help instructors to audit the absence of students efficiently.

## **2. Definitions**

### **2.1 Database Server**

A database server is a computer system or program that provides database services to other computers or computer programs. Typically, client applications access database servers over a network. Database servers are gaining importance because of the increasing popularity of the client/server architecture model in computing. Data stored on a Database Server is setup on a dedicated computer system/server which is accessed concurrently. Database servers maintain data integrity, handles transaction support and also user authorization.

As per requirements of the client server model, an application is divided into front end and back end by the Database Server. The front end runs on the user's computer and displays requested data. The back end runs on the server and handles tasks such as data analysis and storage.

Advantage Database Server is a complete, high performance client/server data management system for standalone, networked, Internet, and mobile database applications. Advantage Database Server allows developers the flexibility to combine powerful SQL statements and relational data access methods with the performance and control of navigational commands. Advantage provides native development interfaces designed to leverage existing knowledge of popular development environments. Using optimized data access, Advantage provides security, stability, and data integrity with zero administration. Advantage is the clear choice for application developers needing proven reliability, performance, and functionality as well as a cost-effective solution for virtually any application development environment.

### **2.2 PDA (Personal Digital Assistant)**

The PDA's are advancing to a more powerful device and equipped with increasing numbers of features. Word processors, personal schedulers, e-mailing, language programming and other traditional desktop applications are increasingly available on this platform.

On the technological side we have seen some developments that can give a boost to mobile learning. On the one hand there is the upcoming usage of GPRS and UMTS; this makes it possible to send/receive data at a higher speed. On the other hand there is a large increase of functionality and usage of mobile devices. One of the last developments is the support of TCP/IP, http-protocols within WAP2.0. This makes mobile internet applications possible and gives access to general web page formats.

### **2.3 Qt Application Framework**

This paper is a technical review of Qt, a cross-platform application framework that is used for developing application software with a graphical user interface (GUI), and non-GUI programs for server. Qt is a comprehensive C++ application development framework for creating cross-platform GUI applications using a "write once, compile anywhere" approach. Qt lets programmers use a single source tree for applications that will run on Windows 98 to Vista, Mac OS X, Linux, Solaris, HP-UX, and many other versions of UNIX with X11. The Qt libraries and tools are also part of Qt/Embedded Linux, a product that provides its own window system on top of embedded Linux. Figure 1 shows Qt and web in one structure.

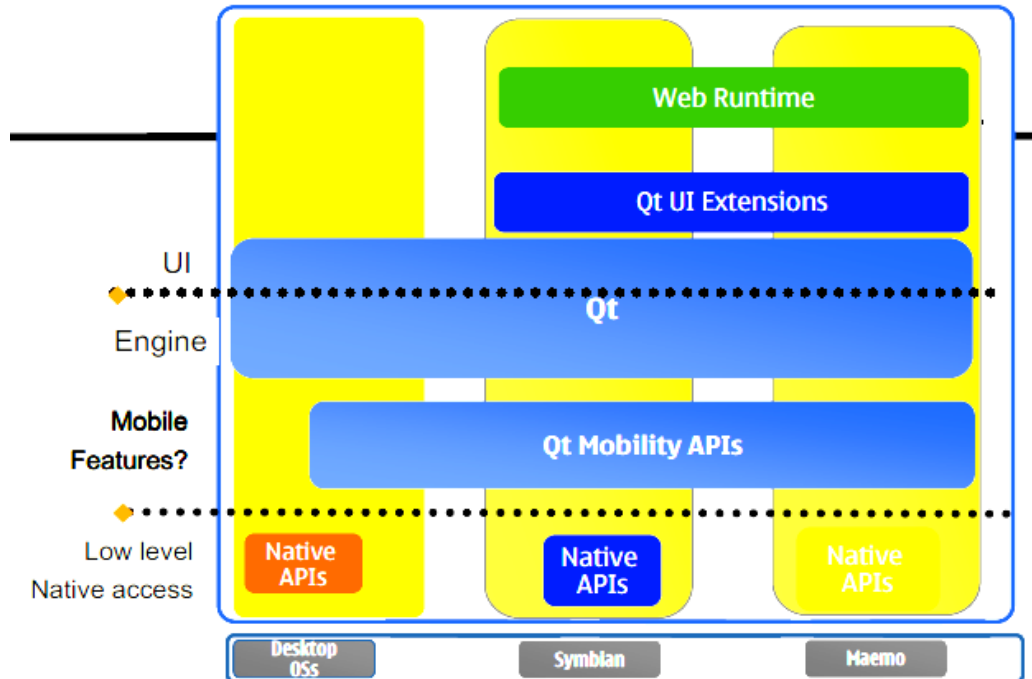


Figure 1. Qt and Web are the ways to go

### 3. Software Methodology and Requirements

As shown in Figure 2, as the design methodology, we chose to use the software engineered agile methodology because it helps to understand the nature of the system we will build. Agile modeling is a practice-based methodology for Modeling and documentation of software-based systems. It is intended to be a collection of values, principles, and practices for modeling software that can be applied on a software development project in a more flexible manner than traditional Modeling methods. This section specifies the software requirements for the proposed system.

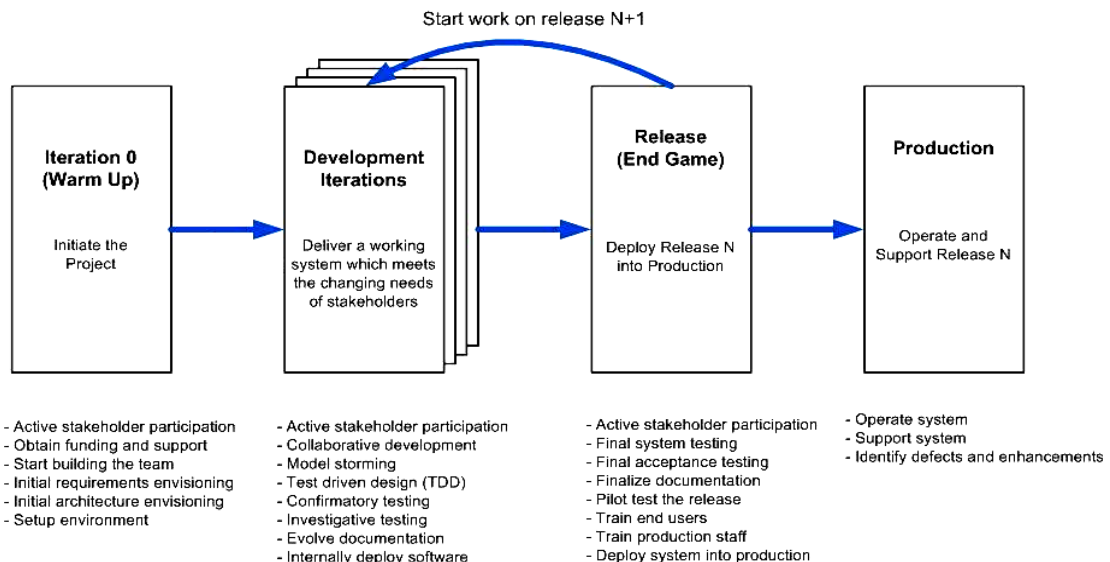


Figure 2.The agile system development life cycle (SDLC)

We classified main requirements for development proposed system as follows:

- (ID) card: Each student should have an identification (ID) card number that carries a barcode. (CR)
- Barcode reader: A barcode reader shall capture students' IDs at class room during a class session. After capturing the readings shall be transferred to the wireless device. (CR)
- PDA: a PDA with wireless instruments: the readings shall be sent to the server immediately after every scan, or after a group of scans. (CR)
- Mobile Phones: each student and teacher should have a mobile phone for connecting internet via GSM/GPRS services and Internet browsers. (CR)
- Attendance server equipped with wireless instruments: attendance server should stay functional and up all the time regardless of wireless (GSM) network availability. (SR)

#### 4. System Model

##### 4.1 Use Case Diagram of Proposed System

The use cases for the attendance and assessment System are used to represent the basic functionalities of the system as use cases focus on the behavior of the system from an external point of view. Figure 3 depicts the use case diagram of the system.

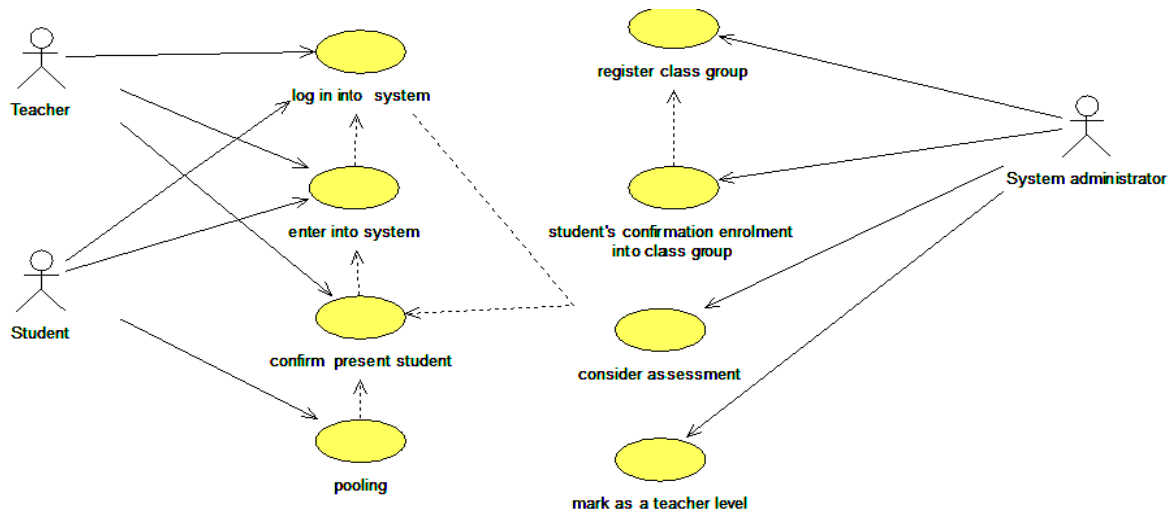


Figure 3.Use Case Diagram of Proposed System

##### 4.2 Class Diagram

Class diagrams describe the structure of the system in terms of classes and objects. Classes are abstractions that specify the attributes and behavior of a set of objects where as objects are entities that encapsulate state and behavior. In Figure 4, the class diagram for the system shows the classes with their potential attributes and methods.

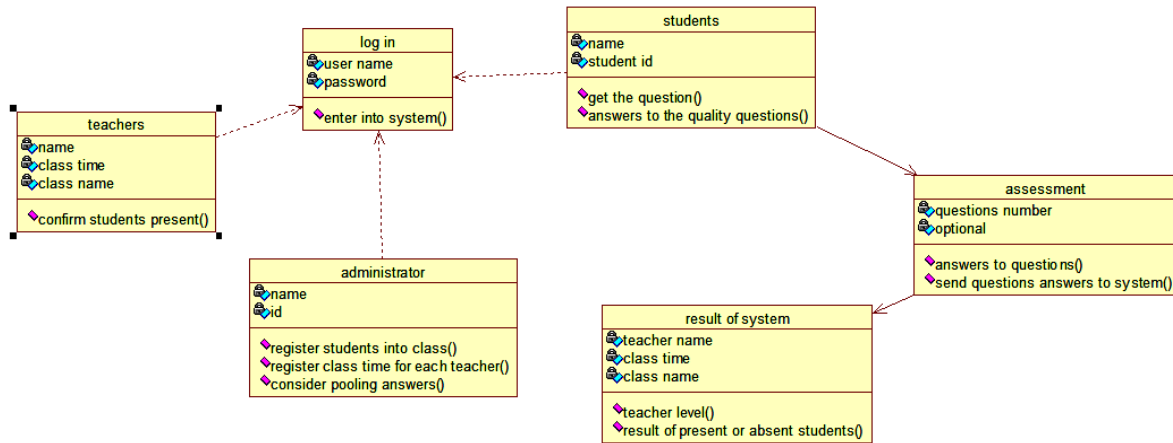
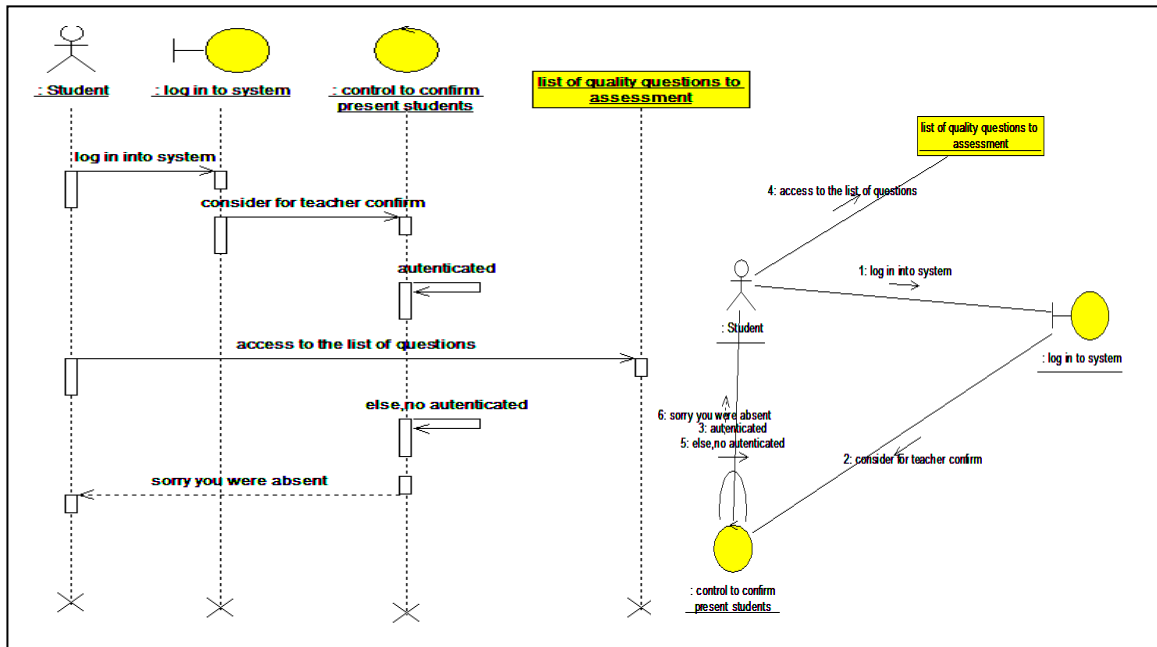


Figure4. Class Diagram for Bluetooth Enabled Information Provision System

#### 4.3 Sequence Diagram for Student Module

A Sequence diagram is a system model that is used to depict the interaction between participating objects in a given use case. The sequence diagrams for this particular system are organized in such a way that they can clearly show the participating objects in the given use case composed of user interfaces, control objects and persistent data elements. Figure 5 shows the sequence diagram of the system.



#### 4.4 Activity Diagram

Activity diagrams show the work flow of the system. They illustrate what activities can be done in parallel, and the possibility of alternative paths through the work flow. The activity diagram for this system depicts the different activities involved through the course of the working with the system in terms of the actors involved. Figure 6 shows the activity diagram of the system.

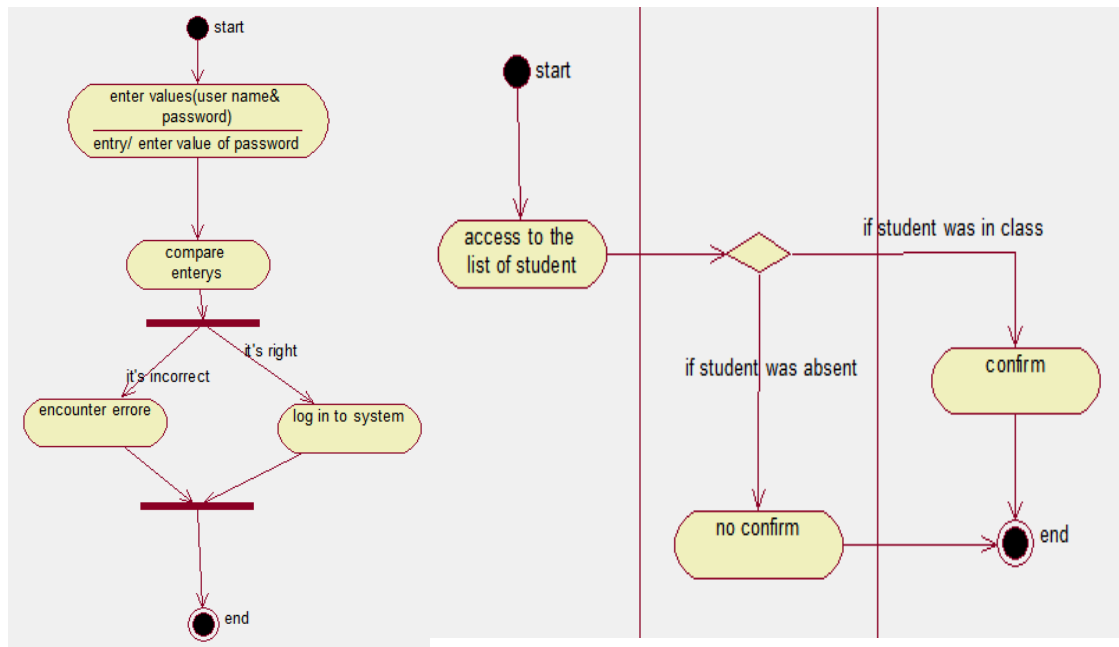


Figure 6. Activity Diagram of the system

### 5. System Overview

The Roll Call system provides an easy and handy way to keep track of those students who miss classes during an academic semester or year. It is aimed at making the attendance taking process an easy and fast one via the use of the Internet and wireless technologies. This system was developed using three layer architecture, as depicted in figure 7 has been chosen for monitoring of system using Internet technology. This architecture provides greater application scalability, high flexibility, high efficiency, lower maintenance, and reusability of components. In this design, each tier can be run either on a separate machine or on the single machine.

- Client-Tier: The user interface running in a web browser in the computer.
- Application-Tier: Qt web server will be used running in windows platform.
- Database-Tier: SQL server database running in WINDOWS platform.

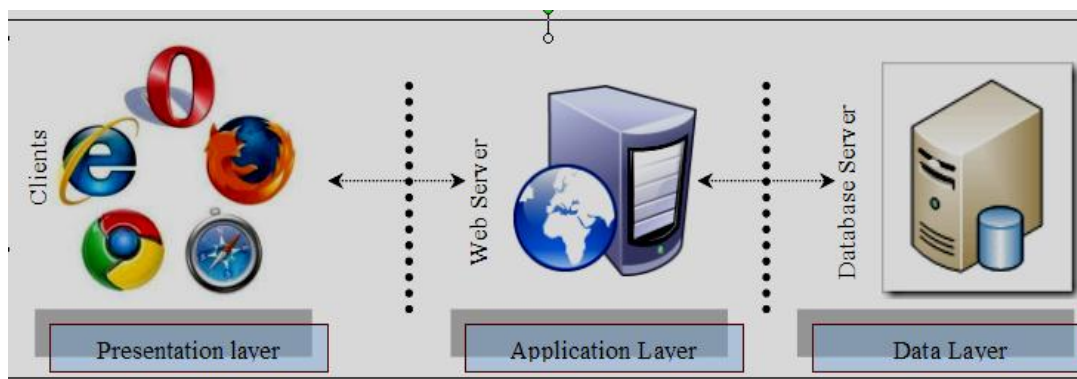
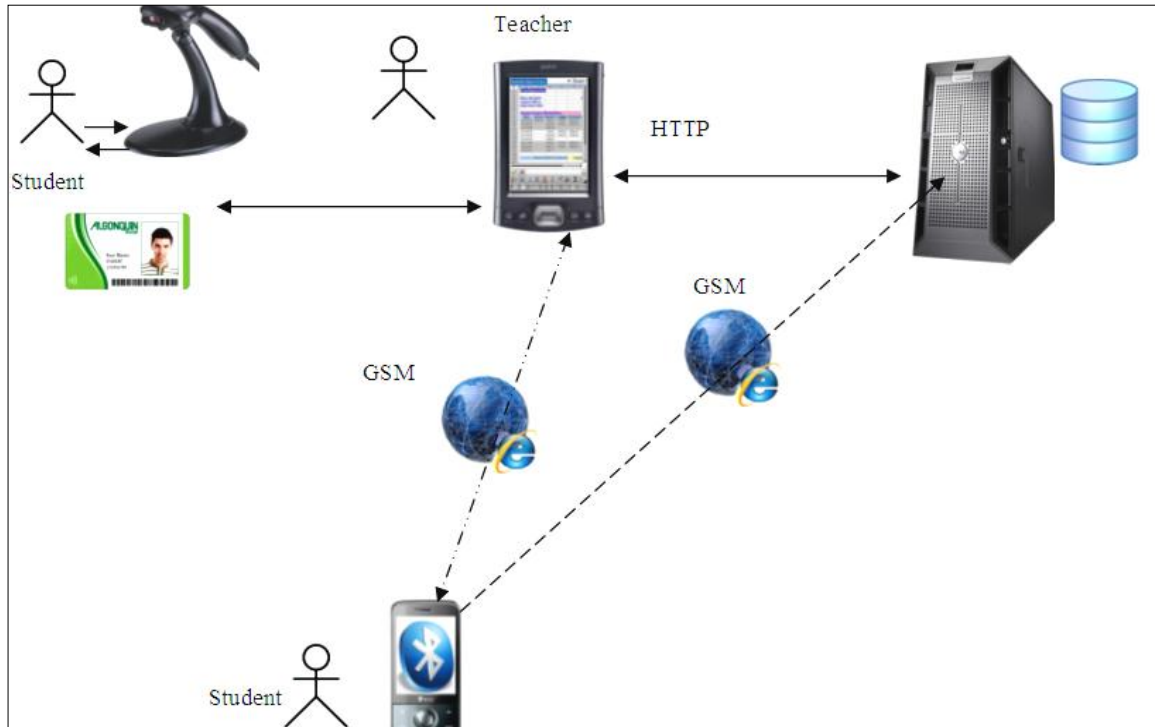


Figure 7.Three –layer architecture

As shown in Figure 8, all what is needed for implementing such a system includes a barcode reader, a wireless portable device, and a host server .The barcode reader is used for scanning the IDs of students while entering the class room. The wireless device (A PDA in our case) is sued as an intermediate point which establishes a communication link between the class room and the attendance server. Hence, the teacher is required to bring his/her PDA to the class room. It receives the reading from the barcode and, thereafter, each ID read will be immediately written into the main database on the server which is running remotely. Connection to the Internet is established via the card phone installed on the PDA using the PCMCIA jacket or via wireless access points that are present. The mobile phone shown in Figure 7 is used in case the PDA has



no mechanisms for mobile communications. The instructor may check attendance status in-class, or later using a nice graphical interfaced QT application that runs on his/her desktop, as shown in Figure 8.

Figure 8.System Components for roll call and attendance system

## 6. Sample Qt Codes for Handling Data in Database

The commercial edition of Qt comes with many database drivers, whereas the GPL edition has fewer due to licensing restrictions. The drivers that are available include ones for IBM's DB2, Borland's Interbase, MySQL, Oracle, ODBC (for Microsoft SQL Server), PostgreSQL, SQLite, and Sybase. However, like any aspect of PyQt, it is possible to create additional database drivers if one we need is not available. Figure 9 shows sample code for connecting to SQL database.

```
QSqlDatabase createSqlServerConnection()
{
    QSqlDatabase db = QSqlDatabase::addDatabase("QODBC",
"RollCallSystem");

    QString dsn = QString::fromLocal8Bit("MSSQLServer");
    qDebug() << dsn;
    db.setDatabaseName(dsn);
    db.setUserName("ADMIN");
    db.setPassword("ADMINPASS");
    if(!db.isValid() || !db.open()) {
        QMessageBox::critical(0, QObject::tr("Database Error"),
            db.lastError().text());
        exit(-1);
    } else {
        qDebug() << "Connect succeeded.";
    }
    return db;
}
```

Figure 9.Qt Code for Connecting to SQL server Database

## 7. Conclusion

The system designed and implemented in this work fulfils society needs in many fields in instant Roll call and assessment. Out objective in this work was after a solution that is easy to install and use, yet powerful and efficient. The system components include a PDA, a bar code reader (or any other input device that can be interfaced with the PDA), a mobile phone and the host computer running our tool. The software engine, which is a number of communicating serves and beans, handles HTTP requests and responses from and to the client PDA to retrieve information.

One of the advantages of the system is the optional use of mobile phones and the GSM network to connect the PDA to the Internet which gives it an ultimate wireless power. After the connection is established any database can be accessible by the implemented server. The use of Bluetooth technology makes the connection between the mobile and the PDA very convenient to the user since no line-of-sight is required as in IrDA nor an extra jacket that adds up to the weight and size of the PDA. Moreover, this option allows connectivity even though there is no wireless infrastructure around the classrooms.



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