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RFID based Academic Assessment Automation System

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ABSTRACT: In this paper, the concept for a radio frequency identification (RFID) enabled student workbook is discussed and a prototype system developed. The workbook is a question-answer notebook in traditional paper format in which hand written solutions to student assignments are written. An embedded RFID tag in the workbook is then used for the student to store his/her solution to the attempted assignment questions at home. On entry to the classroom and once the questions have been attempted, an RFID reader in the classroom will retrieve the answers from the workbook, automatically collate the results and instantly provide a summary of these results for the individual student and the class as a whole. If problems are highlighted, the teacher can then investigate issues with individual students and review the answers provided in the workbook. RFID can used for attendance because tag has unique code. It can also sent a message to the particular staff by GSM modem.

KEYWORDS: RFID interface, assessment, automation.

I. INTRODUCTION

The use of technology in the classroom has rapidly expanded over the last few years and now education technologies, both wired and wireless, exist to aid the student and teacher. Today, a range of technologies exist to support teaching and learning. In this paper, such technologies are considered and a student workbook (question-written answer notebook in paper format) used for class assignments is electronically enabled using radio frequency identification (RFID) [2]. Essentially, a passive RFID tag is embedded into the cover of the workbook and this allows for the student answers to the assignment questions to be stored in the RFID tag memory. Thus, in this arrangement, the student answers the assignment questions by writing the fully worked solutions into the workbook and on completion of the questions, stores a summary of the answers into the RFID tag memory using a PC/RFID reader arrangement at home. The workbook is then taken to the class and on entry into the classroom, the assignment answers are automatically read using a classroom PC/RFID reader arrangement, collated and available for the class teacher [1-9].

The teacher then immediately knows the results of the assignment for all students, and if particular students have had problems answering the assignment questions, these students are immediately and automatically made aware to the teacher at the start of the class. The student therefore retains his/her copy of the fully-worked solutions for reference and the teacher has the results available without an explicit need to personally collate the assignments and manually collate the results.

The idea is shown in Fig. 1. Here, the PC runs a suitable software application to interface the PC to the RFID reader hardware. For communications (two-way transfer of required data between the PC/reader and workbook/tag), the workbook is placed over the reader by the student. This action allows the assignment answers stored on the tag embedded in the cover of the workbook to be transferred to the PC and the next assignment data to be uploaded to the tag. The results will then be stored in a suitable database. The PC application then assesses the student answers and if necessary, the educator is automatically alerted if there are any problems to rectify. All students in the class will upload their assignment solutions and so the class results can be instantly be made accessible to the teacher [10-17].

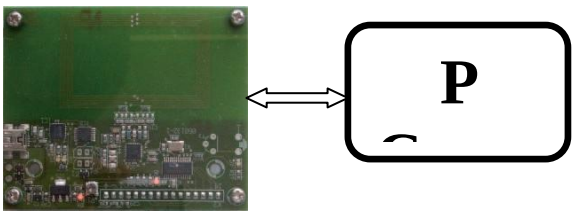

Figure 1. PC – RFID reader - workbook arrangement

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Such a set-up has a number of potential uses for both the student and the teacher. For the student, there is an immediate electronic storage of his/her assignment results at home (on the tag and on his/her own computer) and also centrally within the education institution which\ can then be accessed via

a suitable student portal web site. For the teacher, there are the benefits that the student progress in assignments can be obtained and instantly analyzed at the start of the class without the need to read all workbooks (suitable for large classes) and also problems can be flagged and dealt with on an individual student basis. However, care will need to be taken to ensure that the answers on the tag are those provided in the workbook. This could be undertaken, for example, by random selection of workbooks to be audited in the classroom and/or for the workbooks from the complete class to be audited during or at the end of the course [18-26].

The paper is structured as follows. Section I has introduced the paper and the focus of the work. Section II will provide an overview of RFID and section III will discuss the workbook concept. Section IV will discuss the attendance concept. Section V will discuss the message sending concept. Section VI will introduce the prototype system and its evaluation and finally, section VII will conclude the paper with future

II. RFID OVERVIEW

Radio frequency identification (RFID) is a wireless means to connect two electronic circuits together. It is widely used in applications such as travel cards, building access control, inventory tracking and is a technology widely used in the idea of the "Internet of Things" [3].

Both data and power can be transferred through the wireless interface. Depending on the system used, data transfer can be over distances from a few centimetres to tens of meters. An RFID system basically consists of three parts:

1. The **RFID tag**.
2. The **RFID reader** (or interrogator) – which incorporates an antenna.
3. A **computer** (PC) running a software application which interfaces to the reader (and hence the tag).

An RFID system can take one of a number of different forms, however a basic RFID system is shown in Fig. 2. Here, a PC runs a software application which accesses the RFID reader hardware (typically via a USB serial interface). This is a duplex link in that:

1. Commands can be sent to control the RFID reader hardware operation and data can be sent to the RFID tag via the reader.
2. The status of the RFID reader can be determined and data from the RFID tag can be received via the reader.

The tag is essentially a coil of wire with a parallel capacitor to form a resonant circuit at the required oscillation frequency, and an integrated circuit (IC). The tag can be passive, semi-passive or active, depending on the power supply arrangement. In a passive tag, the power is provided by the reader once the tag is within range (mainly using inductive coupling – near field communication (NFC)). In an active tag, only data is transferred and an in-built battery power supply provides the energy required to operate the tag electronics. This is suitable for longer range (electromagnetic coupling between the reader and tag) and where the tag includes electronics that require more energy than can be transferred via the coupling. Semi-passive tags include a battery power supply for specific electronic circuits within the tag, but the communications interface circuitry is powered by the wireless link.

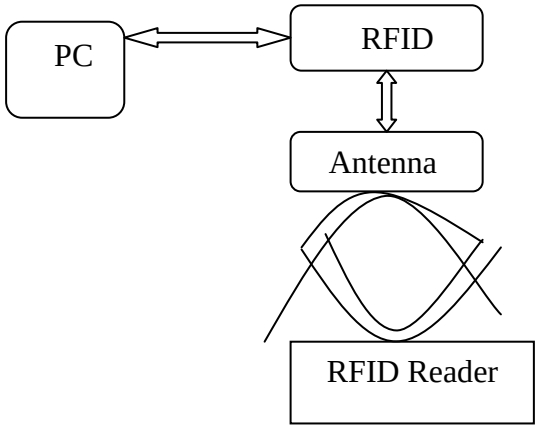

Fig. 2. A basic RFID system

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III. THE WORKBOOK CONCEPT

Within engineering education, assignments and practical laboratory work is an essential part of the student learning experience. Traditionally, these have been hand-written into laboratory note books and these have been assessed by the teacher. In recent years, electronic based technology has superseded much of the hand-written work with word processed assignments and reports becoming standard practice. However, in many cases the hand-writing skills have been neglected and in some cases, completely lost. Many students now can find it hard to hand-write reports and assignments, preferring to use word processing as an 'easier' alternative. This has led to the loss of skills which are still required in the workplace (such as keeping log books and notes from meetings) and the need for such skills can come as a shock to graduates. This has come about by the use of technology in the classroom as a replacement for handwriting. In this work, we consider retaining the handwritten assignments and laboratory reports, but augmenting them with RFID technology. RFID provides for a convenient and wireless means to exchange data. In this case, data exchange is between the student and teacher. The idea here is to provide for a learning scenario whereby student assignments will be handwritten (fully worked solutions) and the final answers are exchanged via an RFID tag embedded within the cover of the workbook. Fig. 3 shows the idea with the workbook placed over an RFID reader for data exchange.

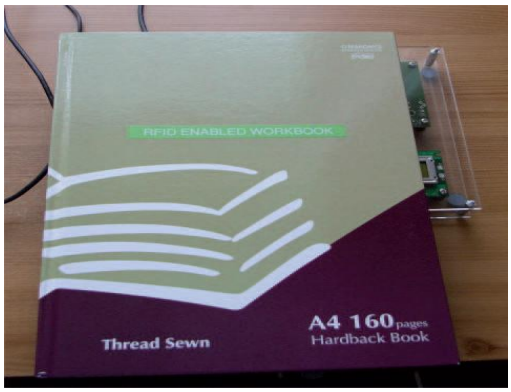

Figure 3. Workbook placed over the reader

Fig. 4 shows the tag secured to the back cover of the workbook.

Figure 4. Workbook inside cover showing the RFID card (tag) used in the prototype

The procedure to use the system will be as follows:

1. Initially, as the start of the course and in the classroom the student places his/her workbook on the classroom PC/reader arrangement and the first assignment data is uploaded to the workbook tag.
2. At home, the student answers the assignment questions by writing full solutions into the workbook.
3. On completion of the assignment at home, the workbook is placed by the students' own PC/reader arrangement and a PC application allows the student to enter the final answers and store these in the tag.

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4. The student attends the class and in the classroom places his/her workbook on the classroom PC/reader arrangement. The assignment answers are read from the workbook tag and stored in a database, the tag contents are erased and the next assignment data is stored in the workbook tag.
5. Once all students have uploaded his/her assignment answers to the classroom PC/reader arrangement, the results are accessed from the database, analyzed and a summary of the results are available to the teacher. Any issues can be quickly identified and addressed, at a class level or at an individual student level.
6. Steps 2 to 5 are repeated for all assignments.

IV. ATTENDANCE CONCEPT

Here RFID can also used for a attendance purpose .The RFID tag has unique code once student can enter into the classroom immediately RFID reader can read the tag same time it will identify the student and generate attendance to student .its also produce attendance report to individual as well as the whole class.

V. MESSAGE SENDING CONCEPT

This concept is based on the GSM modem (global system for mobile communication) .once the student can enter into the classroom it generate a attendance to a particular student and also it have the information about how many student can present in the classroom already it will student data base and also classroom data base. With help of GSM modem it will send the information to particular staff that message contain the information about how many student can present in particular course

VI. PROTOTYPE SYSTEM DESIGN

In order to assess the viability and use of such a system, a prototype system was designed and used on a small trial basis. This involved the use of a suitable RFID reader and the development of software applications for the student and the teacher.
The two software applications were required to have the following basic functionality. Visual Basic 2010 as part of the Visual Studio programming suite from Microsoft [8] was used for the interface design as it provides for a powerful graphical user interface design capability and links to the USB (Com) port for data I/O and for database access.
The student PC application requires the following:
1. Always running (runs at start-up), but is hidden from view until the workbook is placed over the reader.
2. When the workbook is detected, the application is visible and the data is read from the workbook tag.
3. The assignment is identified and the possible answers are selectable by the user.
4. Once the answers have been entered into the application, the data is stored.
5. The application automatically stores the data, reads back the stored data and checks for correct data storage.
6. On completion, the student is informed of the data storage success and the application automatically hides from view.
The student would "walk-through" six steps to set-up the reader-workbook interaction, to select the assignment and then question answers, to upload the answers to the workbook and then to verify that the answer upload process was successful.
The classroom (tutor) PC application requires the following:
1. The teacher enters a username and password which are stored in the My SQL [9] database.
2. The next assignment is set by the teacher.
3. Each student then places his/her workbook on the reader and the current assignment is read and the next assignment data is written to the tag.
4. The data is stored in the database and the student is given a message informing him/her of the actions taken.
5. On completion of all students providing their assignment answers, the teacher views the assignment results and queries the database.
6. If problems are identified, corrective action can be taken in the class.
The tutor PC application where the tutor is guided through a process to enable the workbook, to retrieve the student answers, to interrogate the database and to upload the necessary information for the next assignment. In this version of the application, the layout is a standard PC Windows style of application suited for control with a computer mouse. Commonly used tasks are available as buttons on the main window, although additional functions are available through the pull-down menu. However, there will be implementation and deployment issues to consider such as:
1. Building RFID technology into everyday life.

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2. Practical issues involving the students being required to store the properly use the technology.
3. Integrating the technology into the institution learning management system (LMS).
4. Ensuring the answers are the student own efforts.
5. Protecting the data stored on the tag.
6. The limitations of data storage on the tag.

VII. CONCLUSIONS AND FUTURE WORK

In this paper, the concept for a radio frequency identification (RFID) enabled student workbook was discussed and a prototype system presented. The workbook is a question-answer notebook in traditional paper format in which hand written solutions to student exercises are written. An embedded RFID tag in the workbook is then used for the student to store his/her solutions to the attempted questions. The use of the embedded tag in student assessment was presented. Future work will be to further develop and evaluate the system.

REFERENCES

[1] Ian Grout, Ciara Murphy and Alexandre César Rodrigues da Silva, "Remote Laboratory Experiment Access via an RFID Interface", Proceedings of the REV 2012 conference, 4th July – 6th July 2012, Bilbao, Spain.
[2] Patrick J. Sweeney II, RFID for Dummies, Wiley, 2005, ISBN 0- 7645-7910-X.
[3] Jun Zheng David Simplot-RylChatschik Bisdikian Hussein T. Mouftah, "The Internet of Things", Guest Editorial, IEEE Communications Magazine, November 2011.
[4] Philips Mifare Ultra-light, NXP Semiconductors
[Online]Available:http://www.nxp.com/products/identification_and_security/smart_card_ics/mifare_smart_card_ics/mifare_ultralight/ [Accessed in October 2013].
[5] Mifare industry standard for contactless smart transaction.Available:http://www.nxp.com/products/identification_and_security/smart_card_ics/mifare_smart_card_ics/ [Accessed in October 2013].
[6] Hamid Ali Abed Al-Asadi, "Temperature dependence of the lasing characteristics of vertical cavity surface emitting lasers," Engineering Journal of Technology University, Vol. 145, 1994.
[7] Boselin Prabhu S.R. and Sophia S., "Environmental monitoring and greenhouse control by distributed sensor Network", International Journal of Advanced Networking and Applications, 5(5), 2014.
[8] Boselin Prabhu S.R. and Sophia S., "Greenhouse control using wireless sensor network", Scholars Journal of Engineering and Technology, 2(4), 2014.
[9] Hamid Ali Abed Al-Asadi, "Temperature dependence of the noise characteristics of Multiisection semiconductor lasers," Science Journal, vol. 7, No. 3, 2001.
[10] Hamid Ali Abed Al-Asadi, "Linewidth characteristics of vertical cavity surface emitting lasers due to external optical feedback," Science Journal, vol. 8, 2001.
[11] Boselin Prabhu S.R. and Sophia S., 'Modern cluster integration of advanced weapon system and wireless sensor based combat system', Scholars Journal of Engineering and Technology, 2(6A), 2014.
[12] Boselin Prabhu S.R. and Sophia S., 'A review of efficient information delivery and clustering for drip irrigation management using WSN', International Journal of Computer Science and Business Informatics, 14(3), 2014.
[13] Hamid Ali Abed Al-Asadi, "Linewidth characteristics of vertical cavity surface emitting lasers due to external optical feedback," Science Journal, vol. 8, 2002.
[14] Hamid Ali Abed Al-Asadi, "Theoretical investigation of spectral linewidth properties of double fused 1.3 um MQW-VCA in reflection and transition modes," Tikrit Journal for Pure Science, vol. 8, No. 2, 2002.
[15] Boselin Prabhu S.R. and Sophia S., 'Mobility assisted dynamic routing for mobile wireless sensor networks', International Journal of Advanced Information Technology, 3(3), 2013.
[16] Boselin Prabhu S.R. and Sophia S., 'A review of energy efficient clustering algorithm for connecting wireless sensor network fields', International Journal of Engineering Research and Technology, 2(4), 2013.
[17] Hamid Ali Abed Al-Asadi, "Vertical cavity amplifiers and its cavity length dependence the saturation power and quantum efficiency," Tikrit Journal of Pure Science, vol. 9, No. 2, 2003.
[18] Hamid Ali Abed Al-Asadi, "Effects of pump recycling technique on stimulated Brillouin scattering threshold: A theoretical model," Optics. Express, Vol. 18, No. 21, pp. 22339-22347 Impact factor: 3.88, 2010.
[19] Boselin Prabhu S.R. and Sophia S., 'Variable power energy efficient clustering for wireless sensor networks', Australian Journal of Basic and Applied Sciences, 7(7), 2013.
[20] Boselin Prabhu S.R. and Sophia S., 'Capacity based clustering model for dense wireless sensor networks', International Journal of Computer Science and Business Informatics, 5(1), 2013.
[21] Hamid Ali Abed Al-Asadi, "Brillouin Linewidth Characterization in Single Mode Large Effective Area Fiber through the Co-Pumped Technique," International Journal of Electronics, Computer and Communications Technologies (IJECCT), Vol. 1(1), pp. 16-20, 2010.
[22] Boselin Prabhu S.R. and Sophia S., 'An integrated distributed clustering algorithm for dense WSNs', International Journal of Computer Science and Business Informatics, 8(1), 2013.
[23] Boselin Prabhu S.R. and Sophia S., 'A research on decentralized clustering algorithms for dense wireless sensor networks', International Journal of Computer Applications, 57(20), 2012.
[24] Hamid Ali Abed Al-Asadi, "Analytical study of nonlinear phase shift through stimulated Brillouin scattering in single mode fibre with pump power recycling technique,", Volume 13 Number 10, Journal of Optics. Impact factor: 1.99, 2011.

ISSN: 2350-0328

International Journal of Advanced Research in Science, Engineering and Technology

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[25] Boselin Prabhu S.R. and Sophia S., 'Hierarchical distributed clustering algorithm for energy efficient wireless sensor networks', International Journal of Research in Information Technology, 1(12), 2013.
[26] Boselin Prabhu S.R. and Sophia S., 'Real-world applications of distributed clustering mechanism in dense wireless sensor networks', International Journal of Computing Communications and Networking, 2(4), 2013.