**CHAPTER I**

**INTRODUCTION**

**BRIEF BACKGROUND**

The **internet of things** (**IoT**) is the network of physical devices, vehicles, buildings and other items—[embedded](https://en.wikipedia.org/wiki/Embedded_system) with [electronics](https://en.wikipedia.org/wiki/Electronics), [software](https://en.wikipedia.org/wiki/Software" \o "Software),[sensors](https://en.wikipedia.org/wiki/Sensor), actuators, and [network connectivity](https://en.wikipedia.org/wiki/Internet_access) that enable these objects to collect and exchange data In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed and controlled remotely across existing network infrastructure creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit when IoT is augmented with sensors and actuators, the technology becomes an instance of the more general class of [cyber-physical systems](https://en.wikipedia.org/wiki/Cyber-physical_system), which also encompasses technologies such as [smart grids](https://en.wikipedia.org/wiki/Smart_grid), [smart homes](https://en.wikipedia.org/wiki/Smart_home), [intelligent transportation](https://en.wikipedia.org/wiki/Intelligent_transportation) and [smart cities](https://en.wikipedia.org/wiki/Smart_city). Each thing is uniquely identifiable through its embedded computing system but is able to interoperate within the existing [Internet](https://en.wikipedia.org/wiki/Internet) infrastructure. Experts estimate that the IoT will consist of almost 50 billion objects by 2020.

The ability to network embedded devices with limited CPU, memory and power resources means that IoT finds applications in nearly every field. Such systems could be in charge of collecting information in settings ranging from natural ecosystems to buildings and factories, thereby finding applications in fields of [environmental sensing](https://en.wikipedia.org/wiki/Environmental_monitoring) and [urban planning](https://en.wikipedia.org/wiki/Urban_planning).   
On the other hand, IoT systems could also be responsible for performing actions, not just sensing things. [Intelligent shopping systems](https://en.wikipedia.org/wiki/Retail_Intelligence), for example, could monitor specific users' purchasing habits in a store by tracking their specific mobile phones. These users could then be provided with special offers on their favorite products, or even location of items that they need, which their fridge has automatically conveyed to the phone. Additional examples of sensing and actuating are reflected in applications that deal with heat, electricity and [energy management](https://en.wikipedia.org/wiki/Energy_management), as well as cruise-assisting [transportation systems](https://en.wikipedia.org/wiki/Intelligent_transportation_system). Other applications that the internet of things can provide is enabling extended home security features and home automation. The concept of an "internet of living things" has been proposed to describe networks of [biological sensors](https://en.wikipedia.org/wiki/Biosensor) that could use cloud-based analyses to allow users to study DNA or other molecules. All these advances add to the numerous list of IoT applications. Now with IoT, you can control the electrical devices installed in your house while you are sorting out your files in office. Your water will be warm as soon as you get up in the morning for the shower. All credit goes to smart devices which make up the smart home. Everything connected with the help of Internet.

However, the application of the IoT is not only restricted to these areas. Other specialized use cases of the IoT may also exist. An overview of some of the most prominent application areas is provided here. Based on the application domain, IoT products can be classified broadly into five different categories: smart wearable, smart home, smart city, smart environment, and smart enterprise. The IoT products and solutions in each of these markets have different characteristics.

**NEED FOR STUDY**

The interest in the topic of Near field Communication has set its way through the choosing of this specific domain. IoT is a massive technology and is a trending development area where innovations can be brought in and the scope of research can be widened globally.There are various areas in which the concept of NFC can be applied and can bring in a tremendous change in the developing economy.

[Ambient intelligence](https://en.wikipedia.org/wiki/Ambient_intelligence) and [autonomous control](https://en.wikipedia.org/w/index.php?title=Autonomous_control&action=edit&redlink=1) are not part of the original concept of the internet of things. Ambient intelligence and autonomous control do not necessarily require Internet structures, either. However, there is a shift in research to integrate the concepts of the internet of things and autonomous control, with initial outcomes towards this direction considering objects as the driving force for autonomous IoT.

In the future the internet of things may be a non-deterministic and open network in which auto-organized or intelligent entities ([Web services](https://en.wikipedia.org/wiki/Web_service), [SOA](https://en.wikipedia.org/wiki/Service-oriented_architecture) components), virtual objects (avatars) will be interoperable and able to act independently (pursuing their own objectives or shared ones) depending on the context, circumstances or environments. Autonomous behavior through the collection and reasoning of context information as well as the objects ability to detect changes in the environment, faults affecting sensors and introduce suitable mitigation measures constitute a major research trend, clearly needed to provide credibility to the IoT technology. Modern IoT products and solutions in the marketplace use a variety of different technologies to support such context-aware automation but more sophisticated forms of intelligence are requested to permit sensor units to be deployed in real environments.

**OBJECTIVES & SCOPE OF WORK**

**NFC in payroll and attendance**

With reference to the base paper “electronic attendance”, the idea of applying NFC for delimiting the operation of attendance and control of various other salary related issues like appraisals can be monitored by the administration.The use of encryption technique such as AFS or DFS is used to improvise the security factors in this domain of knowledge. This has been a major advantage for numerous organizations since the monitoring of information has been well maintained and has paved its way for improvement in the technological factors. In this system,the user need not be connected to the internet to store the data on the card. The information on the card will automatically be synchronized in the database once the range of connectivity to the internet is provided.This is a major advantage since , we need not rely on the internet for storing the information in a particular location.

The implementation of this technology can also be extended to a system such as a mall,where we use a hardware for creating a bill in the entry and the exit points.Whereas,using this strategy will eventually reduce the cost of the hardware set-up since we just require a NFC compatible device and a card to store the information.The cost of implementation and also the time to wait in a long queue for generating and paying the bills can be effectively reduced.

**CHAPTER II**

**LITERATURE REVIEW**

**BASE PAPER:**

**ELECTRONIC ATTENDANCE SYSTEM USING NFC**

**MOHAMMAD AWEDH, AHMED MUEEN**

King Abdulaziz University

Publication Year: 2016

**ABSTRACT**

In today’s world, efficiency and transparency is what needed to increase the performance and eliminate the presence of fraudulent in a system. Recording and monitoring students’ attendance become very important part for any institutions. This paper is presented about an Electronic Attendance System (EAS) using Near Field Communication (NFC).System allows teachers and parents to monitor student attendance electronically. With this system teachers can replace the existing time consuming and inefficient system and eliminate any illegal attendance. Mostly, in universities and colleges attendance are taken by calling students names, while, in others ,passing attendance sheet, where student are asked to sign just next to their names. Both methods have disadvantages. In the first case, for instance, lecturers with large class may find hassle to check all of these students by names and it might take precious time of each lesson; in second case, some students may unintentionally or deliberately sign another student’s name or manual signing of attendance by students are troublesome and may distract teacher from teaching.

This paper based student attendance registration cause loss of time for students and the teachers and lack student attendance authentication. Therefore, itis essential for educational institutions to have solutions that simplify and increase the speed of data collection and boost the lectures efficiency .Technological enhancements can be useful tools to help in the development of new attendance systems to eliminate the disadvantages of the manual method while improving its advantages. Bluetooth, Radio Frequency Identification (RFID) and NFC (Near Field Communication) are few of the examples of such tools [4]. In this paper we present our web based attendance system using Near Field Communication(NFC) technology. The presentation in this paper is organized as follows: Section II presents a review on works done by some researches related to electronic attendance system, which include some latest technology like biometric, RFID and NFC. Section III discussed about the methodology. The working of the system is explained in Section IV. Results are presented in section Finally the last part presents the conclusion.

A fingerprint device is used in fingerprint attendance system. There are multiple benefits such as ease of access and not requiring any means of entry such as a card .Other than its data recording, this system can also be used as a door lock that can lock and unlock the door upon the user’s entry .In Radio Frequency Identification (RAFID) based, the method of attendance and entry is the same as the fingerprint reader, the only difference is the tools used, which is the RFID card [3]. The idea of the RFID card is to store data on the card that consists of the user’s information. All that data is encrypted into the card which is used as a key to access and record when the user arrived [5]. A NFC is a method to give students and faculty members a key to access to labs, classroom, gym, library, and parking[6]. The NFC is accessible by the user’s phone, as shown This is handy when purchasing a book from the bookstore and getting lunch from the central restaurant. But the reason we are interested in this idea is its ability to register the student’s attendance upon entry. It is fast and easy.

**METHODOLOGY**

To clarify the components within our artifact, we drew a sketch to demonstrate how our design works and the processes needed to generate the outputs for our Electronic Attendance System (EAS). As shown in. we clarified what each component’s main function is in this design and how each step reflects on the outcome of our design .To use the EAS, the steps required are both straightforward and simple. All the student needs is the mobile app installed in his or her phone, shown in In able for the students to successfully register themselves using this app, it only takes four easy step s.When opening the app, a pop up window appears. In this pop up window, students are asked to enter their ID number and then press ok. Next screen shows student information such as his or her university ID number. The student slides or brings their mobile phone next to the NFC tag. After the mobile phone is connects to the NFC patch, a sound and another popup window displays. A message is shown stating that the command for the students’ registration is being sent. Finally when the mobile app displays the information regarding the location of where the student is, the app also displays a message, that the attendance was successful or not.

**INFERENCE**

We tested our application efficiency to reassure of the outcomes. The benefits we get from testing our artifact is to modify or change certain aspects of the specification until the desired outputs are met. Three team members were given an android based smartphone with the NFC feature .The devices that were used, in our experiment are:

Samsung SII

Samsung Note II

Sony Xperia

After asking each team member to give his schedule

containing the time and what day of the week the students attend the class. We conducted this experiment three times to reassure that our results are realistically accurate .The results are identical. The devices are all similar inits process time and from the results of the experiment, shown in the Figure 5, the yellow bar which symbolizes the average time of the three results are extremely similar to all the team members .This demonstrates that the device works fast. Even in the worst case scenario, which is 15 sec., it is still considered fast compared to the traditional method.

Our idea was to take real time students attendance using personal mobile phone without any wastage to time. Using NFC chips on each seat, the app on the mobile phone is used to read the NFC chip. NFC chip has encrypted data that contains information such as the building number, the classroom number, and even the seat number in the case of a student using this attendance system during an exam. Providing teachers a new technology to attains overall attendance of a student directly without any manipulations from attendance sheet. No students can mark attendance for other unintentionally or deliberately. With this idea in mind, we have worked together to make this design idea come to life.

**REFERENCE PAPERS:**

**NFC-DynFS: A way to realize dynamic field strength scaling during communication**

Manuel Menghin ; Norbert Druml ; Christian Steger ; Reinhold Weiss ; Rolger Bock ; Josef Haid

Publication Year: 2015

Near Field Communication (NFC) shows potential in multiple areas like payment, identification, transport, etcarticle title to sign in or learn about subscription options.

Formal security analysis of NFC M-coupon protocols using Casper/FDR

Ali Alshehri ; Johann A. Briffa ; Steve Schneider ; Stephan Wesemeyer

Publication Year: 2015

Near field communication (NFC) is a standard-based, radio frequency (RF), wireless communication technology that allows data to be exchanged between devices that are less than 10 cm apart. NFC security protocols require formal security analysis before massive adoptions, in order to check whether these protocols meet its requirements and goals. In this paper we formally analyse NFC-based mobile.

**Components for an interoperable NFC mobile payment ecosystem**

Rainer Schamberger ; Gerald Madlmayr ; Thomas Grechenig

Publication Year: 2015

Although NFC technology for contactless chip cards (ISO/IEC 14443) is known for over ten years now, the market penetration of mobile phones and payment terminals integrating NFC is rather rare. From a technical point of view, there are no issues that prevent services that are based on NFC from being rolled out. The critical part is to put all the necessary players in place and form an interoperable.

**Applying relay attacks to Google Wallet**

Michael Roland ; Josef Langer ; Josef Scharinger

Publication Year: 2015

The recent emergence of Near Field Communication (NFC) enabled smart phones resulted in an increasing interest in NFC security. Several new attack scenarios, using NFC devices either as attack platform or as device under attack, have been discovered. One of them is the software-based relay attack. In this paper we evaluate the feasibility of the software-based relay attack in an existing mobile.

**Modularization of mobile shopping assistance systems**

Denise Paradowski ; Antonio Krüger

Publication Year: 2015

A customer shopping process consists of several essential and optional tasks like payment or information retrieval. This paper presents an overview of the possible solutions in the field of Mobile Interaction that can be applied in order to perform these tasks in future applications based on current and upcoming communication and interaction technologies.

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**Exploring multimodal feedback for an NFC-based mobile shopping assistant**

Gregor Broll ; Henri Palleis ; Hendrik Richter ; Alexander Wiethoff

Publication Year: 2015

This paper explores how mobile devices can provide useful multimodal feedback during interactions with NFC-tagged objects. We exemplify our approach with a mobile shopping assistant that uses haptic-visual and audio-haptic feedback to inform diabetics about the agreeability of tagged grocery products.

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**Mobile ticketing with NFC management for transport companies. Problems and solutions**

Near Field Communication (NFC), 2013 5th International Workshop on

Date of Conference:

5-5 Feb. 2014

In this paper we analyze the problems that are encountered in mobile ticketing systems where proximity technologies are used for validation and check of the e-tickets, leaving out the stage of ticket purchase, which can be done either remotely or in proximity. We have identified several security issues that are common in mobile ticketing and we propose some methods to solve them. In addition, we propose a protocol to provide secure validation and check of e-tickets. The innovation of this protocol is that it provides a good level of security and it is sufficiently abstract to be independent of NFC operating mode; that is it works in classical Card Emulation mode making use of Secure Element and it is implementable in Peer-to-Peer mode too.

**CHAPTER III**

**METHODOLOGY**

**NFC in payroll and attendance**

With reference to the base paper “electronic attendance”, the idea of applying NFC for delimiting the operation of attendance and control of various other salary related issues like appraisals can be monitored by the administration.The use of encryption technique such as AFS or DFS is used to improvise the security factors in this domain of knowledge. This has been a major advantage for numerous organizations since the monitoring of information has been well maintained and has paved its way for improvement in the technological factors. In this system,the user need not be connected to the internet to store the data on the card. The information on the card will automatically be synchronized in the database once the range of connectivity to the internet is provided.This is a major advantage since , we need not rely on the internet for storing the information in a particular location.

The implementation of this concept will be as follows: The NFC cards with the serial no of the card will be purchased and the data will be stored in this card. The scope of storing the data and retrieving the data is very efficient and can be done very easily.All we need is a NFC compatible phone for tapping on.The data is stored into the card and is transferred to the database when the internet service is provided.The simple organization of the data helps us to manipulate things with great ease.Once the card is tapped on the back of the NFC compatible device,the phone will read the information on it.The data is first put into this card by tapping it in the phone and storing the required data.The mobile application that we build helps us to ffill the required details and the data is stored into the card. This data is then manipulated for various functionalities.The data stored is transferred to the database ,on access to the internet.

Inorder to secure the details of the data stored,we make use of the encryption schemes like AFS amd DFS. For a reliable transmission of data ,we require the encryption scheme to support the organization and maintain the information without owing it to the third party vendors. Also only the authorized people are allowed to alter the provided information.By means of various techniques,the spurious attacks can be overcome and we shall maintain a well developed and equipped software for the attendance schema.