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Study on Applications of (RFID) on Tracking Students Movement

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Abstract*-This paper tackles the Radio Frequency Identification (RFID) and its Application in various fields, such as to monitor drop-off/pick up of school children to enhance the safety of children during the daily transportation from home to school and vice versa. The problem of the study lies in challenges that face the society in delaying of obtaining information, which is represented in the children facing dangers by criminals or by bad companions or even by the children themselves represented by neglecting and lacking awareness of the risks of not attending school. The paper aimed to uncover the optimum means of solving the mentioned problem and to develop an electronic system to raise the efficiency of the educational system in schools. The paper concluded to a number of results top of which are: As the relevance and importance of security, surveillance and monitoring is continuously increasing, the importance of RFID based technology is increasing parallel. Henceforth, this study comes as a contribution to reducing cases of abductions by suggesting the RFID slide system in the student's tracking, which will be reviewed in detail below.*
Keywords: RFID, GPS, IoT, wireless, tracking, GSM.

Introduction

Wireless communication has been around for a long time and is still a developing subject with new advancements being made all the time. The majority of wireless technologies employ air as a communication channel. The use of wireless technology to accurately locate items within a specific range is known as wireless tracking. A successful technology would need to be accurate, dependable, and adaptable. RFID is a wireless technology that is mostly used to track assets. It has attracted a lot of interest around the world and is widely employed in a variety of applications. The success of RFID applications in different sectors, as shown below, demonstrates that the possibilities are unlimited. RFID (Radio Frequency Identification) is a relatively recent technology for tracking objects. It's a wireless automatic identification system that uses an electromagnetic challenge/response exchange to automatically identify an object, place, or person without requiring a direct line of sight. This was created during World War II and is gaining popularity due to its ease of use and inexpensive cost of implementation. RFID is a simple technology that consists of two components: tags and readers. It works on a number of different frequencies. The tags can be passive (they only emit a signal when they are near a reader and are powered by the reader's signal) or active (they have their own battery life and can produce a signal on their own). The readers are base stations that record the presence of tags within their range. The reader determines the signal strength by reading the unique ID of tags. The heart of (RFID) technology is the Returned Signal Strength Indicator (RSI). It's used to figure out how far away the tag is from the reader. Some tags can be read from a distance of several meters and even beyond the line of sight.

This technology has a number of advantages. It offers real-time data transfer, user-friendly software, dependability, and flexibility. It features a minimal cost of implementation, higher precision, and a broad range of applications. Monitoring, asset tracking, person identification, product identification, and security systems all employ this technology. It can be used in a variety of settings, including health care, libraries, tool inventories, and positioning systems. Many wireless technologies exist, but RFID is contactless, convenient, efficient, and dependable, therefore it may be considered a novel technology. RFID technology is widely used around the world, and its impact on our daily lives is wide-ranging and significant (Li et al., 2006; Wyld, 2005). Logistical tracking, product monitoring and maintenance, product safety and information, and the payment process are all examples of RFID applications. Many governments around the world, both developed1and developing2countries, are now attempting to use it for a variety of purposes, ranging from tracking manufactured items, cash, and patients to ensuring the security of payment systems. Massive RFID applications across all industries and countries are predicted to provide significant potential
benefits for sustainable energy infrastructure, transportation safety, and health care. RFID technology has evolved over the last 50 years to become a more efficient and effective device for humans as well as an effective solution to technical and organizational difficulties in a variety of industries. However, important difficulties such as proper ICT technology, controlling networks within RFID domains, standards requirements, and privacy have yet to be resolved3. Jung and Lee, 2015. Open to the public This article is licensed under the Creative Commons Attribution 4.0 International License (http://creativecommons.org/licenses/by/4.0/), which allows for unrestricted use, distribution, and reproduction in any medium as long as you give appropriate credit to the original author(s) and source, provide a link to the Creative Commons license, and indicate if any changes were made. We examine past literature on RFID technology in the public sector to determine what has been done and discovered, as well as policy implications and research priorities. We go over four different elements of RFID research and policy implications in more detail. First, we look at numerous rival RFID application concepts used by governments around the world. Second, we use past literature to categorize a variety of RFID applications. Third, we attempt to resolve the technological and governance concerns that RFID technology now confronts. Finally, we identify major public issues and make recommendations for future research. The researcher showed and

detailed, as shown in (Fig. 1) below, the equipment utilized for constructing and designing the electronic circuit, which includes software and hardware requirements:

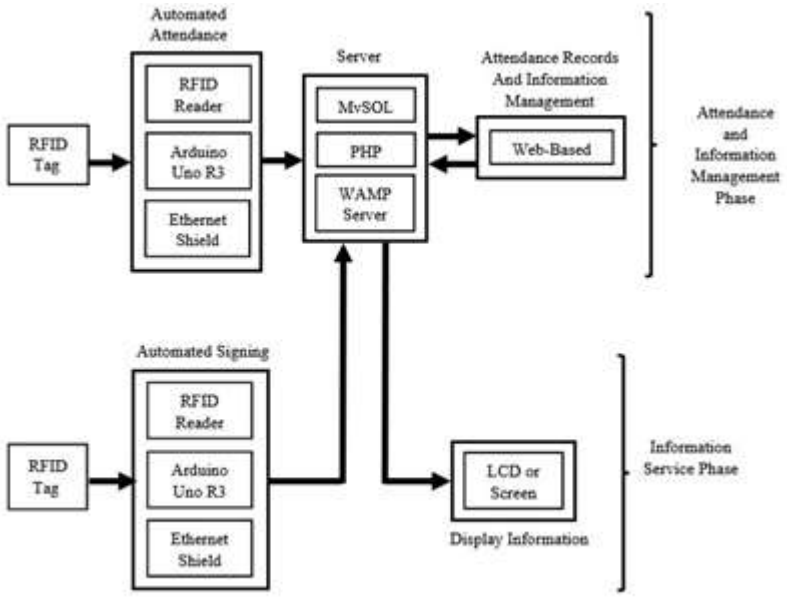

Figure 1. Block diagram for the proposed system architecture

Methodologies and processes for conducting and monitoring the student attendance and information system, as well as methods and implementation steps. Through a literature study that provides an overview of what has been achieved so far, the proposed circuit aims to explore student services that provide presence and information services based on applications and technologies of the Internet of Things. Hardware and software components are required to build the described system, and the implementation process was chosen based on three criteria and metrics, including cost, availability, and ease of programming. The RFID reader is attached to the Arduino Uno microcontroller, which is an open circuit system with pins, as well as the Ethernet shield, which is connected to the Arduino board. The Arduino circuit sends the signal over an Ethernet cable to a server that uses Wamp, PHP, and MySQL to archive student data and attendance records and present student records via a web-based application like a computer at the front end of the attendance records and information management end to present students attendance records and to students registration via the faculty's staff. Furthermore, the proposed system provides students with information by showing their grades, daily schedules, lecture times, classroom numbers, and other pertinent instructions on an LCD panel. The block diagram for the proposed system in (Fig. 1) depicts these information services.

INTRODUCTION TO THE SYSTEM

A. Phase One (Student Attendance and Information Management Phase): This section outlines all of the system's processes. All actions and procedures for conducting the existing system's student attendance management section are explained and given in this stage (Fig. 2). The student scans the (RFID tag) into the (RFID reader), which reads the (ID) for the respective student via ID (reading process) and then sends data to the Wamp server (MySQL and PHP) via wired (Server Process) to record, manage, and display student attendance records via a web-based application.

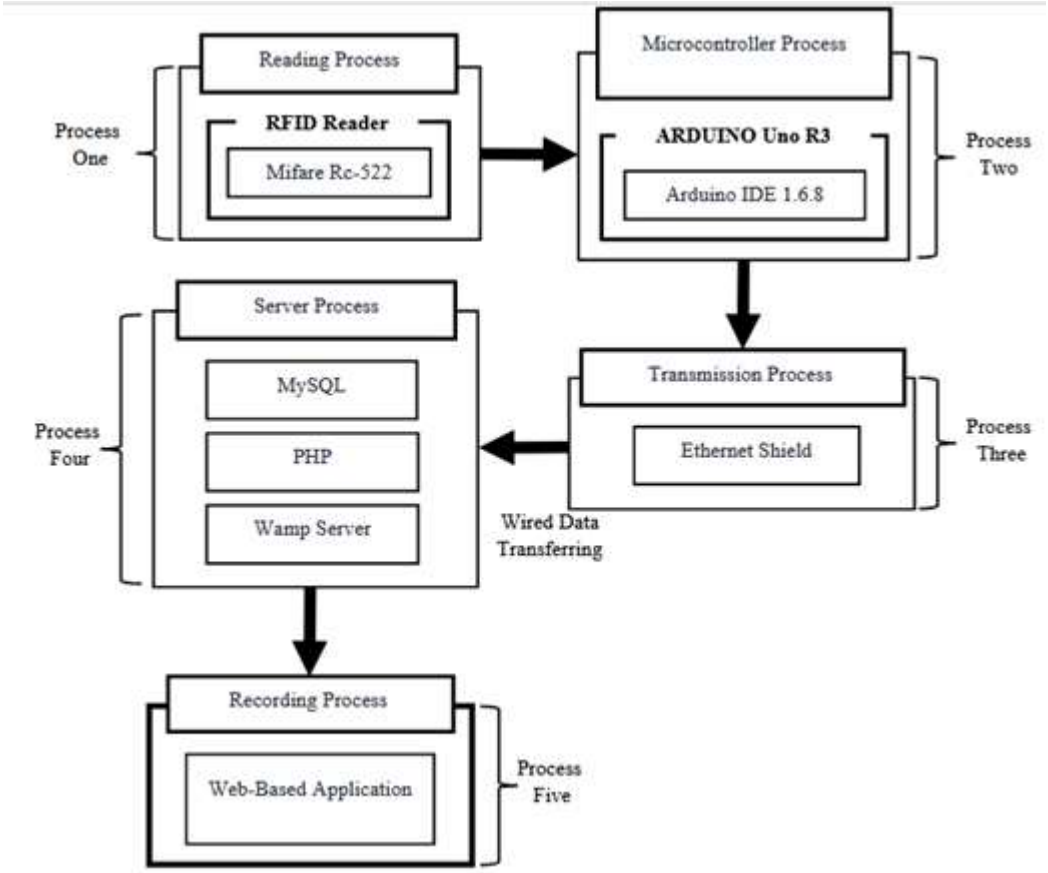

Figure 2. Procedure steps for student attendance and information management phase

B. Second Phase: (Student Information Service Phase) The RFID reader (reading process) is used to read the student's ID, and the Arduino UNO (microcontroller process) is used to transmit the student's information over the cable via Ethernet Shield card to the Wamp server (transmission process). To identify student ID and communicate student information to the screen, a server (MySQL and PHP) is needed (see Fig. 3). The student scans the (RFID tag) with the (RFID reader), which reads the student's data (ID) and sends it to the server-side (MySQL and PHP) via the Arduino board, where it looks for the student's ID and retrieves his data from the database, and then displays the information on the screen or LCD (see Fig. 3)

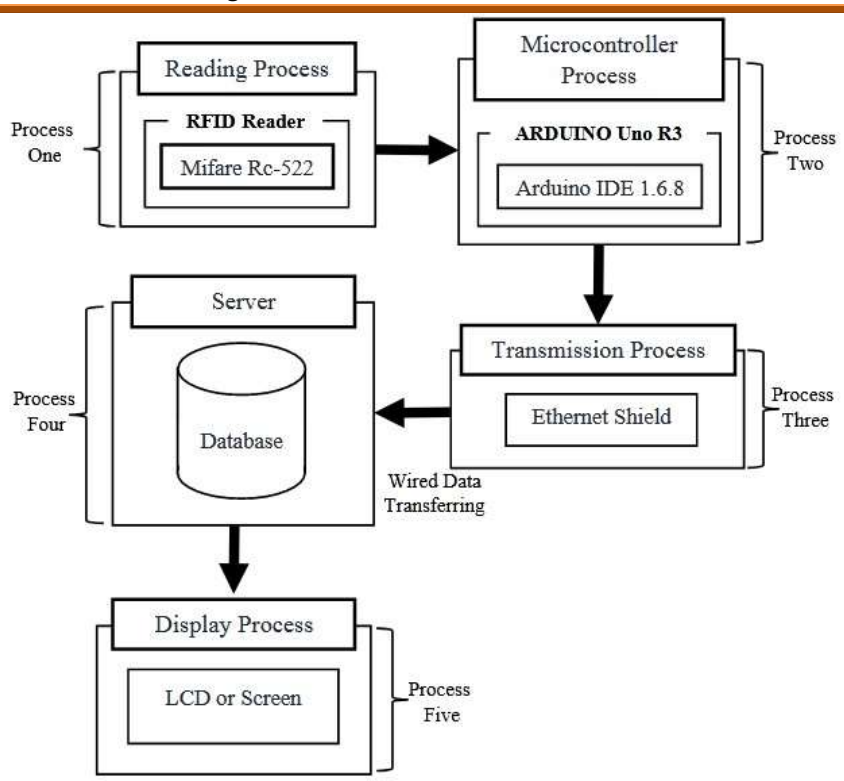

Figure 3. Procedure steps for the student information service phase

These records include information on the student, such as name, stage, and group, as well as the student's daily schedule, which includes classroom number, lecture time, topic name, and lecturer name. In addition, the system displays all instructions and duties issued by the administration to a certain student.

II. Review of the Literature:

An overview of the history of RFID technology Frederick Hertz discovered the existence of radio frequencies during an experiment in 1886 (Wyld, 2005), and RFID technology was developed for defence during World War II4. The RFID system drew a large number of academics and innovators in the 1970s and 1980s, thus efforts to register patents proceeded (Takahashi,2004). RFID had been patented by researchers including Charles Walton. Many US and European corporations saw the necessity of developing RFID technology in the 1980s and began producing RFID tags. Soon after, researchers at MIT established an Auto-ID centre to encourage the usage and application of RFID technology. However, according to most academics, Wal-Mart was the first to commercialize RFID technology, launching an RFID-based material identification system in 2005. (Shahram and Manish 2005). Wal-supply Mart's chain currently uses RFID technology to track commodities such as food, clothes, and electronics. 5.

Date	Event
1886	The idea of using Radio Frequency to reflect waves from objects was started from Frederick Hertz's experiment.
1930-1940	American navy research laboratories developed a system known as IFF(Identify Friend or Foe).
1940-1950	The first application of RFID consisted of identifying allied or enemy planes during WW2 through the use of IFF system.
1973	Charles Walton, a former IBM researcher registered a patent using RFID technology, a radio-operated door lock.
1980-1990	Many US and European companies started to manufacture RFID tags.

2003	The Auto-ID centre for MIT became EPC global, an organization whose objective is to promote the use and adoption of RFID technology.
2005	Wal-Mart launched and RFID pilot.

Table 1. A brief history of RFID technology

RFID technology is a brand-new policy instrument that can assure high transparency, efficiency, and effectiveness in government service delivery, not just in industrial regions. Table 1 provides an overview of how RFID technology was created and disseminated. A systematic review's research design. We looked for RFID articles between 2003 and 2015 using an internet database and expert knowledge. By methodically researching available material, we classified RFID applications and examined challenges and concerns that RFID confronts today. An overview of RFID technology's history 1886 was the year of the event. Frederick Hertz's discovery spawned the idea of using radio frequencies to reflect waves off things. IFF (Identify Friend or Foe) was created by American naval research facilities between 1930 and 1940. During World War II, the initial application of RFID was to identify allied or enemy planes using the IFF system. In 1973, Charles Walton, a former IBM engineer, filed a patent for a radio-operated door lock employing RFID technology. During the 1980s and 1990s, a slew of American and European businesses began producing RFID tags. 2003 EPC worldwide, MIT's Auto-ID centre, is a non-profit organization whose mission is to promote the usage and use of RFID technology. 2005 Wal Mart has begun an RFID trial program. Journal of Open Innovation: Technology, Market, and Complexity (2015) 1:9 Jung and Lee Page 2 of 19 We gathered material from two separate sources for our systematic review. To begin, the majority of the research is discovered by searching the database. Through Seoul National University's main library webpage, we may access electronic databases such as Google Scholar, World Web of Science (WWS), Proquest Central, and Science Direct. For our literature search, we used the terms "RFID technology," "RFID government," "RFID application," and "RFID problem." This approach of searching led us to the majority of the study. Discussions with specialists were the second way we utilized to acquire data. To this end, we have compiled a list of specialists in the fields of information technology, science technology, and government administration. Five specialists agreed to assist us and offered a few research articles noted for their logical flow and plenty of substance. From among the experts' recommendations, we selected relevant research publications. In summary, we used past literature as our search resource, which we gathered via the two ways we outlined above: searching an e-database and questioning experts.

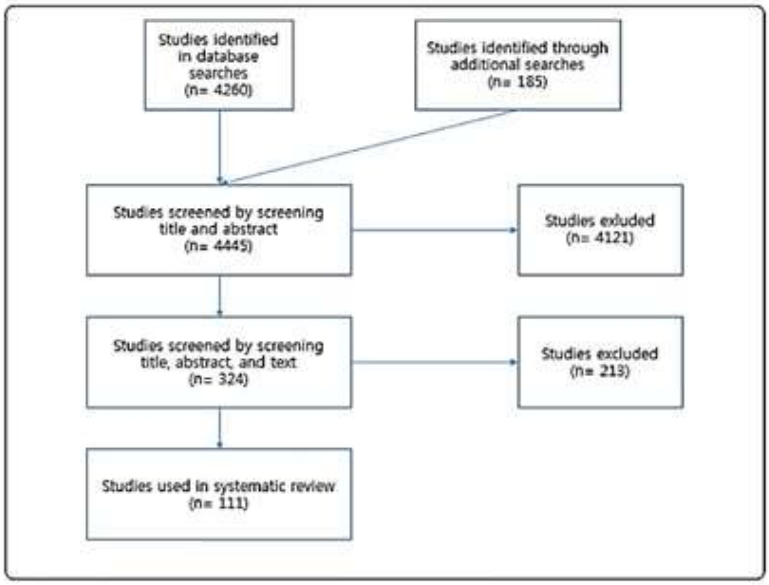

Figure 5. Analytical Frame

According to the flow chart, we identified the literature for systematic review in three steps. First, the total number of studies we discovered in the e-database was originally 4260. In addition, 185 research publications were discovered based on expert suggestions and previously published studies. Through the first stage, a total of 4,445 studies were chosen. Second, we ruled out 4,121 people based on basic qualifying criteria such as title and abstract screening. RFID research that met one of the following criteria were expressly excluded: 1) studies that only deal with RFID technology from a scientific and engineering standpoint; 2) studies that do not consider how the public sector implemented RFID technology; 3) studies that do not discuss any social scientific implications; and 4) studies that only deal with RFID technology from a scientific and engineering standpoint. Only 324 publications discussing

RFID challenges and their consequences in the public sector were included in the final analysis. Finally, we eliminated 213 more studies. Analytical Frame (Fig. 5) Rather than focusing on the private sector or RFID technology itself, Jung and Lee Journal of Open Innovation: Technology, Market, and Complexity (2015) 1:9 Page 3 of 19 focuses on its uses in contemporary society and social scientific consequences. Finally, we picked 111 publications for our systematic review.

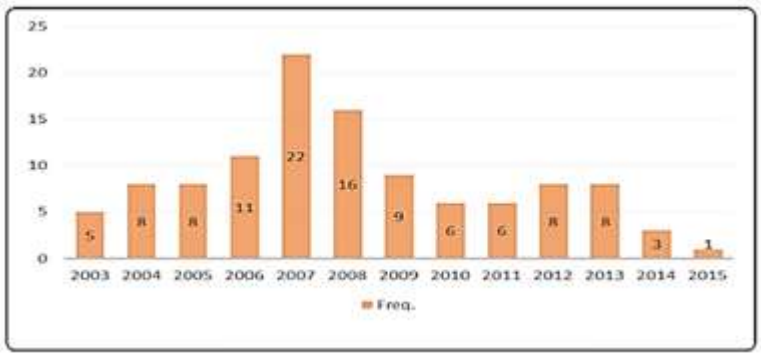

Figure 6. Descriptive statistics of collected literatures by year

As shown in (Fig. 6) There were 22 studies published in 2007 out of a total of 111 literatures. The popularization and commercialization of RFID technology began in 2005 with Wal-acceptance, Mart's as we mentioned before in the history of RFID section. After WalMart's creative footprints were broadcast over the globe, many academics began to notice the possibilities of new technology and attempted to study and improve RFID technology. Aside from that, certain governments throughout the globe have used RFID technology to develop a new manner of delivering public services. As a result, 49 literatures were published between 2006 and 2008, accounting for over 45 percent of our total research. We divided government use of RFID technology into six categories for our research: agriculture and livestock, defense and security, environmental applications, healthcare and welfare, identification, and transportation.

As 'RFID general,' we classified research that did not focus on a specific industry and analyzed and introduced RFID technology from a broad viewpoint. 'RFID general' studies frequently look into a variety of approaches to use RFID technology in a variety of industries at the same time. The RFID general area had 42 publications, as shown in (Fig. 7). As a result, many RFID research have stayed in the state of broadly introducing RFID technology rather than becoming fully specialized. Among the areas, the identification sector has the second-highest number of published literatures. This finding appears obvious because an e-ID card or e-Passport has the greatest potential to harm privacy, which is one of the most significant and well-known challenges that RFID technology faces today. As shown in [Table 1], the history of RFID technology may be traced back to the requirement to ensure national security. Even though the US army created an RFID-based identifying system to identify allies and foes about 60 years ago, RFID technology is being employed to safeguard individuals. Weinstein (2005) and Konsysnki & Smith (2003), for example, reported on how the US Army and Navy use RFID in transport containers. to identify materials (see Fig. 6) Descriptive Statistics of Literatures by Year Jung and Lee Journal of Open Innovation: Technology, Market, and Complexity (2015) 1:9 Page 4 of 19 RFID is used by the US Army and Navy to identify not just US troops' own weapons and containers, but also enemy forces in combat (Tien 2004) 6. In terms of the airport and port security, RFID technologies are particularly critical. Following the terrorist events on September 11, 2001, President George W. Bush allowed all US airports and ports to use RFID-based identification systems to safeguard the country from future assaults (Werb and Sereiko 2002) 7. To improve security and efficiency, the Taiwanese government chose to introduce an RFID-based e-Seal system in 2012. (Tsai and Huang 2012). RFID technology may also be utilized to improve jail management and kid protection. RFID tags are used in child protection monitoring in some nations, such as Japan and the Republic of Korea.

Application	Author	Year	Case	Country
Army and Navy	Weinstein	2005	US Navy embedded RFID into a cargo container	US
	Konsynski and Smith	2003	Army track containers of the material	US
	Tien	2004	US Army using RFID for tracking its army in Iraq	US
	Anon	2002	US Army piloted 4 projects using RFID	US

Airport and Port Security	Werb and Sereiko	2002	2 RFID programs to prevent terrorist's attack	US
	Smith and Konsynski Zhang	2003 2013	New York City government project using RFID, CargoMate	New York City, US
	Tsai and Huang	2012	Kaohsiung port adopt RFID system for port security	Taiwan
Prison management And Child protection	Kim	2008	Calipatria prison-issued RFID embedded bracelet to its inmates	US
	Nicholas	2008	LA County prison management	US
	Ema and Fujigaki	2011	Let parents know the exact time of a child's arrival and departure time	Japan
	Yonhap news	2013	Child monitoring through RFID tag in beach	Rok

Table 2. RIFD application in Defense and Security.

Identification After the 9/11 attacks, electronic passports such as 'e-passports' were widely embraced. Following the tragic catastrophe that rocked the United States, the American authorities realized the significance of thoroughly examining VISAs and passports. People who wished to enter the US might soon utilize RFID tag attached electronic passports instead of standard barcode based passports, according to the US Department of State10. The European Union also agreed that biological data should be included in e-passports. In 2004, the EU Justice and Home Affairs Council voted to add fingerprints to passports as a second required identification. 11 RFID may also be utilized in e-ID cards in a variety of nations. Prime Minister Tony Blair and his Labor Party, for example, persuaded the United Kingdom to adopt biometrically improved national identity cards (Ezovski and Watkins 2007). In late 2004, Tony Blair's administration declared that an RFID tag integrated national identity card will be implemented. China is another country that uses e-ID card nowadays. In reality, China is the country where the e-ID card is currently most frequently used. The 2008 Beijing Olympics sparked a wave of adoption. As part of the preparations for the most important international sporting event, the world's largest smart card project was implemented.

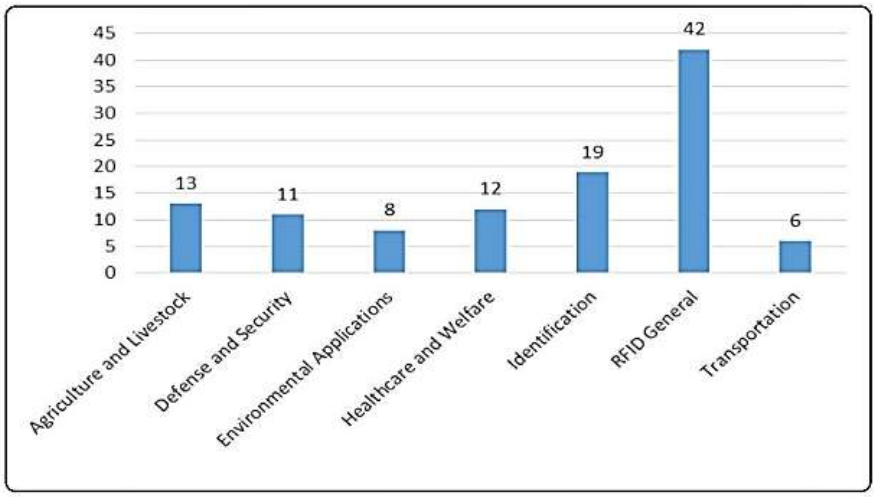

Figure 7. Descriptive Statics of Literature by Applications

An RFID tag affixed to each tree collects information about its position and state, which is kept in a web information system so that trees may be maintained properly. According to Kim et al. (2006), a web-based information system with an interactive system might handle information remotely (Table 4). Transportation Another significant application area for RFID technology is public transit. Electronic toll collection using RFID is one of the oldest and most widely used RFID applications (Ulatowski 2007). When a car with an RFID tag enters a toll booth, the RFID reader scans and reads the information stored on the RFID tag. The motorist will pay debits based on the price suggested by the electronic reader. In the United States, electronic toll collection is seen as a cost-effective and efficient technique of avoiding long queues at toll booths (Ulatowski 2007). In criminal situations, RFID-based toll collection is used since it allows prosecutors to pinpoint the specific position of the offender. Year Case Application Paper Waste Management in the Country In 2006, the ROK Ministry of Environment created an RFID system for medical waste management, according to Kang et al. Infotech To deal with the fast development in the amount and varieties of garbage in India, the country

implemented RFID technology in 2013. Ruan and Hu are a couple. Shanghai's local administration began implementing RFID garbage management in 2011 to prepare for the Shanghai Expo. WWICS China 2011 2008 How is RIFD being used by the US government in trash management? The USS Chindler and her crew Cases of RFID in garbage management in EU member countries in 2012 Ransford and colleagues 2012Waste management operating system widely used in the United States of America Tree Care on the Streets ROF government uses RFID technology to regulate street tree condition ROK Kim et al.2006 Page 7 of 19 of the criminal's automobile, according to Jung and Lee Journal of Open Innovation: Technology, Market, and Complexity (2015) 1:9. (Smith 2006).

In South Korea, the government has established a credit card-linked electronic toll collection system known as 'Hypass,' which is designed specifically for collecting tolls on expressways. If their automobiles have an RFID tag embedded in them, they can drive through the tollbooth without stopping since the RFID scanner scans the data instantly and completes the payment procedure in about 5 seconds (Kim 2008). In 1997, Hong Kong introduced a similar public transit toll collecting system, the 'Octopus Card,' which is now known worldwide for its ease. This system can process 10 million transactions per day and is compatible with all types of public transport (Kovavisaruch and Suntharasaj 2007). South Korea has established the 'Hypass' electronic toll collection system, which is linked to credit cards and is designed specifically for collecting transportation tolls on expressways. In India, where trains are the most extensively utilized mode of public transit, RFID technology is also employed for toll collecting. If their automobiles have an RFID tag embedded in them, they can drive through the tollbooth without stopping since the RFID scanner scans the data instantly and completes the payment procedure in about 5 seconds (Kim, 2008). RFID has also been employed as a critical technology in developing nations to improve the efficiency and transparency of public transportation systems. For example, the Mexican government is working on a project called "Creating Traffic Knowledge in Mexico: Applying RFID to Prevent Vandalism," one of the goals of which is to establish a transportation information system to collect subtler data for government decision-making (Prado et al. 2010). In Bangladesh, where the BRTA (Bangladesh Road Transport Authority) was established in 2003, the technology is primarily used for the control and supervision of road transport networks (Hossain et al. 2009). In India, where trains are the most extensively utilized mode of public transit, RFID technology is also employed for toll collecting (Table 5). Welfare and health care RFID makes it easier for hospitals to manage their equipment and save money in the public health sector12. RFID tags have previously been utilized by US government entities such as the FDA to monitor the pharmaceutical industry13.

Table 5 RFID implementation in transportation Application Paper Year Case Country Public Transportation Since American hospitals handle over 4,000 patients Ulatowski 2007 ovavisaruch and Suntharasaj ovavisaruch and Suntharasaj ovavisaruch and Suntharasaj ovavisaruch and Suntharasaj 2007 In Hong Kong, there is a well-known success smart card instance. Hong Kong is a city in Hong Kong. Suntharasaj and Kovavisaruch 2007 China Pransanth and Soman have the world's largest smart card transportation system. RFID-based transportation system in India, mostly for train toll collection, was introduced in 2009. In ROK, the Hypass case from 2008 is utilized in highway toll collecting. ROK is in charge of road maintenance. 2013 Prado et al. Mexico's government is utilizing data acquired from RFID systems to make decisions, which is causing the country to be indecisive. 2012, Hossain et al. Bangladesh's road system is being monitored and controlled. Jung & Lee's Open Innovation Journal:

Complexity, Technology, and Market (2015) Medication mistakes are common while taking 1:9 Page 8 of 19 medications each day. Taiwanese public hospitals have aggressively utilized RFID innovation (Kuo and Chen 2008)14, thanks to significant government backing. Engineers in Pakistan are developing an RFID identification system15 for visually challenged individuals with the backing of the Pakistani government, despite the fact that it is not yet marketed (Murad et al. 2011) Animal husbandry and farming Food safety and agricultural and animal management may both benefit from RFID technology. Another significant benefit of this system is that it makes use of cutting-edge technologies like RFID to detect animal sickness (Hossain and Quaddus 2009) The Navigation Approach for Appropriate Pesticide Use was created with government backing as a fundamental system for risk management in agriculture (Nansekiet al. 2005). The European Union (EU) pioneered RFID technology in agriculture in the late 1990s, and numerous nations, including Australia, Japan, and South Korea, quickly embraced the technology. The Australian government was the most enthusiastic in RFID16 implementation among those countries. For example, all livestock in Australia are born with RFID implanted tags on their bodies; data that allows farmers to identify each entity and its health condition is recorded in the National Livestock Identification System (NLIS). In Japan, RFID technology has been implemented in agriculture, particularly to ensure food safety and agricultural risk management, which can arise when pesticides are misused (Nanseki et al. 2005, Sugahara 2009). As part of the "e- Japan" initiative, the Japanese government hoped to develop a food traceability system by 2010. (Chen et al. 2008). Another country that uses a mandated RFID-based identifying system in livestock management is the United States. The USDA is pushing for RFID tagging of cattle, according to RFID Gazette (2006), to make disease trends easier to trace. The proposal for establishing the National Animal Identification System was begun when the National Institute for Animal Agriculture (NIAA) was founded in 2002.

What the United States is doing Use Author Year Case Table 6 RFID application in healthcare and wellbeing Country in Charge of a Public Hospital Many hospitals are actively participating in RFID system in hospital management with the backing of the government, according to Kuo and Chen (2008). Wyld Pharmacy in Taiwan By 2007, the US government and FDA advised that pharmaceutical companies use RFID tags to avoid counterfeit drugs. US Thuemmler and colleagues Romero and Lefebvre, 2007 Skinar 2005 were released in 2013. When medication providers refused to accept RFID tags, the Florida State Service for the Impaired levied punishment on them. The Pakistan government devised and executed an RFID tag-using service for visually

challenged persons (Murad et al. 2011). Nicholas Managing Infections in Pakistan To determine who was the SARS virus carrier in 2003, the Singapore government tracked visitors, patients, and employees in 2008. Kuo et al. (Singapore) RFID plans to track SARS patients were approved by a Taiwan hospital in 2004. Journal of Open Innovation: Technology, Market, and Complexity (2015) 1:9 Page 9 of 19 Taiwan Jung and Lee Journal of Open Innovation: Technology, Market, and Complexity

III. RESULTS AND DISCUSSION

The paper concluded with several results, top of which is that RFID technologies and information systems can be used to develop new systems on the web. RFID is an emerging technology with full benefits to emerge in several years to all industries worldwide and it will bring a good opportunity for improving deeds efficiency and hence the safety of the public in return. The traditional method for taking student absence report is usually done by using paperwork and handwriting on the advertisement wall. This method requires a lot of staff, leads to duplication of effort, and is time-consuming and inefficient.

IV CONCLUSION AND FUTURE WORKS

Student attendance and information system is built and deployed to handle student data and provide features for tracking student attendance, grading student marks, providing timetable, lecture time, room number, and other student-related information. Additionally, the suggested solution improves convenience for the workers by eliminating the need for additional paperwork and data storage vaults. The results of the system's development have proven to be dependable in supporting the attendance management system for an academic sector using RFID technology and a microcontroller board. It's a good example of a successful implementation. In Section 5, we discovered two main themes in the findings of the comparative research. Tiwari et al., 2014 [28] and the suggested system are two of the proposed AMS that meet the majority of the system functioning requirements. The AMS given by Srinidhi and Roy, 2015 [33], on the other hand, has all of the system features. The first of two key aims for future directions is to expand the planned system to include employee data as well. The second is to expand the system to include more than one faculty by including a face identification mechanism into the attendance tracking system to regulate card replacements among various students. The suggested solution makes life easier for employees by eliminating the need for additional paperwork and data storage vaults. The results of the system's development have proven to be dependable in supporting the attendance management system for an academic sector using RFID technology and a microcontroller board. It's a good example of a successful implementation. In Section 5, we discovered two main themes in the findings of the comparative research. Tiwari et al., 2014 [28] and the suggested system both have the majority of the system functioning requirements. The AMS given by Srinidhi and Roy, 2015 [33], on the other hand, has all of the system features. The first of two key aims for future directions is to expand the planned system to include employee data as well.

The second is to expand the system to include more than one faculty by including a face identification mechanism into the attendance tracking system to regulate card replacements among various students.

RFID improves children's safety on their daily bus rides to and from school. The RFID tags worn by the youngsters are detected by RFID-based detecting equipment installed inside the bus. The required data is subsequently sent to the system database server through a GSM modem. The system monitors for and determines which youngster failed to board or exit the bus, and sends out an alarm message. In addition, the system monitors the attendance of the youngsters and refreshes the database. Parents may access the system's website and keep track of their children's information.

V. SOME STUDIES THAT DISCUSS RFID

Active RFID tags and barcodes are utilized to track infusion pumps, beds, and wheelchairs, according to Wen Yao et al.[1]. RFID tags are placed on medicine bottles to identify fraudulent pharmaceuticals in the supply chain and to prevent medication overuse. It's used to track a blood tracking device that can continually report blood temperature, track the position of the blood bag, and validate that it got to the right patient. Misidentification is a medical blunder that can be avoided by employing RFID technology. Positive patient identification (PPI) uses include employing a smart patient bracelet to follow vulnerable patients (elderly with chronic illnesses, TB and dementia patients), in an emergency, to validate the identity of freshly born newborns, and to identify catastrophe victims. Patient information such as name, date of birth, admitting orders, insurance information, surgery location, and so on is also revealed. In the pathology lab, a new RFID-based specimen labeling system minimized errors. Endotracheal tubes with RFID tags are utilized for accurate bedside monitoring to decrease health risks. Temperature sensing makes it easy to trace contaminated blood in hospitals to help safeguard the hospital's blood supply, while chemical sensing can help with enhanced medical monitoring. By incorporating a map information system put on a white cane, an interior navigational system for blind or visually impaired persons utilizing RFID can be utilized to locate a pathway for patients. Errors in data collection in hospitals can be eliminated by automatically gathering data. If a piece of equipment fails, RFID can quickly detect it and remove it from service. It can also aid in the creation of a record of which piece of equipment was utilized with which patient. The Glibbest RFID EAS (Electronic Article Surveillance) Gates, which are used to prevent theft in Library RFID Management Systems utilizing the same

RFID tags embedded in library goods, are mentioned in [7]. They have everything they need. When an un-borrowed object passes through a gate, it not only records it (to a distance of approximately 1 meter), but it also activates the alarm system and lights flash. It includes the option of activating a camera that will capture guests who set off the alert. Theft detection is a vital and essential component of the tag's chip. It is a stand-alone technology since it runs independently of the library database. This single technology is sufficient for both the library's inventory and theft management. When un-borrowed objects pass past the theft detection gates, the Library staff is instantly notified. The use of RFIDs for tool inventory is discussed by Matthias et al. [8]. RFID tags are connected to all tools in the Smart Tool Box, and the boxes are fitted with RFID readers and antennae. The toolbox can uniquely identify all of the tools in it and execute the routine and basic completeness checks automatically. This is accomplished by comparing all tool IDs to a list of tool IDs that belong to the box.

Tools that are missing are shown by empty slots, whereas tools that belong to a separate toolbox are indicated by a specific indication. It also detects the mechanic's RFID badge, which allows it to identify him. If he is not the owner of the box, a notice will appear to prevent tools from being mixed up. The time a mechanic pulls a tool out and puts it back is used to infer the tool's usage history. It enables content optimization by eliminating seldom used tools from the toolbox and storing them in the tool inventory.

All tools in the inventory have RFID tags linked to them. An RFID reader and antenna are also mounted on the checkout counter. Because the tools initiate all operations, there is no need for explicit user engagement with the system. The tool management system validates the ID when a tool is placed on the counter. If the tool is presently checked out, a return procedure is started, and the recognized tools are recorded as returned. Otherwise, a checkout procedure is started, which marks the tools as checked out. This enables comprehensive tool usage information and can lead to a more efficient tool inventory [1].

Cecilia et al. [2] describe an RFID system for remote monitoring and control of nocturnal living conditions. This uses RFID passive technology to monitor activity at night and automatically emit alarms in the event of abnormal behavior. Manual monitoring causes a person to lose sleep, which can be harmful to his health.

Audio/video recording systems and active sensors directly connected to first-aid remote centers are common components of remote monitoring systems. Miniaturized wearable tags linked to items and traditional ambient tags spread across the environment are used in the NIGHT Care platform. The electromagnetic signals created by contact with the subject and the surrounding environment are processed by a long-range UHF RFID reader, which shows the existence or absence of the object. For real-time data processing, a physical layer software engine is present, as well as a web-based graphical processor with warning modules that alert the supervisor during accidents. This technology makes security personnel's jobs simpler [2], and it addresses wireless, automated, and non-contact identification of persons attending large-scale events. It uses a network architecture called EPC (Electronic Product Code), which is a standard for networked RFID systems. The tests were performed in Tokyo at an Internet technology and networking equipment show. RFID systems were employed for operations such as same-day registration, recording venue admission, and processing essential information (recording, searching). The network connected all of the peripheral systems. Visitors utilized RFID tags as both an access pass and a business card to convey their contact information. The exhibitors utilized RFID tags to give visitors who had requested information an electronic version of booklets. Visitors were monitored using a real-time monitoring system that included video surveillance. One issue was that when guests brought laptop computers or other non-RFID electronic devices, readability decreased, making it impossible to see the tag. A portable wireless monitoring device for sleep apnea diagnosis has been proposed by Yang et al. [22]. An on-body sensor system, as well as an RFID reader and tag, make up this system. To reduce the physical size of the sensors, this system is intended to operate in the 5.8 GHz ISM band. Each tag has its own resonance frequency, which is labeled on the sensor device that corresponds to it. It is accessed through the on-body sensor device. This approach helps to alleviate the patient's anxiety during the monitoring procedure. The MIMO approach is used to counteract the fading effect caused by body movement, reflection, and other factors [3]. Nosaiba et al. [3] discuss the location of mobile robots using RFID sensors and neural networks. The researchers use RFID technology to locate mobile robots. The robot detects the RSSI (received signal strength indicator) tag's position and adds it to a list of tag IDs. The robot is a learning agent that uses received percepts to learn about its surroundings and interact with objects. The x and y coordinates of the items' positions are included in the tags. The distance that must be travelled is calculated using these coordinates and the trigonometric function. To decrease the mobile robot localization error, the RFID reader recognizes a specific tag when the mobile robot passes a circular zone around the tag. A 433-MHz Wavetrend L-RX300 receiver with a baud rate of 57,600 bps and Wavetrend TG501 Personnel active Tags send data every 1.5 seconds are used in the RFID system. The electromagnetic waves that cause a signal to be transferred from the tag to the reader are known as RF waves. The microcontroller then transmits it to a distant PC, where it is stored. It's essentially a self-navigating agent that makes use of RFID systems [4].

An RFID-based position and orientation measuring system for movable objects in intelligent settings is discussed by Ali Asghar et al. [4]. Ambient intelligence (AmI) studies the situations in which applications and services adapt to changes in the environment and act in accordance with the needs of the users.

One of the most difficult challenges is recognizing the position and orientation of nearby objects. In such smart settings, this is critical for successful collaboration among movable physical things. It is necessary to have a reliable indoor positioning system that offers 2-D location and orientation information for mobile items. Low-range passive radio frequency identification (RFID) technology is used in the system. RFID carpeting and many peripherals for sensor data analysis make up the system [5].

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دراسة تطبيقات RFID في تتبع حركة الطلاب المدارس

الخلاصة:
تتناول هذه الدراسة تعريف الترددات الراديوية (RFID) وتطبيقاتها في مختلف المجالات ، مثل مراقبة صعود / نزول أطفال المدارس لزيادة سلامة الأطفال أثناء النقل اليومي من المنزل إلى المدرسة وبالعكس. تكمن أهمية الدراسة في التحديات التي تواجه المجتمع في تأخر وصول المعلومات والتي تتمثل في تعرض الأطفال لأخطار المجرمين أو رفقاء السوء أو حتى من قبلهم أنفسهم والمتمثلة في الإهمال وعدم الوعي بمخاطر عدم حضورهم للمدرسة. هدفت هذه الدراسة للكشف عن الوسائل المثلى لحل المشكلة المذكورة ولتطوير نظام إلكتروني لرفع كفاءة النظام التعليمي في المدارس وقد اختتمت إلى عدد من النتائج وعلى رأسها أنه تزداد أهمية التقنيات القائمة على RFID مع تزايد أهمية الأمن والسلامة بشكل مستمر. تأتي هذه الدراسة كمساهمة في الحد من حالات الاختطاف من خلال اقتراح نظام شريحة RFID في تتبع الطالب ، والذي سيتم مراجعته بالتفصيل أدناه.
الكلمات المفتاحية: RFID ، GPS، انترنت الأشياء ، لاسلكي ، التتبع ، GSM.