Abstract: In this research, the benefit of the integration of GPS (phone GPS), GIS (ArcGIS) and Android systems have been taken to be applied in collecting data and showing it on a map according to the co-ordinates of the customer location, and this data can be updated according to the location of the customer and the sent attribute data from that location (Dynamic system). So management center can obtain real time data.

I. INTRODUCTION

Now a day GIS becomes a necessary in all kinds of business because it provides a system for managing business information of any kind according to its location. Bringing together data with a shared spatial component can reveal trends and pattern and lot of information that aren’t apparent with tabular database and it enables the decision makers to understand and evaluate the data by using cartographic tools to display information stores in their database. Maps created using GIS help people to make better decisions. Whether in a single department or across an entire organization, GIS offers boundless possibilities. The subject of this research is the use of GPS as a method of collecting spatial data for Geographic Information Systems (GIS) in addition to Android system. The appropriateness of this seems obvious, but let’s explores some of the main reasons for making GPS a primary source of data for GIS:

- Availability: By using GPS the positions can be located anywhere on the earth and at any time, that’s because the GPS satellites cover the whole world 24 hours.
- Accuracy: GPS allows the user to know position information with remarkable accuracy. A receiver operating by itself, can let you locate yourself within 10 to 20 meters of the true position.
- Ease of use: Anyone who can read coordinates and find the corresponding position on a map can use a GPS receiver. A single position so derived is usually accurate to within 10 meters or so. Those who want to collect data accurate enough for a GIS must involve themselves in more complex procedures, but the task is no more difficult than many GIS operations.

And the reasons for using the Android system are: multitasking, ease of notification, easy access to thousands of applications and can install a modified ROM.

The project idea is consist of three parts as the following:

1. Collecting the data from a specific location and sending it using a handset working with Android environment.
2. Receiving the data that was sent from the handset via internet connection by a web page inside a computer server and exporting it into a database.
3. Manipulating, analyzing the received data and show all of it in a map.

Chapter one is an introduction about the project and how it works. GIS, its definition, historical overview about GIS, GIS benefits, GIS application, GIS components and what we can do with GIS are in chapter two. Chapter three is handling tracking system, types of tracking systems and application of tracking systems. Chapter four is consist of computer package. Measurements and results are in chapter five. Finally chapter six is the conclusion and recommendations.

II. GEOGRAPHIC INFORMATION SYSTEMS

A. Introduction to geographic information system (GIS)

Geographic Information System (GIS) is one of the most important techniques that have been made in the field of survey engineering in the latter half of the twentieth century and contributed in the innovation of many new useful applications. The first beginning of the development of geographic information systems was in 1964 in Canada in the development of maps numbering (convert it from an image to a digitized image) and link these digital maps with spatial information (descriptive information) in the form of lists, which led to the creation of several layers containing information on agriculture, soil, livestock, land use, etc., this project called the Geographic Information System of Canada. In 1969 was founded the Institute of Research and Environmental Systems (ESRI) (Environmental System Research Institute) in the United States by Jack Dingermond to become the first company specializing in the development of GIS software and the best known so far in the world, and in 1970 the first international conference on geographic information systems has been organized by the World Association of Geographers with support of Scientific and Cultural Organization United Nations (UNESCO). Some people confuse between the description of geography and the geographic information system, and some of them allege that geographic information systems are only one of the new technologies of Geography and others(against the grain) try to change the naming of this technique to another name such as (Spatial Information System) or (Land Information System), it should be noticed that here the word "geography" in the terminology of geographic information systems are only an indication that this type of information systems linked to a place or a specific geographical location on the surface of the earth, and that
GIS is just to distinguish between this type of information systems and the other information systems which are not related to a place or specific location, such as management information systems of banks and companies and others. So GIS is a relatively new field, it used to be that computerized GIS was only available to companies and universities that had expensive computer equipment. These days, anyone with a personal computer or laptop can use GIS software. Over time GIS Applications have also become easier to use, it used to require a lot of training to use a GIS Application, but now it is much easier to get started in GIS even for amateurs and casual users. As we described above, GIS is more than just software, it refers to all aspects of managing and using digital geographical data.

B. GIS Definition
Geographic Information System can be defined as:
- Geographic: survey measurement, pipe, valve, meter, address, street intersection, zip code, etc
- Information: flat file, relational database table, spreadsheet, scanned image, digital photo and CAD file, etc

First, according to the Federal Interagency Coordinating Committee (1988): A system of computer hardware, software, and procedures designed to support the capture, management, manipulation, analysis, modularity and display of spatially referenced data for solving complex planning and management problems. Second, Phil Parent (1988) states that GIS is a “system that contains spatially referenced data that can be analyzed and converted to information for a specific set of purposes, or application. The key feature of a GIS is the analysis of data to produce new information.” Also, Francis Hanigan (1988) states that: A GIS is “any information management system which can:
- Collect, store, and retrieve information based on its spatial location
- Identify locations within a targeted environment which meet specific criteria
- Explore relationships among data sets within that environment
- Analyze the related data spatially as an aid to making decisions about that environment
- Facilitate selecting and passing data to application-specific analytical models capable of assessing the impact of alternatives on the chosen environment
- Display the selected environment both graphically and numerically either before or after analysis.”

At last, David P. Lusch defines GIS as following:
An integrated system of computer hardware and software coupled with procedures and a human analyst which together support the capture, management, manipulation, analysis, modeling and display of spatially referenced data. GIS integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically referenced information. GIS allows us to view, understand, question, interpret, and visualize data in many ways that reveal relationships, patterns, and trends in the form of maps, globes, reports, and charts. A GIS helps you answer questions and solve problems by looking at your data in a way that is quickly understood and easily shared. GIS technology can be integrated into any enterprise information system framework.

GIS data generally consist of two components:
1) Graphical data about geographic features (e.g., rivers, land use, political boundaries),
2) Tabular data about features in the geography (e.g., population, elevation, modeled ambient concentrations of air toxics). GIS combines these Different types of data using a “layering” technique that references each type of data to a uniform geographic coordinate system (usually a grid such as latitude and longitude coordinates). Layered data can then be analyzed using special software to create new layers of data.

C. The Benefits of GIS
Utilization of GIS in different field provides number of benefit. There many include:
- Save Money/Cost Avoidance
- Save Time
- Increase Efficiency
- Increase Accuracy
- Increase Productivity
- Increase Communication & Collaboration
- Generate Revenue
- Support Decision Making
- Aid Budgeting
- Automate Workflow
- Build an Information Base
- Manage Resources

D. GIS Applications
GIS can be applied in different fields such as:
- a) GIS in business
  A GIS is a tool for managing business information of any kind according to where it's located. You can keep track of where customers are, site businesses, target marketing campaigns, optimize sales territories, and model retail spending patterns. A GIS gives you that extra advantage to make you and your company more competitive and successful.
- b) GIS in agriculture
  GIS is used in a variety of agricultural applications such as managing crop yields, monitoring crop rotation techniques, and projecting soil loss for individual farms or entire agricultural regions. A GIS enables you to better understand and evaluate your data by creating graphic displays using information stored in your database. With a GIS, you can change the display of your geographic
data by changing the symbols, colors, or values in the database tables.

**GIS in electric/gas utilities**
Cities and utilities use GIS every day to help them map and inventory systems, track maintenance, monitor regulatory compliance, or model distribution analysis, transformer analysis, and load analysis.

**GIS in the environment**
GIS is used every day to help protect the environment. As an environmental professional, you can use GIS to produce maps, inventory species, measure environmental impact, or trace pollutants. The environmental applications for GIS are almost endless.

**GIS in forestry**
Today, managing forests is becoming a more complex and demanding challenge. With GIS, foresters can easily see the forest as an ecosystem and manage it responsibly.

**GIS in geology**
Geologists use GIS every day in a wide variety of applications. You too can use GIS to study geologic features, analyze soils and strata, assess seismic information, or create 3-dimensional displays of geographic features.

**GIS in hydrology**
You can use GIS to study drainage systems, assess groundwater, and visualize watersheds, and in many other hydrologic applications.

**GIS in land use planning**
People use GIS to help visualize and plan the land use needs of cities, regions, or even national governments.

**GIS in local government**
People in local government use GIS every day to help them solve problems. Often the data collected and used by one agency or department can be used by another.

**GIS in mapping**
Mapping is an essential function of a GIS. People in a variety of professions are using GIS to help others understand geographic data. You don't have to be a skilled cartographer to make maps with a GIS.

**GIS in the military**
Military analysts and cartographers use GIS in a variety of applications such as creating base maps, assessing terrain, and aiding in tactical decisions.

**GIS in risk management**
A GIS can help with risk management and analysis by showing you which areas will be prone to natural or man-made disasters. Once identified, preventive measures can be developed that deal with the different scenarios.

**GIS in Site Planning**
People around the world use GIS to help them locate sites for new facilities or locate alternate sites for existing facilities.

**GIS in transportation**
GIS can be used to help you manage transportation infrastructure or help you manage your logistical problems. Whether monitoring rail systems and road conditions or finding the best way to deliver your goods or services, GIS can help you.

**GIS in the water/wastewater industry**
People in the water/wastewater industry use GIS with the planning, engineering, operations, maintenance, finance, and administration functions of their water/wastewater networks.

**E. Components of GIS**
A working GIS integrates five key components:

1. **Hardware**
   Hardware is the computer on which a GIS operates. Today, GIS software runs on a wide range of hardware types, from centralized computer servers to desktop computers used in stand-alone or networked configurations.

2. **Software**
   GIS software provides the functions and tools needed to store, analyze, and display geographic information. Key software components are Tools for the input and manipulation of geographic information A database management system (DBMS)/Tools that support geographic query, analysis, and visualization graphical user interface (GUI) for easy access to tools.

3. **Data**
   Possibly the most important component of a GIS is the data. Geographic data and related tabular data can be collected in-house or purchased from a commercial data provider. A GIS will integrate spatial data with other data resources and can even use a DBMS, used by most organizations to organize and maintain their data, to manage spatial data.

4. **People**
   GIS technology is of limited value without the people who manage the system and develop plans for applying it to real-world problems. GIS users range from technical specialists who design and maintain the system to those who use it to help them perform their everyday work.

5. **Methods**
   A successful GIS operates according to a well-designed plan and business rules, which are the models and operating practices unique to each organization.
F. What Can You Do with GIS

1) Map Where Things Are
   Mapping where things are lets you find places that have the features you're looking for and to see patterns.

2) Map Quantities
   People map quantities to find places that meet their criteria and take action. A children's clothing company might want to find ZIP Codes with many young families with relatively high income. Public health officials might want to map the numbers of physicians per 1,000 people in each census tract to identify which areas are adequately served, and which are not.

3) Map Densities
   A density map lets you measure the number of features using a uniform areal unit so you can clearly see the distribution. This is especially useful when mapping areas, such as census tracts or counties, which vary greatly in size. On maps showing the number of people per census tract, the larger tracts might have more people than smaller ones. But some smaller tracts might have more people per square mile a higher density.

4) Find What's Inside
   Use GIS to monitor what's happening and to take specific action by mapping what's inside a specific area. For example, a district attorney would monitor drug-related arrests to find out if an arrest is within 1000 feet of a school--if so, stiffer penalties apply. Find What's Nearby GIS can help you find out what's occurring within a set distance of a feature by mapping what's nearby.

5) Map Change
   Map the change in an area to anticipate future conditions, decide on a course of action, or to evaluate the results of an action or policy. By mapping where and how things move over a period of time, you can gain insight into how they behave. For example, a meteorologist might study the paths of hurricanes to predict where and when they might occur in the future.

G. Programs of GIS
   - Arc GIS by ESRI
   - MGE by INTERGRAPH
   - STAR
   - GFIS
   - ILWIS by ITC NETHERLAND
   - MAP INFO
   - ERDAS
   - IDRISI

H. Data Representation and Projection in GIS
   GIS represents real world data (both discrete objects and continuous fields) using digital data. If data exists in ordinary form then a digitizer, scanner, etc, may be used to convert coordinates in to digital format. While inputting data in to the GIS one needs to specify identities of the objects on the map as well as their spatial relationships. Data representation in Geographic Information System is done using following methods:
   - Raster Method - Here data is arranged in rows and columns or in the form or cells storing single values. Value recorded in each cell may be categorized on basis of individual data classes that they represent.
   - Vector Method - Geometries such as points, lines, areas, etc, are used to represent objects. You can also make use of vectors to represent continuously varying fields.

   GIS uses principal of mathematical projection while transferring information from one model to another (from three-dimensional curved surfaces to two-dimensional mediums such as paper or computer).

   Raster Advantages
   - The most common data format
   - Easy to perform mathematical and overlay operations
   - Satellite information is easily incorporated
   - Better represents (continuous) type data

   Vector Advantages
   - Accurate positional information that is best for storing discrete thematic features (e.g., roads, shorelines, sea-bed features.
   - Compact data storage requirements
   - Can associate unlimited numbers of attributes with specific features.

Fig (2) Raster and vector presentation

I. Relate information using GIS
   Primary purpose for employing Geographic Information System is to relate information across different sources. For this purpose it is essential to know locations of the different variables that need to be related. The system uses random notations such as x, y, z in order to denote location of the different variables under study. These variables may be coordinates of latitude, longitude and elevation or they may be other geocode system like Zip codes, highway mile markers, etc. Several government and non-government agencies are coming up with computer databases that can be directly entered in to GIS.

III. TRACKING SYSTEM
   A. Introduction
      Generally tracking is the observing of persons or objects on the move and supplying a timely ordered sequence of respective location data to a model e.g.
capable to serve for depicting the motion on a display capability.

**B. Tracking in virtual space**

In virtual space technology, a tracking system is generally a system capable of rendering virtual space to a human observer while tracking the observer's body coordinates. For instance, in dynamic virtual auditory space simulations, a real-time head tracker provides feedback to the central processor, allowing for selection of appropriate head-related transfer functions at the estimated current position of the observer relative to the environment.

**C. Tracking in real world**

Within the real world, there are a variety of technologies employed within asset tracking systems. Some are lag time indicators, that is, the data is collected after an item has passed a point for example a bar code or choke point or gate. Others are 'real-time' or 'near real-time' like Global Positioning Systems depending on how often the data is refreshed. There are bar-code systems which require a person to scan items and automatic identification (RFID auto-id). For the most part, the tracking worlds are composed of discrete hardware and software systems for different applications. That is, bar-code systems are separate from Electronic Product Code (EPC) systems, GPS systems are separate from active real time locating systems or RTLS for example, a passive RFID system would be used in a warehouse to scan the boxes as they are loaded on a truck - then the truck itself is tracked on a different system using GPS with its own features and software.

**D. Tracking definition**

A tracking unit is a device that uses the Global Positioning System to determine the precise location of a vehicle, person, or other asset to which it is attached and to record the position of the asset at regular intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location database, or internet-connected computer, using a cellular (GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or when analyzing the track later, using tracking software.

**E. Tracking types**

- Tracking rigid objects
- Tracking articulated objects, e.g. humans or animals
- Tracking fully non-rigid objects

**F. Types of tracking systems**

The concept of tracking goods, people and animals has long been used by humans as a method to control their surroundings. Early tracking devices such as the astrolabe and compasses were used to help people track the movement of heavenly bodies. Modern technology has given people the ability to track nearly anything, below is some of tracking systems types there are:

- **GPS**
  The Global Positioning System uses a series of roughly 32 satellites located in medium Earth orbit to triangulate the position of an object. While it was developed by the US Air Force, it was put into civilian use in the early 21st century.

- **RFID**
  Radio-frequency identification tags are one of the easiest and smallest devices that can be installed in nearly any component to enable tracking. These are commonly seen in retail items for warehouse management.

- **RSSI**
  Received Signal Strength Indication is a tracking system that uses real time locating technology to identify the position of an object or person. RSSI features wireless technology that can be installed into name badges or items.

- **LBS**
  Location-based service is the type of tracking device used to make a person's cell phone reveal a location. Similar to GPS, this system can be installed in nearly any communications device or vehicle.

- **Inertia**
  Inertial tracking devices are mechanical in nature and use gyroscopes to detect a change in orientation. These are fast and accurate, but limited in the distance in which they can identify movement.

**G. Tracking systems application**

1. Tracking system can be applied in different ways

   Indoors assets are tracked repetitively reading e.g. a barcode, any passive and active RFID and feeding read data into Work in Progress models (WIP) or Warehouse Management Systems (WMS) or ERP software. The readers required per choke point are meshed auto-ID or hand-held ID applications.
However tracking could also be capable to provide monitoring data without binding to fixed location by using a cooperative tracking capability, e.g. an RTLS.

II. Yard management

Outdoors mobile assets of high value are tracked by choke point, 802.11, Received Signal Strength Indication (RSSI), Time Delay on Arrival (TDOA), active RFID or GPS Yard Management; feeding into either third party yard management software from the provider or to an existing system.

III. Fleet management

Fleet management is applied as a tracking application using GPS and composing tracks from subsequent vehicle's positions. Each vehicle to be tracked is equipped with a GPS receiver and relays the obtained coordinates via cellular or satellite networks to a home station. Fleet management is required by:

- Large fleet operators, (vehicle/railcars/trucking/shipping)
- Forwarding operators (containers, machines, heavy cargo, valuable shipping)
- Operators who have high equipment and/or cargo/product costs
- Operators who have a dynamic workload

IV. Mobile phone services

Location-based services or LBS is a term that is derived from the telematics and telecom world. The combination of A-GPS, newer GPS and cellular locating technology is what has enabled the latest “LBS” for handsets and PDAs. Line of sight is not necessarily required for a location fix. This is a significant advantage in certain applications since a GPS signal can still be lost indoors. As such, A-GPS enabled cell phones and PDAs can be located indoors and the handset may be tracked more precisely. This enables non-vehicle centric applications and can bridge the indoor location gap, typically the domain of RFID and RTLS systems, with an off the shelf cellular device. Currently, A-GPS enabled handsets are still highly dependent on the Location-Based Service (LBS) carrier system, so handset device choice and application requirements are still not apparent. Enterprise system integrators need the skills and knowledge to correctly choose the pieces that will fit the application and geography.

H. Usefulness of tracking

- Animation & Interaction
- Navigation
- Recognition of objects
- Video surveillance
- Medical applications
- Computer assisted living

I. Example of the relationship between GIS and Tracking

Integrated Tracking Systems is known for our Full Service GIS (geographic information systems) Support. GIS enables you to fully understand the dynamics of the geographic markets you serve. Integrated Tracking Systems can assist in developing these understandings and addressing the strategies and programs necessary to leverage your position in the market and to take full advantage of your market dynamics.

J. Key Benefits

Number of benefits can be gained such as:

- Cost Effective
- Subject Matter Experts - in both Compliance, Marketing and GIS
- Reliable as Expeditious
- Experienced
- Cost Effective
- Subject Matter Experts - in both Compliance, Marketing and GIS
- Reliable as Expeditious
- Experienced

IV. COMPUTER PACKAGES

A. Arc GIS

Explains the program are as follows

1. ESRI GIS software

ESRI was founded in 1969 as Environmental Systems Research Institute; it has grown into the world leader in GIS technology. Over the past 40 years ESRI has evolved from a small consulting firm to the largest research and development organization dedicated to GIS. ESRI develops GIS solutions that function as an integral component in nearly every type of organization. The ESRI Arc GIS is integrated geographic information system that make users have the ability to visualize, manage, create, and analyze geographic data. Also they will be able to comprehend the geographic context, allowing you to see relationships between features and identify new patterns in your data.

2. Arc GIS consisting of three parts

- Arc GIS Desktop software, an integrated suite of advanced GIS applications.
- Arc GIS gateway, an interface for managing geodatabases in a database management system.
- Arc IMS software, internet-based GIS for distributing data and services.

3. The Arc GIS system allows users to

- Create maps and interact with your data.
- Save time using map templates to create consistent style in your maps.
- Build process models, scripts, and workflows to visualize and analyze your data.
- Read, import, and manage more than 70 different data types and formats including demographics, facilities, CAD drawings, imagery, Web services, multimedia, and metadata.
- Communicate more efficiently by printing, publishing, and sharing your GIS data and dynamic content with others.
- Use tools such as Find, Identify, Measure, and Hyperlink to discover information not available when working with static paper maps.
- Make better decisions and solve problems faster.

4. Arc GIS Desktop

Arc GIS desktop is a comprehensive, integrated, scalable system designed to meet the needs of a wide range of GIS users. Arc GIS desktop includes a suite of integrated applications: Arc Map, Arc Catalog and Arc Toolbox. Using these three applications together, you can perform any GIS task, simple to advanced, including mapping, data management, geographic analysis, data editing, and reprocessing.

5. Arc GIS Desktop key features

Arc GIS provides number of key features, there are:

a) Spatial Analysis

Hundreds of tools for performing spatial analysis are included in Arc GIS for Desktop. These tools allow you to turn data into actionable information and automate many of your GIS tasks. For example, you can:
- Calculate density and distance.
- Perform advanced statistical analysis.
- Conduct overlay and proximity analysis.
- Create sophisticated geoprocessing models.
- Represent surfaces and perform advanced surface analysis.

b) Data Management

With support for more than 70 data formats, you can easily integrate all types of data for visualization and analysis. An extensive set of geographic, tabular, and metadata management, creation, and organization tools allows you to:
- Browse and find geographic information.
- Record, view, and manage metadata.
- Define, export, and import geodatabase data models and datasets.
- Create and manage the schemas of geodatabases.
- Search for and discover GIS data on local networks and the web.

c) Mapping and Visualization

Produce high-quality maps without the hassles associated with complex design software. With Arc GIS for Desktop you can take advantage of:
- A large library of symbols
- Simple wizards and predefined map templates
- Extensive suite of map elements and graphics
- Advanced drawing tools
- Graphs, reports, and animation features
- A comprehensive set of professional cartographic tools

d) Advanced Editing

Manipulate data with a minimum number of clicks and automate your editing workflow with powerful editing tools. Advanced editing and coordinate geometry (COGO) tools simplify your data design, input, and cleanup. Multiuser editing support makes it possible for multiple users to edit your geodatabase at the same time, facilitating data sharing between departments, organizations, and field staff.

e) Geocoding

From simple data analysis to business and customer management to distribution techniques, there is a wide range of applications for which Geocoding can be used. With geocoded addresses, you can spatially display the address locations and recognize patterns within the information. This can be done by simply looking at the information or using some of the analysis tools within Arc GIS for Desktop.

f) Map Projections

With a vast selection of projected and geographic coordinates systems, Arc GIS for Desktop allows you to integrate datasets from disparate sources into a common framework. You can easily merge data, perform various analytic operations, and produce extremely accurate, professional quality maps.

g) Advanced Imagery

There are many ways you can work with image data (raster data) in Arc GIS for Desktop. You can use it as a background (base map) to analyze other data layers, apply different types of specifications to the image dataset, or use it as part of the analysis.

h) Data Sharing

The power and convenience of ArcGIS.com is now at your fingertips. With Arc GIS 10 for Desktop you can take full advantage of ArcGIS.com without ever leaving the Arc Map interface. Import base maps, search for data or features, and share information with individuals or groups from a convenient, centralized location.

i) Customization

Easily customize the user interface by adding and removing buttons, menu items, or docking toolbars within Arc GIS for Desktop, or develop custom GIS desktop applications with Arc GIS Engine, which is available through the ESRI Developer Network (EDN).

B. Java Runtime Environment (JRE)

The Java Runtime Environment (JRE), also known as Java Runtime, is part of the Java Development Kit (JDK), a set of programming tools for developing Java
applications. The Java Runtime Environment provides the minimum requirements for executing a Java application; it consists of the Java Virtual Machine (JVM), core classes, and supporting files.

C. WAMP
Acronym for Windows/Apache/MySQL/PHP, Python, (and/or) PERL
The acronym WAMP refers to a set of free (open source) applications, combined with Microsoft Windows, which are commonly used in Web server environments. The WAMP stack provides developers with the four key elements of a Web server: an operating system, database, Web server and Web scripting software. The combined usage of these programs is called a server stack. In this stack, Microsoft Windows is the operating system (OS), Apache is the Web server, MySQL handles the database components, while PHP, Python, or PERL represents the dynamic scripting languages.

D. MySQL
MySQL is an open source RDBMS that relies on SQL for processing the data in the database. MySQL provides Application programming interfaces for the languages C, C++, Eiffel, Java, Perl, PHP and Python. In addition, OLE DB and ODBC providers exist for MySQL data connection in the Microsoft environment. A MySQL .NET Native Provider is also available, which allows native MySQL to .NET access without the need for OLE DB. MySQL is most commonly used for Web applications and for embedded applications and has become a popular alternative to proprietary database systems because of its speed and reliability. MySQL can run on UNIX, Windows and Mac OS.

E. Dreamweaver
Adobe Dreamweaver (formerly Macromedia Dreamweaver) is a proprietary web development application originally created by Macromedia. Dreamweaver is available for both Mac and Windows operating systems. Recent versions have incorporated support for web technologies such as CSS, JavaScript. Dreamweaver is a program to design web pages, in addition to its shape and attractive professional editor that provides a suitable environment for the development of web pages in a neutral for the different browsers and different web programming languages. It’s helps programmer to coloring the text in different codes to facilitate tick, as the discovery of errors in the code design.

F. PHP
Self-referentially short for PHP: Hypertext Preprocessor, an open source, server-side, HTML embedded scripting language used to create dynamic Web pages.

In an HTML document, PHP script (similar syntax to that of Perl or C ) is enclosed within special PHP tags. Because PHP is embedded within tags, the author can jump between HTML and PHP (similar to ASP and Cold Fusion) instead of having to rely on heavy amounts of code to output HTML. And, because PHP is executed on the server, the client cannot view the PHP code. PHP can perform any task that any CGI program can do, but its strength lies in its compatibility with many types of databases.

G. Java EE
Java is a programming language expressly designed for use in the distributed environment of the Internet. It was designed to have the "look and feel" of the C++ language, but it is simpler to use than C++ and enforces an object-oriented programming model. Java can be used to create complete applications that may run on a single computer or be distributed among servers and clients in a network. It can also be used to build a small application module or applet for use as part of a Web page. Applets make it possible for a Web page user to interact with the page.

H. ODBC
Open Database Connectivity (ODBC) is Microsoft's strategic interface for accessing data in a heterogeneous environment of relational and non-relational database management systems. Based on the Call Level Interface specification of the SQL Access Group, ODBC provides an open, vendor-neutral way of accessing data stored in a variety of proprietary personal computer, minicomputer, and mainframe databases.

ODBC alleviates the need for independent software vendors and corporate developers to learn multiple application programming interfaces. ODBC now provides a universal data access interface. With ODBC, application developers can allow an application to concurrently access, view, and modify data from multiple, diverse databases.

ODBC is a core component of Microsoft Windows Open Services Architecture. Apple has endorsed ODBC as a key enabling technology by announcing support into System 7 in the future. With growing industry support, ODBC is quickly emerging as an important industry standard for data access for both Windows and Macintosh applications.

I. MySQL Connector/ODBC
(sometimes called just Connector/ODBC or MyODBC) is a driver for connecting to a MySQL database server through the Open Database Connectivity (ODBC) application program interface (API), which is the standard means of connecting to any database. Users can connect from within common applications and programming environments, such as Microsoft Access or Excel or Borland Delphi.

MyODBC is available for most major operating systems, including Windows, UNIX, Linux, Solaris, AIX, and OS X either under the free software/open source
GNU General Public License (GPL) or under a commercial license.

J. HTML

HTML is abbreviation of Hyper Text Markup Language and it is a computer language devised to allow website creation. These websites can then be viewed by anyone else connected to the Internet. It is relatively easy to learn, with the basics being accessible to most people in one sitting; and quite powerful in what it allows you to create. It is constantly undergoing revision and evolution to meet the demands and requirements of the growing Internet audience under the direction of the » W3C, the organization charged with designing and maintaining the language. The explanation is Hypertext Markup Language.

- Hypertext is the method by which you move around on the web - by clicking on special text called hyperlinks which bring you to the next page. The fact that it is hyper just means it is not linear - i.e. you can go to any place on the Internet whenever you want by clicking on links -there is no set order to do things in.
- Markup is what HTML tags do to the text inside them. They mark it as a certain type of text (italicized text, for example).
- HTML is a Language, as it has code-words and syntax like any other language.

K. Android

1. Android definition

Android is a mobile operating system that is based on a modified version of Linux. It was originally developed by a startup of the same name, Android, Inc. In 2005, as part of its strategy to enter the mobile space, Google purchased Android and took over its development work (as well as its development team). Google wanted Android to be open and free; hence, most of the Android code was released under the open-source Apache License, which means that anyone who wants to use Android can do so by downloading the full Android source code. Moreover, vendors (typically hardware manufacturers) can add their own proprietary extensions to Android and customize Android to differentiate their products from others. This simple development model makes Android very attractive and has thus piqued the interest of many vendors. This has been especially true for companies affected by the phenomenon of Apple’s iPhone, a hugely successful product that revolutionized the Smartphone industry.

Companies like Motorola and Sony Ericsson, which for many years have been developing their own mobile operating systems. When the iPhone was launched, many of these manufacturers had to scramble to find new ways of revitalizing their products. These manufacturers see Android as a solution - they will continue to design their own hardware and use Android as the operating system that powers it.

2. Eclipse

The first step towards developing any applications is obtaining the integrated development environment (IDE). In the case of Android, the recommended IDE is Eclipse, a multi-language software development environment featuring an extensible plug-in system. It can be used to develop various types of applications, using languages such as Java, Ada, C, C++, COBOL, Python, etc. For Android development, you should download the Eclipse IDE for Java EE Developers.

3. Android SDK

Android SDK is A (Software Development Kit) that enables developers to create applications for the Android platform. The Android SDK includes sample projects with source code, development tools, required libraries to build Android applications and an emulator, allowing the developer to test most of the applications without needing a real device (Obviously, for some applications such as those using the hardware of an Android device like camera, Bluetooth, etc) the developer would need a real device and the emulator will not fit the bill.
4. Android Emulator

The Android SDK includes a mobile device emulator a virtual mobile device that runs on your computer. The emulator lets you develop and test Android applications without using a physical device.

V. MEASUREMENTS AND RESULTS

Introduction The project is an android application that collects data and coordinates from sales points and sends this information to a server that stores this data to a database in the form of tables, so as to use this information in distribution as well as making use of this application in performing operations on tracking systems.

A. Measurements

Steps that have been working

1. Creating a web page using PHP

All the web pages were created using dream weaver in order to receive the data from the point of sales (POS). It then saves the information to the database and gets a notification response from the server to insure that the information has been stored in the tables according to a specific order in preparation for its analysis using ArcGIS.

1.1 Login.php page

A page that contains two text fields – the user name and the password fields was created from XY app. This page provides the employee the access to the system and use the application, and is limited only to company employees.

1.2 System administrator’s page

It is the first page of the administrator side it makes sure only the administrator has permission to enter the system, by his user name and password checked, to add new employees at the company in the system.

1.3 New customer’s page

A page was created that contains the following text fields: the customer name, the customers phone number, the customers address along with the coordinates to the sales point. This page also sends this information to the database tables.

1.4 Check user’s page

Page was created to check if the customer ID exist, to make sure the customer already exists on the database.

1.5 New employee’s page

This page contains five text fields which are: employee name, phone number, user name, password and address. Then sends this information to the employee table.
1.6 Master operation’s page
This page retrieves the information from the employee table and the customer tables, in addition to the operations ID, the time of the operation, the sales point’s coordinates and the sales amount and puts all this into a new row.

2. Creating a database using MySQL
A database was created to receive the data sent from XY app in preparation for its use by ArcGIS.

The database consists of four tables which are:
1. the employee table
   Contains: the ID number-the name of the employee-telephone number - username - password.
2. The customer table
   Contains, the ID number -customer name-phone number-address-coordinates (longitude, latitude).
3. the main table (sales)
   Consists; number of operation - customer unique number - latitude-longitude-employee’s unique number-employee name –transaction time-- items 1 - items 2.
4. The login table
   It contain the user name and password of system administrators

3. The IDE (Eclipse - Android SDK)
The application can be used by any commercial foundation that has sales department by using any Android cell phone with GPS chip. The android cell phone that includes this application must be given to the sales person (the person who goes to the point of sales and sell the products), in purpose of collecting wanted data. The application was designed to contain several pages in the interface, to show the fields that are filled in by the user. Backend of these pages is the Android code for the desired operations on the certain page. Android code was designed in the IDE Eclipse-Android SDK.

3.1 Login
A code has been written, that sends the inputs to a web page to verify the access permission for the employee through the database. If the validity of the inputs is established the employee then redirect to the customer’s page.

3.2 Customer’s page
This is a simple page. Its contents provide the user with a choice between choosing a new customer or an already existing customer.

3.3 New customer page
This page is a code that receives input concerning the customer’s name, phone number, address as well as their
coordinates. After the information is entered it is sent to the webpage so it can be entered into the database.

**Fig (15) New customer page**

### 3.4 Search for an existing customer page

This is a code that checks for the existence of a client in the database, if the customer exists you are then transferred to the sales page otherwise a reply is generated by the server.

**Fig (16) Search for an existing customer**

### 3.5 Sales page

This is a code with an interface that consists of three text fields: item1 and item2. The user enters the values of the commodity in the designated fields. This page sends these values to the webpage so it can be added to the database.

**Fig (17) Sales page**

### 4. Linking the database to the Arc Catalog

In order to create a kinetic MySQL database using ODBC MySQL connector was used. MySQL connector/ODBC was used in order to make the MySQL formulation understandable when adding new database connection on the Arc Catalog. After that the database id created so it can be accessed from the Arc Catalog. Opening the Arc Catalog and entering the database using OLE DB Connection.

### 5. Retrieving the database tables

To do so, Arc Catalog has been used to recall the database from MySQL and adding it to database connection to be existed in Arc Map.

**Fig (18) Database table**

### 6. Inserting and adjusting the image

Satellite image for the study area with high resolution have been added and adjusted by using known points appeared in the image. This adjusted image is used to show the locations of sales points. Table shows the coordinates that are used to adjust the satellite image. There are uses geodetic GPS, Reduced to (WGS1984) and projection in UTM.

**Table Coordinates (1)**

<table>
<thead>
<tr>
<th>point</th>
<th>E</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>450649.7</td>
<td>1720139</td>
</tr>
<tr>
<td>C</td>
<td>450609</td>
<td>1720327</td>
</tr>
<tr>
<td>D</td>
<td>450554.7</td>
<td>1720433</td>
</tr>
<tr>
<td>E</td>
<td>450727.1</td>
<td>1720574</td>
</tr>
<tr>
<td>F</td>
<td>450372.7</td>
<td>1720506</td>
</tr>
<tr>
<td>G</td>
<td>450381.2</td>
<td>1720368</td>
</tr>
</tbody>
</table>
7 Adding the attributes
The database that defined in the Arc Catalog have been added and displayed in the map through the measured co-ordinates by the handset GPS.

Fig (19) Image

B. Results
After the above applied measurements, resulting the following:
- The constructed database updating automatically with the sending data from the customers depending on their locations.
- Accordingly, the locations appear on a map on Arcmap program depending on the sent co-ordinates and the other data.
- The formed system is a dynamic system because all of the previous points.

VI. CONCLUSION AND RECOMMENDATIONS
A. Conclusion
In this research, GPS and GIS in addition to Android system integrated together and the result of this integration is an application transmitting co-ordinates and any other data of the customer to server, and then the transmitted data show on a map with attributes of features, and then any analysis and query can be done. This application obviously saving time, money and effort. Thus, this application can be applied in different places such as: Auto location submission (tracking applications, vehicle monitoring system, family members/employees tracking and mobile anti-theft). Also in points of interest collecting applications (ATM, pharmacies … etc). Furthermore can be applied in security applications such as police incidents and traffic accidents. Also in census data collection with location, and finally can be applied in web maps.

B. Recommendations
The following recommendations are suggested for the future work:
- Integration for the database with web GIS systems such as ArcGIS server, MapGuide and Open server … etc.
- Make network analysis with system database points/dataset.
- Integration and overlay features over Bing maps or Google maps.
- For proper application it recommended that to use a private server to having a full control on the data.
- For large amount of data it recommended that to use ORACLE database.
- Uploading photos for the locations in addition to the co-ordinates.

Stanford website “Geographic information system for Business”.
http://centrin.net.id/
http://www.esri.com
http://en.wikipedia.org
http://www.frankspringerandassociates.com/index.html
http://www.sfu.ca/rdl/GIS/tour/gis.html
http://www.stonecourses.net/environment/index.html
C. Application user guide

Login

User not found

User found

Existing customer

Not found

Found

Phone

Address

Name

Sales page

Check ID

| item1 | item2 | Insert ID |

| Found | Not found |

| item1 | item2 | Insert ID |

Sales page
Appendix (D) Check Code

```java
public class chek extends Activity {
    Button btn1;
   HttpPost httppost;
    StringBuffer buffer;
    HttpResponse response;
    HttpClient httpclient;
    List<NameValuePair> nameValuePairs;
    EditText id,tel;
    TextView tv;
    ProgressDialog dialog = null;
    AlertDialog alert;
    TextView usernm;

    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.chek);
        btn1=(Button)findViewById(R.id.btn1);
        id = (EditText)findViewById(R.id.id);
        tel = (EditText)findViewById(R.id.tel);
        tv = (TextView)findViewById(R.id.tv);
        usernm =(TextView) findViewById(R.id.usernm);
        Bundle b = getIntent().getExtras();
        String name = b.getString("name");
        usernm.setText(" " + name);
        String cus_id = b.getString("ID");
        id.setText(" " + cus_id);
        btn1.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                dialog = ProgressDialog.
                        show(chek.this, ",",
                                "Validating customer id or telepho...",
                                true);
                new Thread(new Runnable() {
                    public void run() {
                        login();
                        }}).start();
                    }
                    void login(){
                        try{
                            httpclient=new DefaultHttpClient();
                            httppost= new HttpPost("http://41.67.53.148/ANDROID_DB/chekuser.php"); // make sure the url is correct.
                            //add your data
                            nameValuePairs = new ArrayList<NameValuePair>(1);
                            nameValuePairs.add(new BasicNameValuePair("ID",id.getText().toString().trim()));
                            nameValuePairs.add(new BasicNameValuePair("tel",tel.getText().toString().trim()));
                            httppost.setEntity(new UrlEncodedFormEntity(nameValuePairs));
                            response=httpclient.execute(httppost);
                            //edited by James from coderzheaven, from here....
                            responseHandler = new BasicResponseHandler();
                            final String response = httpclient.execute(httppost, responseHandler);
                            System.out.println("Response: " + response);
                            if(response.equalsIgnoreCase("confirmed")) {
                                dialog.dismiss();
                                String text =String.format(id.getText().toString());
                                runOnUiThread(new Runnable() {
                                    public void run() {
                                        Toast.makeText(chek.this,"confirmed", Toast.LENGTH_SHORT).show();
                                        }});
                            } else {
                                public void run() {
                                    Toast.makeText(chek.this,"error", Toast.LENGTH_SHORT).show();
                                    };
                                }
                                };
                            };
                        };
                    };
                }
            }
        }
    }
```
tel.getText().toString();
Intent(chek.this,sells.class);
    intent.putExtras(b);
    // Bundle b = new
Bundle();
b.putString("user",usernm.getText().toString());
b.putString("name",id.getText().toString());
//Intent intent = new
Intent(chek.this,sells.class);
intent.putExtras(b);
startActivity(intent);
//startActivity(new
Intent(chek.this,LbsGeocodingactivity.class));

}else{
    showAlert();
}

} catch(Exception e){
    dialog.dismiss();
    System.out.println("Exception : " + e.getMessage());
}
public void showAlert(){
    dialog.dismiss();
    chek.this.runOnUiThread(new Runnable() {
        public void run() {
            AlertDialog.Builder bui = new
            AlertDialog.Builder(chek.this);
            bui.setTitle("ID Or Telphon");
            bui.setMessage("access dinay")
                .setCancelable(false)
                .setPositiveButton("OK",
new DialogInterface.OnClickListener() {

public void onClick(DialogInterface dialog,
        int id) {

    }
            });
            AlertDialog alert =
            bui.create();
            alert.show();
        }
    });
//show alert
}