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Analysis and Study of Machine to Machine (Real Time Data Management)

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Abstract: Machine to machine communication is a procedure in which two devices communicate data in order to achieve the desired output without the need for human intervention. Corporate processes may be enhanced, business assets can be managed more efficiently, and new revenue can be easily generated using this application. In everyday life, ATM customers confront issues such as the lack of guards, ATM thefts, lack of security, and ATMs without cameras, among others. Machine to machine communication is crucial, since it makes life easier by connecting mobile operating systems such as Android, iOS, and Windows to tracking devices, as well as employing fingerprint sensors with mobile devices. As a result, a real time GPS tracker knows how to send data to a mobile device. Individual users utilize this service to broadcast their current position to relatives and friends in real time. This service is used by businesses to manage their staff or to give a track and trace service to their customers as a bonus feature. The panic alarms generated during the process are handled with extreme caution and responsibility. Real time finger imprint is a leading producer of fingerprint core technology that tracks the finger and stores the data on the device. The machine-to-machine concept is gaining popularity. This utility will be released in the future, along with upgrades, and will set new security goals.

Keywords: Fingerprint sensors, Machine to machine communication, Mobile OS, Panic alert, Tracking and its usage.

I. Introduction

Machine to machine communication or data exchange occurs when two machines communicate without the need for human contact. It genuinely connects Machines to Machines. M2M is the next wave of technology revolution, connecting people, systems, and smart gadgets in novel and transformative ways, resulting in significant utility gains. Approaching M2M as a fresh development sector, on the other hand, provides a blank slate on which to create the company's future generation. Not only can the vending route driver be told, but inventory on the truck and in the warehouse can also be updated, and suppliers can be notified to refill. The capacity for any gadget to communicate wirelessly increases its value beyond conception in any industry [1].

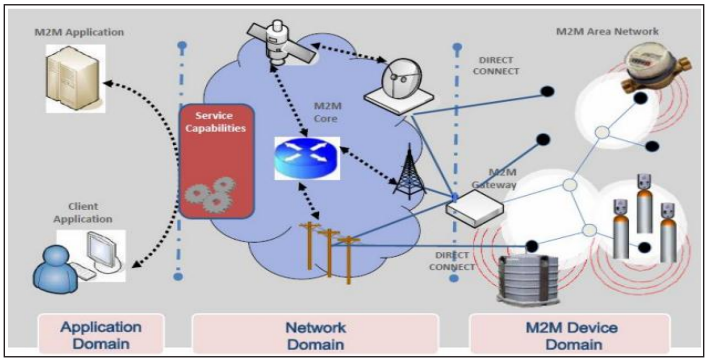

Fig. 1: Simple Architecture of M2M Systems with its Components

Adding NFC tags to your fridge or the back side of your TV remote control is an example of consumer use of M2M enabling services. The apps of your favorite pizzeria or any other fast food establishment will start when you use the NFC task launcher on your Android phone [2]. If they don't have an app, you can use the NFC tag to store the URL of your pizzeria.

The following is a brief description of the various components and elements of an M2M system:

- M2M Device: A device that can respond to requests for data stored on the device or that can communicate data on its own.
- M2M Area Network: Provide connectivity between M2M Devices and M2M Gateways, for example, through a personal area network.
- M2M Gateway: Equipment that employs M2M capabilities to assure M2M Device interoperability and communication network connectivity.
- M2M Communication Network: This network is responsible for communications between M2M Gateways and M2M applications, such as xDSL, LTE, WiMAX, and WLAN [3].

- M2M Applications: This section contains the middleware layer, which routes data through various application services and into specialized business-processing engines.

II. Working Process

Telemetry is a language that the machine understands. Telemetry is the concept of remote machines and sensors gathering and sending data to a central location for human or computer interpretation. A remote sensor captures data and transfers it wirelessly to a network, where it is then routed, commonly through the Internet, to a server such as a personal computer. The data is then examined and acted upon in accordance with the software in place.

To send data, M2M communications uses existing networks, such as public wireless networks.

Consider the scenario of a water treatment facility. City engineers are responsible for ensuring that the community has access to safe drinking water. They must keep track of the raw water supply, the treatment procedure, and the final product, drinkable water.

Engineers would first install sensors in crucial spots. This includes putting sensors near or around the raw water source, such as a lake or river, as well as near the water plant's major intakes. They would also install sensors at various phases of the treatment process, as well as additional sensors on the plant's outflow pipes, which distribute the purified water to the community. These sensors will transfer data in real time to a wireless network that is connected to the Internet. Engineers then use computers with specific software to monitor the incoming streaming data. Finally, engineers may keep an eye on the outflow water to guarantee that their treatment is producing high-quality drinking water for the community.

Fig. 2: Municipal Water Plants

III. Applications

Different applications where M2M is used widely:

- Manufacturing
- Healthcare
- Utility Sector
- Automotive and Transport
- Security and Surveillance
- Agriculture

M2M applications in which we are into:

- Biometrics with Mobile
- Card Reader with Mobile
- Smart DMS

Let us discuss all the above applications in detail:

Manufacturing

There are a variety of reasons why 'smart' manufacturing is a good idea. Digital control systems, asset management, and smart sensors can improve operational efficiency, safety, and reliability, while integration with smart building systems and smart grids can reduce energy consumption and carbon footprint. When RFID and M2M are combined, a great possibility opens up in industries ranging from aerospace to oil and gas to electronics, with applications including inventory management, shipping and delivery, tracking parts, work in progress, and personnel data [4]. The faster a production process can adjust to changing client demand, the better.

Healthcare

M2M healthcare applications are expected to have a significant global market. Monitoring vital signs, assisting the elderly or disabled, Web Access Telemedicine points, and remote diagnostics, among other things, have all been considered.

Patients with non-life-threatening diseases can be given sensors (for blood pressure or blood sugar levels, for example), sent home, and monitored remotely by medical personnel — and are frequently taught how to interpret the data. This will free up hospital beds and doctors' time to deal with more pressing problems [5].

Utilities

Metering devices and measurement have a lot of potential in the power industry, oil and gas companies, and other industries.

Smart Grids with Smart Meters: The M2M market includes smart meters for electricity, gas, and water, as well as the smart grids they create [6]. Real time data on resource consumption at the household level enables utilities to effectively manage demand and detect problems, while householders can save money by optimizing their usage patterns.

Automotive and Transport

Sensors and computing devices abound in today's automobiles, which cover everything from engine management to navigation to 'infotainment.' Automobiles are rapidly evolving into connected, context-aware machines that know where they are, where other vehicles are (both locally and regionally), who is driving (via driver face recognition), and how they are driving, and can warn of impending mechanical or other problems, as well as automatically summon roadside assistance or emergency services if necessary.

If a 'smart' automobile is stolen, it can be tracked remotely or immobilized, and new business models like 'pay-as-you-drive' insurance can be adopted. The tracking of high-value assets and vehicles, the monitoring of whole supply chains, vehicle navigational systems (which have promise for both commercial and consumer vehicles), and so on are the main application areas. The roads that automobiles travel on will also become smarter. In cities, lamp-post-mounted sensors, for example, can monitor parking spaces and notify drivers of busy regions [7].

Security and Surveillance

Connected smoke detectors can alert emergency services and activate only the appropriate suppression systems when triggered in smart buildings, including smart homes; connected burglar alarms can immediately identify the point of entry, and motion sensors can track an intruder's progress in real time (the same sensors can identify and track legitimate occupants via wireless access-control systems) [8].

Agriculture

M2M technology is being used in smart agriculture to track the location and condition of livestock, monitor crop growth conditions, and optimize the functioning of agricultural equipment.

Used Applications:

Biometrics with Mobile

With a fingerprint device attached, any mobile OS may be turned into a biometric scanner. In order to keep track of attendance, a fingerprint scanner has been connected to an Android handset, resulting in M2M formulation and the storage of fingerprint data in a mobile app database. With the inclusion of a fingerprint sensor, you can now unlock your phone, sign into apps, and authorize purchases with just your finger. That's not all: Android now has a fingerprint API that allows developers to fully utilize the sensor in their apps [9].

The fingerprint reader on Android can be used for a variety of tasks, including document access and signing, as well as location-based time and attendance for employees whose primary workplace is not a traditional office. It can even be used to collect fingerprints for a database utilizing the fingerprint image export capabilities. Our free toolset makes implementation a breeze.

Fingerprint scanners have become a safe alternative to remembering a long list of user names and passwords, and as secure mobile payment systems become more widely available, these scanners are set to become a more common and important security tool in the future.

Card Reader with Mobile

As the growth into technology and M2M market is into boom the card machine with mobile is of keen importance. The card machine is attached with mobile OS and the payment is done through swiping the card through it. This device entered the market for the sake of data theft that takes place when card details remains into the server.

The credit card is one of the easiest payment tools that could be thought up. It makes for easy transactions of large amounts, and minimizes your losses as you need not carry so much cash on you all the time. However, it can work only if the merchant accepts credit cards (and not all merchants accept all *kinds* of credit cards). Plus, you can only swipe your card if the merchant has a credit card machine [10]. The customer needs a mobile app and a card reader, which comes in the form of a piece of plastic (called a dongle). The card reader is plugged into the phone and the app activated. As the receiver of the payment, all you need to do is just punch in the amount for the purchase, swipe your customer's credit card through the reader, and then get their signature to authorize the payment. Electronic receipts can usually be sent to the buyer's emails for verification and book-keeping purposes.

For example, PayPal in which payment funds are deposited into your PayPal account within minutes of the transaction. It also offers you an optional PayPal merchant debit card which you can then use the funds to make eligible purchases and get 1% cash back from them.

Fig. 3

PayPal here also accepts cheques. All you need to do is take a photograph of the front and back of the cheque to process it. Similarly, you can take photographs of the credit or debit card if you do not have the reader with you, but you will still need to key in the security and zip code manually. PayPal will also charge you the keyed-in rate for that.

Smart DMS

Smart DMS support Machine to Machine communication and the communication among machines without human intervention is called Machine to Machine. Smart DMS is however used in various aspects of security.

For example, Security check on Facebook. It has also been imported in various areas of transportation, energy and health sectors. It has been changing the market structure by using service data and maintaining the unified connection with the help of networks [11].

In Smart DMS system various sensor such as Palm sensor, Heat sensor, oil level detector are connected with DT which sense their respective reading and collect them, And a DT is connected with FRTU, then collected data of different sensor is collected by FRTU with a Energy meter data which is connected with FRTU and this data is sent through GSM wherever we want to send it.

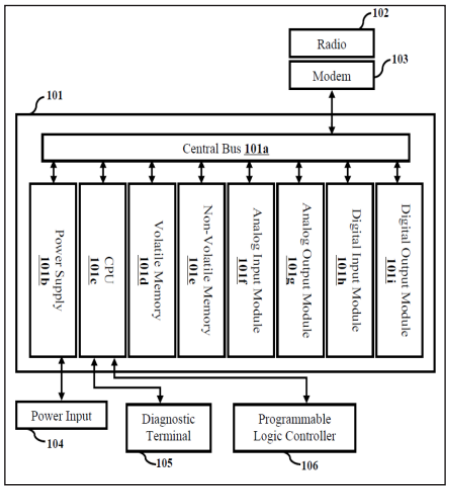

Fig. 4: Process Description

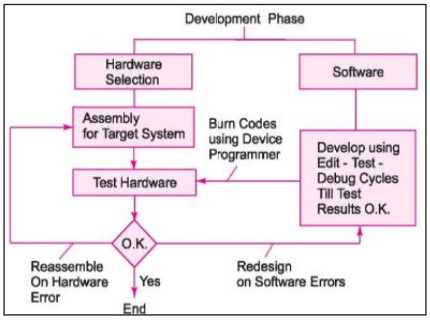

Fig. 5: Stage of Development

During development of Smart DMS sub system i.e. of FRTU, DT and RMU main problem facing is the connection between sub system and fetching data from a particular sub-system (DT) with FRTU, because there are a more number of sensor attached with DT and we have to save the data of every particular sensor of real time so the reading must be accurate and more reliable [12].

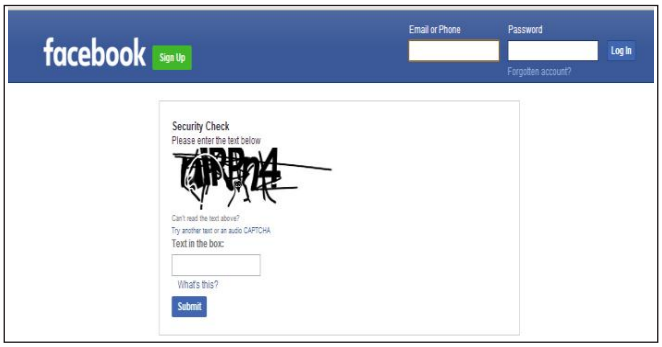

Fig. 6: Application of Smart DMS

Problem in Existing System:

- Sensor reading accuracy is one of the main problem.
- Sometime date of a particular sensor is missed during sending.
- Data of a particular time is not possible to get more human effort.
- Require more serviced Time to Time.

In present system we solve existing problem which are as follows:

- Sensor accuracy is good.
- Data of any sensor is not going to be forgotten.
- Required less servicing.
- One time installation process.

Salient Features:

- Document Management: Provide storage, metadata, security, as well as indexing and retrieval capabilities.
- Digital Library: Making document available with metadata search to end users.
- Host System: Installed on Windows Server, uses MSSQL/ Oracle/MySQL as database.
- ODR - Online Document Reader: No native application required to read the document and prevention of unauthorized copy/paste/download of the text/images.
- Policy Driven Secured Access: Login/password facility to access information, with selective authorization for viewing, printing and downloading.
- Metadata Search: Documents can be searched on Metadata for fast retrieval. Metadata can be in English and or in Indian language.

- Advanced Search: Documents can be searched with advanced features using Boolean search for accurate retrieval.
- Reports: Generates and exports statistic reports on repository.

Benefits:

- Improved control over documents and document-oriented processes.
- Streamlining of time-consuming business processes.
- Security over document access and modification.
- Documents are securely accessible any time from any web-enabled or intranet desktop.
- Improved tracking and monitoring, with the ability to identify bottlenecks and modify the system to improve efficiency.
- Improved productivity and profitability.
- Powerful search capability to find information easily.
- Reduction in operating costs.
- Elimination of errors and delays.
- Instant access to any document.

IV. Real Time Data Useful for Management

Real time analytics is the use of or the capacity to use, data and related resources as soon as the data enters the system.

Types of practical real time data management and analytics available to enterprises now.

- Streaming Data Analysis involves ingesting and analyzing large volumes of high velocity data to detect patterns and trigger predetermined responses in real time.
- Individual Record Look-up requires gaining near-instant access to individual records made up of multiple data points, such as customer name, account numbers and purchase history [13].
- Extremely Low-latency Queries allow business analysts to perform multi-part analytic queries against large volumes of data stored in analytic databases with results returned within an acceptable amount of time, perhaps a few seconds at most.

In order to better understand the accuracy of economic data and its effects on economic decisions, some economic organizations, such as the Federal Reserve Bank of St. Louis, Federal Reserve Bank of Philadelphia and the Euro-Area Business Cycle Network (EABCN), have made databases available that contain both real time data and subsequent revised estimates of the same data.

Real time data management has been used widely in various fields to get the best information from this data.

- Traffic Management: Connecting Traffic Management System (Traffic signals and Traffic Command centers) with a GIS enabled digital road map of the city and using the power of analytics is a key to smooth traffic management. Using real time analytics of data from these sources and linking them to some trends, we can manage traffic flow much better.
- Hospitals: CBI is an IT system that collects and analyzes data and delivers the results to frontline clinicians in real time, helping them to make better decisions. It can be used to keep clinicians informed about everything from infections and iatrogenic *injuries to whether units are over- or understaffed.* As per their strategy real time data provides CBI with three building blocks i.e. change leader's mindset, standardize data and build a culture of transparency [14].
- Tracking: In case of tracking the user gets real time data at certain intervals of time which helps them get better location and regular latitude longitude increases the accuracy level to a great extent.

After considering the uses of real time data in different departments it is very much formulated the essence of real time data in present scenario and its demands in future. It is the need of the hour to leverage enormous amount of data around us and create a more meaningful and smooth living for us.

V. Conclusion and Future Work

There has been a significant growth and development of M2M within North America and Europe. However, the development of M2M in the developing & emerging countries has not yet shown the required level of maturity and growth as expected. The primary reason has been lack of technology awareness among potential customer-segments and less maturity within the telecom platforms that serve as a backbone of M2M.

M2M as an application holds the promise of bringing benefit to both telecom operators and vendors. For service providers it is an opportunity as low-bandwidth M2M services can be readily overlaid onto the current user services network.

In an ideal world, M2M equipment will interoperate smoothly, service providers will compete on a level open-standards playing field without attempting to lock customers into their ecosystems, and the Internet of Things will develop with the same explosive inventiveness as did the original internet.

The future is now with Smart Energy Technology that will turn everything 'Smart' – 'Smart Homes', 'Smart Grids', and even 'Smart Cars'.

References

[1] E. A. Lee, "Cyber physical systems: Design challenges," in *11th IEEE Symposium on Object Oriented Real-Time Distributed Computing*, 2008.

[2] T. Taleb, and A. Kunz, "Machine type communications in 3GPP networks: Potential, challenges, and solutions," *IEEE Communications Magazine*, vol. 50, no. 3, pp. 178-184, 2012.

[3] K. Zheng, F. Hu, W. Wang, W. Xiang, and M. Dohler, "Radio resource allocation in LTE-advanced cellular networks with M2M communications," *IEEE Communications Magazine*, vol. 50, no. 7, pp. 184-192, 2012.

[4] V. Sharma, U. Mukherji, V. Joseph, and S. Gupta, "Optimal energy management policies for energy harvest senor nodes," *IEEE Transaction on Wireless Communications*, vol. 9, no. 4, pp. 1326-1336, 2010.

[5] K. C. Chen, "Machine-to-machine communications for healthcare," *Journal of Computing Science and Engineering*, vol. 6, no. 2, 2012.

[6] C. Y. Ho, and C.-Y. Huang, "Energy-saving massive access control and resource allocation schemes for M2M communications in OFDMA cellular networks," *IEEE Communications Letters*, vol. 1, no. 3, pp. 209-211, 2012.

[7] B. K. Gandhi, and M. K. Rao, "A prototype for IoT based car parking management system for smart cities," *Indian Journal of Science and Technology*, vol. 9, no. 17, 2016.

[8] J. Kumar, S. Kumar, A. Kumar, and B. Behera, "Real-time monitoring security system integrated with Raspberry Pi and e-mail communication link," in *2019 9th International Conference on Cloud Computing Data Science Engineering (Confluence)*, 2019, pp. 79-84.

[9] W. C. Ao, S. M. Cheng, and K. C. Chen, "Connectivity of multiple cooperative cognitive radio ad hoc networks," *IEEE Journal on Selected Areas in Communications*, vol. 30, no. 2, pp. 263-270, 2012.

[10] S. M. Cheng, P. Y. Chen, and K. C. Chen, "Ecology of cognitive radio ad hoc networks," *IEEE Communications Letters*, vol. 15, no. 7, pp. 764-766, 2011.

[11] P. Blasco, D. Gunduz, and M. Dohler, "A learning theoretic approach to energy harvesting communication system optimization," in *IEEE GLOBECOM, Workshop (IWM2MC),* 2012.

[12] R. Y. Udaykumar, and S. Kumar, "IEEE 802.16-2004 (WiMAX) protocol for grid control center and aggregator communication in V2G for smart grid application," *IEEE International Conference on Computational Intelligence and Computing Research*, 2013.

[13] J. B. Ekanayake, N. Jenkins, K. Liyanage, J. Wu, and A. Yokoyama, *Smart Grid: Technology and Applications*. John Wiley & Sons, Ltd., 2012.

[14] D. S. K. Nayak, P. Shreerudra, and J. Tripathy, "IoT ecosystems enable smart communication solutions: A case study," 2022.