**28 May 2020**

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| **Date:** | **28 May 2020** | **Name:** | **Srinidhi J C** |
| **Course:** | Developing IoT Solutions with Azure IoT | **USN:** | **4al16ec078** |
| **Topic:** | 1. **Introduction to IoT** 2. **IoT Cars** 3. **Connected Water Filler Station** 4. **Connected Waste Management** | **Semester & Section:** | **8th -Sem, B-Sec** |
| **Github Repository:** | **SrinidhiJC078** |  |  |

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| **FORENOON SESSION DETAILS** |
| **Image of session**  **A screenshot of a cell phone  Description automatically generatedA screenshot of a cell phone  Description automatically generatedA screenshot of a social media post  Description automatically generatedA screenshot of a social media post  Description automatically generatedA screenshot of a cell phone  Description automatically generatedA screenshot of a cell phone  Description automatically generated** |
| **Report – Report can be typed or hand written for up to two pages.** Introduction to Internet of Things (IoT) **Internet of Things (IoT)** is the networking of physical objects that contain electronics embedded within their architecture in order to communicate and sense interactions amongst each other or with respect to the external environment. In the upcoming years, IoT-based technology will offer advanced levels of services and practically change the way people lead their daily lives. Advancements in medicine, power, gene therapies, agriculture, smart cities, and smart homes are just a very few of the categorical examples where IoT is strongly established.  Over 9 billion ‘Things’ (physical objects) are currently connected to the Internet, as of now. In the near future, this number is expected to rise to a whopping 20 billion.  There are four main components used in IoT  **Low-power embedded systems –** Less battery consumption, high performance are the inverse factors play a significant role during the design of electronic systems.   1. **Cloud computing –** Data collected through IoT devices is massive and this data has to be stored on a reliable storage server. This is where cloud computing comes into play. The data is processed and learned, giving more room for us to discover where things like electrical faults/errors are within the system. 2. **Availability of big data –** We know that IoT relies heavily on sensors, especially real-time. As these electronic devices spread throughout every field, their usage is going to trigger a massive flux of big data. 3. **Networking connection –** In order to communicate, internet connectivity is a must where each physical object is represented by an IP address. However, there are only a limited number of addresses available according to the IP naming. Due to the growing number of devices, this naming system will not be feasible anymore. Therefore, researchers are looking for another alternative naming system to represent each physical object.   **There are two ways of building IoT:**   1. Form a separate internetwork including only physical objects. 2. Make the Internet ever more expansive, but this requires hard-core technologies such as rigorous cloud computing and rapid big data storage (expensive).   In the near future, IoT will become broader and more complex in terms of scope. It will change the world in terms of  “anytime, any place, anything in connectivity.”  **IoT Enablers –**   * **RFIDs:** uses radio waves in order to electronically track the tags attached to each physical object. * **Sensors:** devices that are able to detect changes in an environment (ex: motion detectors). * **Nanotechnology:** as the name suggests, these are extremely small devices with dimensions usually less than a hundred nanometers. * **Smart networks:** (ex: mesh topology).   **Characteristics of IoT:**   * Massively scalable and efficient * IP-based addressing will no longer be suitable in the upcoming future. * An abundance of physical objects is present that does not use IP, so IoT is made possible. * Devices typically consume less power. When not in use, they should be automatically programmed to sleep. * A device that is connected to another device right now may not be connected in another instant of time. * Intermittent connectivity – IoT devices aren’t always connected. In order to save bandwidth and battery consumption, devices will be powered off periodically when not in use. Otherwise, connections might turn unreliable and thus prove to be inefficient.   As a quick note, IoT incorporates trillions of sensors, billions of smart systems, and millions of applications.  **Application Domains:** IoT is currently found in four different popular domains:  1) Manufacturing/Industrial business - 40.2%  2) Healthcare - 30.3%  3) Security - 7.7%  4) Retail - 8.3%  **Modern Applications:**   1. Smart Grids 2. Smart cities 3. Smart homes 4. Healthcare 5. Earthquake detection 6. Radiation detection/hazardous gas detection 7. Smartphone detection 8. Water flow monitoring   The Internet of Things enables transformational change, and there is no question that the automotive sector is changing extremely rapidly. IoT-related technologies will draw the map for the industry to follow, and the connected car will play a major role on the roads and in the economy of the future. The power struggle between automakers and software developers is a symptom of the ongoing transformation, like birth pangs as the industry reinvents itself.  We are moving from an age of products to an age of services and experiences, from hardware to software, from functionality to information as the key object of value creation, and from industry silos to intricately connected ecosystems and value loops. It is no surprise that carmakers find themselves navigating new terrain within an ever-expanding ecosystem of players, all of which are trying to capture value, and where players that control the aggregation and analysis of this information—the software providers—steadily gain ground. As automakers consider their place in this changing industry, they can consider several approaches to strengthening their position:  ·         Align on a vision of the role that the business will play in the ecosystem, understanding and accepting the transformational impacts this may have on the business and on the “old ways of thinking.”  ·         Develop a clear mapping of where data originates—and, consequently, who owns it—for each of the services delivered, to better understand where value can be captured.  ·         Develop a roadmap for shifting to a more service-oriented approach as an entire organization, not just in the connected vehicle divisions, to enable ongoing interaction with customers throughout the entire lifecycle.  ·         Accept new capabilities that need to either be built internally or acquired externally. Seek greater involvement in—and ownership of—in-vehicle software platform development.  ·         Consider ways to address manufacturing/ lifecycle challenges by working closely with technology providers to more closely integrate development processes and software driven feature rollouts and updates.  ·         Identify and build strategic partnerships with key players across the ecosystem, including with emerging smart-device manufacturers, and work across the value chain to build a broader, more holistic brand experience enabled through connected technologies.  The road ahead for the industry is open and lined with opportunity. It’s time to shift into high gear.  By 2030 we expect to see 100% of new cars connected,  Whereas right now we have about 25%.  In terms of a shared vehicle model,  We see that happening now with things like Uber and Lyft.  But we expect that to increase to nearly a third  Of the vehicles on the market will be shared vehicles.  Including younger drivers who are no longer actually buying  Vehicles, but just using shared vehicles.  Instead of buying and managing and having to maintain or  Pay insurance, they just use Uber and  Lyft as their exclusive means of transportation.  In addition to that,  We see an increase in the amount of autonomous cars, and  The number of companies investing in building  Autonomous technology for vehicles.  We expect that 10 to 15% of new cars  In the 2030 time frame will be fully autonomous.  And then, obvious to all of us,  We're seeing EV cars become more and more pervasive,  Whether they are fully electric or gas-electric hybrids.  As these sort of four general trends continue to increase over  The next 10 to 15 years, we are positioned to partner with oems.  To help them actually develop the infrastructure for  Both manufacturing, selling, and then maintaining  The vehicles that they have in market regardless of the number  Of consumers that may buy and sell them, and hand them off.  We are partnering with them specifically in five areas.  We partner with them to build a platform that includes  Facilities to deal with telematics and  Predictive services, productivity and digital life,  Connected advanced driving assistance systems, advanced  Navigation, and then customer insights and engagement.  And you can imagine that there is many use cases that cover all  Five of these.  But I'd like to point out just a couple of interesting scenes  Out of the use cases that we have.  Telematics and predictive services is pretty common.  Everyone knows that is a piece of technology that's required  For understanding your devices.  Within the Azure iot space, we have iot Hubs and  Device management and a bunch of other facilities.  In order to support being able to do device management,  Telematics, and predictive services.  And we have a bunch of  Other technologies that are being built in parallel with  The Connected Vehicle Platform that we are able to leverage.  To provide a very solid foundation that's on par with,  It's the best in class telematics platform.  Productivity and digital life includes a bunch of experiences.  It includes the ability to, when you're in vehicle as we move  Towards a more autonomously driven vehicle.  And you have more time as a driver, and  More cognitive space to do more work while you're in a vehicle.  We can bring things like Office 365, your calendar,  Your email, Skype, various ways to communicate and  Organize your logistics that impact your driving.  Whether you're driving to and from a specific location,  To a meeting, you call in to a meeting because traffic gets too  Hectic and you're not gonna make it.  There are many ways that bringing productivity and  Digital life into the vehicle  Is an increase in the value of your time as your cognitive load  Goes down because the car is able to better drive itself.  One of the magical pieces that we think is actually gonna  Bring that together is the ability to bring  Cortana into the experience.  Where Cortana can work on your behalf with your productivity  And logistical information to provide for  You a seamless experience.  To be able to not have to increase your cognitive load to  Deal with logistics because Cortana can do a bunch of  The logistical organization for you.  So as the future unfolds before us,  Where vehicles become more autonomous, more automated,  More managed remotely and less individual.  We see the opportunity for  A Connected Vehicle Platform to fill the gap.  By not increasing cognitive load,  But actually keeping cognitive load at a constant while  Bringing more value to the experience.  In addition to that,  We believe that we have the technologies and expertise to  Bring in machine learning and data management assets.  Whether it's from Azure ML, or data lake, or the other various  Components that we have in Azure and in Azure IOT.  Say around the Microsoft Connected Vehicle Platform  Is that we are here to partner with the oems.  As they go through the next transformation of their  Industry, we are here to help them understand how to do it  With technology.  How to do it with Azure backend, how to do it in a way that is  Global, secure, distributed and efficient.  And so that's kinda the high level  View and the best summary of  The Microsoft Connected Vehicle Platform |