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Sensors Interfacing on Re-configurable Platform using FPGA in IoT environment

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ABSTRACT: The profitable elements for the quality and profitability of the businesses are temperature, light and dampness. Persistent perception of these variables gives data as information to the administrator and controller to better see, how every element demonstrations quality and productiveness. Wired Networks are hard to oversee on the grounds that more number of parts is utilized amid execution and require wired/links to be associated with every last PC in the system. Remote sensor systems associated with a great many sensor hubs can gather data from an alternate area and transmit the gathered information to a specific client, according to the application required. Henceforth interfacing gadget is essential for sensor interfacing and sensor information accumulation in modern remote sensor system (WSN) in IoT environment. To plan and actualize the mechanical remote sensor arranges on-going and minimal effort remote observing is required. In this programmable entryway cluster (FPGA) present as a decent choice for the innovation improvement and usage. With the expansion in the quantity of sensors, a productive recon gurable sensor interface gadget is expected to coordinate WSN in IoT environment. This framework examines the parameters that are required to plan a recon gurable sensor interface gadget for mechanical WSN using IoT design. For the configuration IEEE 1451 standard is received.

KEYWORDS: CPLD, IEEE1415 protocol, Internet of Things (IoT), sensor data acquisition.

I. INTRODUCTION

Several little electronic gadgets catching physical marvels and working together to screen complex frameworks and associate with nature: remote sensor systems are an essential stride towards a universal world where hardware part is vanishing in our environment while always watching and assessing them. Remote sensors Network (WSNs) address a champion amongst the most troublesome zones in today electronic industry. These systems are required to act naturally administering, low-control asking for, and association careful. The application may have hundreds or countless center points spread out in an area, making the course of action and the sponsorship of WSNs an erratic errand. In spite of the way that the joining headways are clearly tending to splendid sensor, there is still an extending arrangement of sensors. The interfaces and data get ready required for sensors control are altogether different starting with one sensor then onto the next, as well as starting with one application then onto the next. In such setting, the utilization of indistinguishable hubs or a diminished arrangement of centers that are further balanced or changed would rearrange the sending procedure and decrease the item cost. Great configuration approaches for WSNs hub depend on the utilization of a microcontroller. Be that as it may, handling and usefulness needs are ceaselessly expanding because of new application prerequisites and this incorporates WSNs applications. This, additional to the ceaselessly expanding weight for diminishing time-to-business sector, has prompted new plan choices, for example, recon gurable equipment. Recon gurable frameworks have been concentrated on in years ago as an option for both: Application Special Integrated Circuits (ASICs) and General Purpose Processors (GPPs). GPPs, for occasion, beyond any doubt awkwardness between IO (gadget Input-Outputs) and preparing. In an unexpected way, FPGAs gives a lot of IOs, as well as high information handling. Besides, recon gurable frameworks give high exibility as they can be overhauled after framework arrangement furthermore allows time to market diminishment, since the correct model can be a gadget. Accordingly, recon gurable gadgets are ceaselessly picking up piece of the pie and expanding their industry application spaces and research interest. Case in point, the work displayed concentrates on the use of FPGAs in industry control frameworks. Considerably all the more, now, it is conceivable to actualize neural systems and fluffy control arrangements on FPGAs furthermore, reconfigurable processing has been broadly investigated in quickening applications. The information

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gathering unit is wise by morals of brilliant reconfigurable microcontroller based interface. Recon gurable gadgets are those in which the usefulness of the rationale doors is adaptable at run time and the association between the rationale entryways additionally con gurable. The MCU (microcontroller unit) which is utilized for interfacing of sensors has a few constraints like force utilization and massiveness. This MCU finishes the operation with the assistance of intrude on which brings about serial correspondence and makes the operation moderately moderate. Along these lines we have utilized a FPGA as a recon gurable interfacing equipment which oers the unique parallelism and ne-grained adaptability of utilization uncommon circuit with the post creation programmability of programming. Subsequently the FPGA gives leverage of diminished force utilization because of runtime reconfiguration, equipment reuse and exibility. The web of things speaks to the exceptionally expanding system of physical protests, for example, sensors, machines and different things that are given with a one of a kind IP address for network over web and capacity to exchange information over web without human interface. Idea of instrumentation with things, for example, machines with sensors is not new in businesses. Blend of remote sensor system and IoT infers boundless potential for business, medicinal services, buyer and modern application. The engineering of IoT and the different applications in which it is utilized. It basically executed in handling, checking and control-ling the information, for example, temperature, light power, dampness, weight, thickness, low level and so on. Information gathered by the sensor is remotely exchanged towards the control unit for controlling and checking. In future, WSNs are relied upon to be converged with the IoT, where sensor hubs interface with the Internet, and use it to team up and finish their operation. Remote correspondence advancements incorporated system frameworks involving WSN, Auto versatile system, 3G innovation, WiMax, RFID frameworks, individual range system (PAN) are quickly creating as an IOT system. The coordination of IoT and WSN requires a transitional unit called as control unit since WSN incorporates unpredictable and tremendous number of differing sensors. Then again every sensor has its own particular necessity to peruse information and exchange the information towards the goal. To full the prerequisite, control unit is important to execute the WSN in IoT environment. Control unit composes perplexing and unmanageable sensor driver code and information gathering code.

II. MOTIVATION

To overcome from such downside we have to execute configuration of framework with such profoundly perfect processor which can oversee unpredictable and unmanageable information handling parallel. We utilized FPGA to prepare the information which is exchange by the sensor. FPGA gives the advantage of both equipment and programming brings about high cost however FPGA gives close about every one of the advantages of programming exibility, advancement model and equipment productivity. With the assistance of FPGA information securing is done in basic and most straightforward way. In this outline FPGA is utilized as a center controller which not just expands the productivity of sensor information accumulation additionally improve the application scope of the information securing interface hardware in IoT environment. For the correspondence reason we have utilized Zigbee which species an IEEE 802.15.4 convention and predominantly utilized for fast information correspondence. The sensors introduced in the ventures sense the physical amounts (temperature, stickiness and light force) as information and sends towards the FPGA for handling, checking and controlling. Information process by the FPGA is moved in IoT environment with the assistance of Zigbee. The above work can be utilized to execute for different applications, for example, water observing and controlling, horticulture, and in di erent ventures like computerization and vehicle. By changing the reference estimations of sensors we can execute this outline for different applications without changing the programming and equipment which is associated with the FPGA.

III. LITERATURE SURVEY

PROJECT NAME	AUTHOR NAME	THEY PROPOSED	REFER POINTS
[1] "Design and Implementation of Hybrid Cloud Computing Architecture Based on Cloud Bus"	Qunye Qiu, Caifeng Zou	In this paper, we proposed a hybrid cloudcomputing architecture, which can make the current ITarchitecture rapidly migrate to cloud computing, reduce theinvestment, simplify the integration of resources, andsubstantially improve the ability	A new model of hybrid cloud computingArchitecture based on cloud bus is proposed.

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		of business support and the efficiency of IT management.	
[2] "IoT-Based Smart Rehabilitation System"	Yuan Jie Fan, Yue Hong Yin, Member, IEEE, Li Da Xu, Senior Member, IEEE, Yan Zeng, and Fan Wu	This paper presents an ontology-based automating design methodology (ADM) for smart rehabilitation systems in IoT. Ontology aids computers in further understanding the symptoms and medical resources, which helps to create a rehabilitation strategy and reconfigure medical resources according to patients' specific requirements quickly and automatically.	In this paper, an ontology-based automating design methodology for smart rehabilitation system using IoT technology is presented
[3] "Design of a WSN Platform for Long-Term Environmental Monitoring for IoT Applications"	Mihai T. Lazarescu	This paper addresses all phases of the practical development from scratch of a full custom WSN platform for environmental monitoring IoT applications. It starts by analysing the application requirements and defining a set of specifications for the platform. A real-life, demanding application is selected as reference to guide most of node and platform solution exploration and the implementation decisions.	This paper presents the functional design and implementation of a complete WSN platform that can be used for a range of long-term environmental monitoring IoT applications.
[4] "The Applications Of WiFi-based Wireless Sensor Network In Internet Of Things And Smart Grid"	Li Li , Hu Xiaoguang, Chen Ke, He Ketai	The application of the IoT develops rapidly, but due to the special requirements of some applications, the existing technology cannot meet them very good. Much research work is doing to build IoT. WiFi-based	Internet of Things (IoT) and Smart Grid are of great importance in promoting and guiding development of Information technology and economic.
[5] "Internet of Things for Enterprise Systems of Modern Manufacturing"	Zhuming Bi, Senior Member, IEEE, Li Da Xu, Senior Member, IEEE, and Chengen Wang, Senior Member	We are motivated to investigate the impact of IoT on system paradigms, when IoT can be applied in modern manufacturing enterprises. To achieve this objective, both the evolutions of manufacturing paradigms and IT are discussed	Design and operation of a manufacturing enterprise involve numerous types of decision-making at various levels and domains.
[6]		We propose a SCM-based business model to regulate the relationships between ISPs in ICN networks. Both analysis and simulation show that it has less inter-domain path	we propose a Supply Chain Management (SCM) based business model to regulate the business relationships Between ISPs.

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<p>“ Revolutionizing the Inter-Domain Business Model by Information-Centric Thinking”</p>	<p>Zhen Feng, Mingwei Xu, Yuan Yang.</p>	<p>length,higher cache hit ratio, and more economic incentives comparedwith the conventional GR business model.</p>	
<p>[7] “Compressed Sensing Signal and Data Acquisition in Wireless Sensor Networks and Internet of Things”</p>	<p>Shancang Li, Li Da Xu, and Xinheng Wang</p>	<p>proposed a compressed sensing frameworkfor WSNs and IoT and introduced how the framework could be utilized to reconstruct the sparse or compressibleinformation data into a variety of information systems involvingwith WSNs and IoT</p>	<p>This paper show that compressed sensing can be a powerful data acquisition tool for saving energy and communicationresources in networks and information systems</p>
<p>[8] “Design and Implementation of a Low Power Wireless Sensor Network DataAcquisition System”</p>	<p>Fangsuo Wu, Xiaogang Hu, Jianhua Shen</p>	<p>Em-Stack is expected to be a simple, universal and low power WSN protocol suitable for simple applications withlimited system resources. In order to achieve the target, we use CC2430 and design succinct software architecture. Thefunction test result show that Em-Stack works smoothly; the power test result shows that the leaf node in Em-Stack consumes less power than that in Z-Stack.</p>	<p>Nowadays the WSN protocol stack based on ZigBee,such as Z-Stack, has a good performance in many respects</p>
<p>[9] “A Low-Power, Wide-Dynamic-Range Semi-Digital Universal Sensor Readout Circuit Using Pulsewidth Modulation”</p>	<p>Julia Hsin-Lin Lu, Student Member, IEEE, Mac Inerowicz, Sanghoon Joo, Student Member, IEEE,</p>	<p>Describe an integrated universal sensorreadout circuit compatible with a wide range of resistive and capacitive sensors. The implemented highly linear pulsewidthmodulator uses low-power low-area CMOS circuits, which are attractive for mobile and implantable applications</p>	<p>present a low-power, low complexity, and wide-dynamic-range universal sensor readout circuit that convertsthe sensing capacitance or resistance changes to digital duty cycles based on pulsewidth modulation</p>
<p>[10] “Multi-FPGA digital hardware design for detailedlarge-scale real-time electromagnetic transientsimulation of power systems”</p>	<p>Yuan Chen, Venkata Dinavahi.</p>	<p>Hardware emulation on FPGAs makes it possible to overcome many of the limitations related to the real-timeEMT simulation of large-scale power systems by allowingthe user to achieve such level of detail that is seldomachieved on traditional sequential processors. This paperproposed a multi-FPGA design based on the functionaldecomposition methodology for hardware emulation ofsystems using detailed modelling of the individualcomponents.</p>	<p>In the wake of increased load growth, interconnectivity andstressful operating conditions, many utilities worldwide are employing large-scale real-time electromagnetic transient(EMT) simulators for planning</p>

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IV. EXISTING SYSTEM APPROACH

IoT is a most important to support service composition with various application. The architecture of IoT has three layers:

- 1) Perception layer
- 2) Network layer; and
- 3) Application layer.

The design of data acquisition is applied to the perception layer of IoT. The perception layer of IoT is mainly composed of sensors, RFID readers, cameras, M2M terminals, and various data terminals. The data acquisition interface is responsible for the collaboration of various environments and collection of sensor data. Examples of such a workflow which include a water environment monitoring systems that acquire sensors to detect pollution and water quality position. Water environment monitoring is most important in IoT application fields, where the complex water quality information, is used to calculate the water environmental quality at the same time. There are few data collection devices that are dedicated to water quality monitoring system on the market. Such devices can ensure high speed of data acquisition for multiple sensors and adapt to complex and various sensor types well. Therefore design and implement a WSN data acquisition can be used for water environmental monitoring.

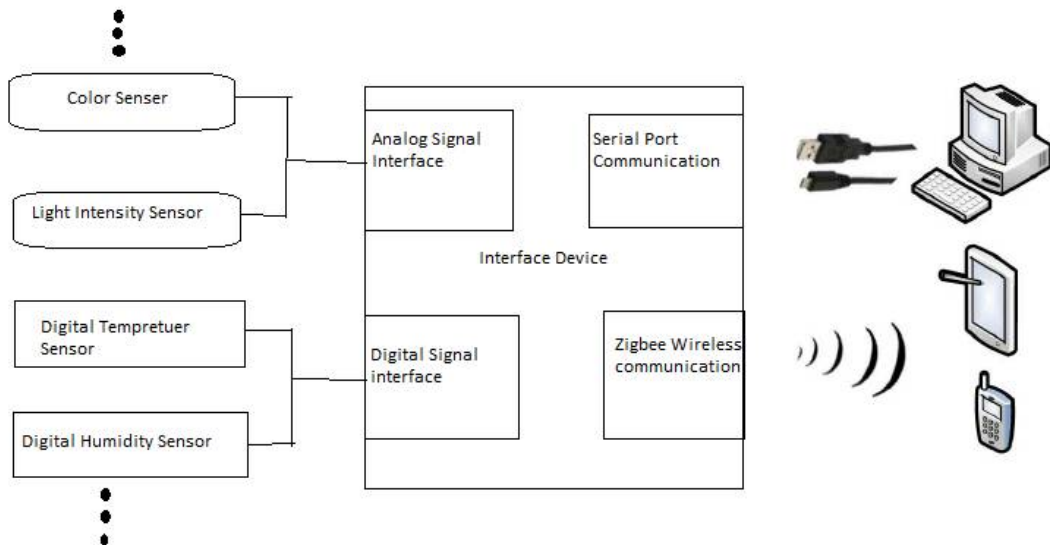


Fig1: Application and working diagram of the reconfigurable smart interface DEVICE

V. FPGA AS RECONFIGURABLE PLATFORM

Reconfigurability is change, particularly delicate change, whereby through the control of bit successions we can alter the properties of segments, and at times de ne frameworks themselves. One can outline frameworks for reconfigurability (the craft of designing degrees of flexibility into implanted frameworks), so clients expecting this reconfigurability can abuse it. We focused on essential recon gurable stages advancement devices and applications As we examined, reconfigurability can be both dynamic and versatile. Reconfigurability alludes to uncommon components that can be changed (to incorporate dynamic and incomplete reconfigurability), while adaptively addresses the behavioral builds that illuminate how recon gurable elements may best be misused in live utilize conditions. Reconfiguration approach totally rely on handling components by dentition allude to the segment in the Wireless sensor hub that plays out the genuine information preparing operations and controls the whole framework exercises. An average case of handling components utilized in Wireless sensor hubs are microcontrollers, advanced sign processors and Field programmable entryway clusters, and so forth. It can be contended that the degree or reach out of WSN reconfigurability depends to a great extent on the way of the preparing components they coordinate. Incomplete

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Reconfiguration is a component of cutting edge FPGAs that permits a subset of the rationale fabric of a FPGA to progressively reconfigure while the rest of the rationale keeps on working unperturbed. Xilinx has given this component in their top of the line FP-GAs. Fractional Reconfiguration of FPGAs is a convincing configuration idea for universally useful recon gurable frameworks for its exhibity and extensibility. Run-time reconfiguration is denned as the capacity to alter or change the practical con guration of the gadget amid operation, through either equipment or programming changes. This is a FPGA highlight that is critical to interchanges, military, and purchaser applications as a way to deal with lessening segment number and power utilization, by reusing the same FPGA for a few capacities. The essential focal points of run-time recon guration in gadgets are decreased force utilization, equipment reuse, outdated nature shirking, and exhibity. The expenses of run-time reconfigurability are in outline and execution multifaceted nature both in design dentition and in coding and test. To metrically evaluate the upsides of the run-time recon guration approaches, the upgrades in force decrease and exhibity ought to be contrasted with the relating increments in configuration unpredictability.

VI. SYSTEM ARCHITECTURE

The signal conditioning circuit is used to connect the sensor to the microcontroller is known as Smart Transducer Interface Module(STIM). STIM is named as TIM Transducer Interface Module. TIM comprises the circuit associated with the sensor, ADC and DAC channels. The FPGA kit has 4 channels of ADC and one channel of DAC, single chip, and single -supply low power 8-bit CMOS data acquisition device having four Analog inputs, one analog output and a serial I²C bus interface. The main functions of this device include analog input multiplexing, on-chip track, 8-bit analog to digital conversion, and 8-bit digital to analog conversion. Two sensors connected to the two different channels of ADC. The TIM are implemented with two status registers for each transducer channel connected with it they are Condition Register which contains the current state of the attributes being reported. The second type of register is the event register. Both registers are 32-bit in length. The functional blocks of TIM are sensors, ampli, ADCs and TEDS.

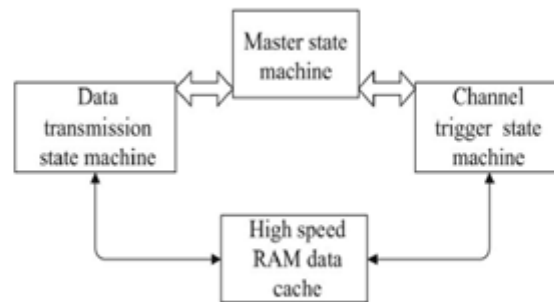


Fig 2: STIM state machine design structure diagram

VII. PROPOSED SYSTEM APPROACH

To connecting WSNs to the Internet is simple in the three main approaches, differing from the WSN integration degree in the Internet structure. Currently adopted by most of the WSNs accessing the Internet, and presenting the highest abstraction between networks, the proposed approach consists of connecting both independent WSN and the Internet through a single gateway. Showing an increasing integration degree, the second approach forms a hybrid network, still composed of independent network, where few dual sensor nodes can access the Internet. The last approach are inspired from current WLAN structure and forms a dense 802.15.4 access point network, where multiple sensor nodes can join the Internet in one hop.

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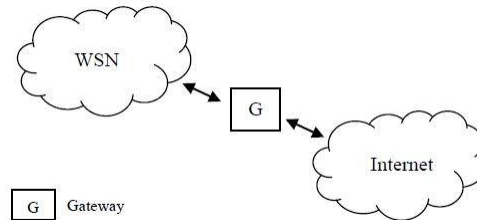


Fig 3: Independent network.

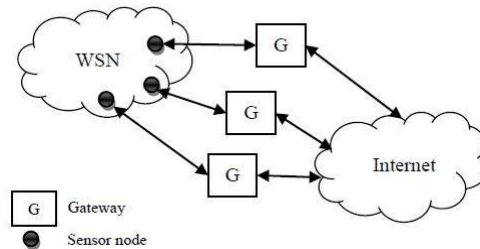


Fig 4: Hybrid network.

The approach presents a single point failure due to gateway uniqueness. Gateway dysfunction would break down the connection between both

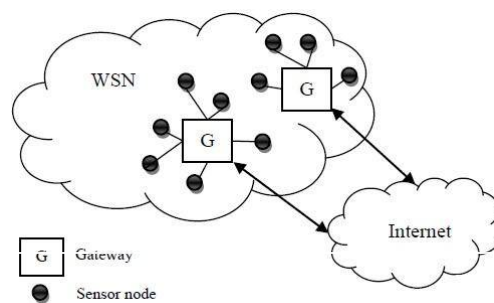


Fig5: Access point Network.

With some gateways and access points, the second and third scenarios do not present such weakness. To ensure network robustness, they should consequently be preferred, if the application supports this type of network structure. The choice between both remaining integration approaches in WSN application scenario. Allowing covering important distances, the second approach can be envisaged for WSNs organized in mesh topology. The advancements in Internet technologies and WSNs, a new trend is forming in the era of ubiquity. IoT is all about physical items talking to each other, where machine- to- machine communications and person-to-computer communications will be extended to things. Key technologies that drive the future of IoT are related to smart sensor technologies including WSN, nanotechnology, and miniaturization. Since IoT is associated with a large number of wireless sensor devices, it generates a huge data. Sensor data acquisition interface equipment is one of the key parts in IoT applications. Data collection is the essential application of WSN and more importantly it is the foundation of other advanced applications in IoT environment. The design of data acquisition inter-face is mainly applied to the perception layer of the IoT. The perception layer of IoT is mainly included of sensors, RFID readers, cameras and various data collection terminals. The

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data acquisition is responsible for collaboration of various environments and collection of sensor data. Examples of such a work include a water environment monitoring system that adopts sensors to detect pollution and water quality.

VIII. EXPERIMENTAL SETUP

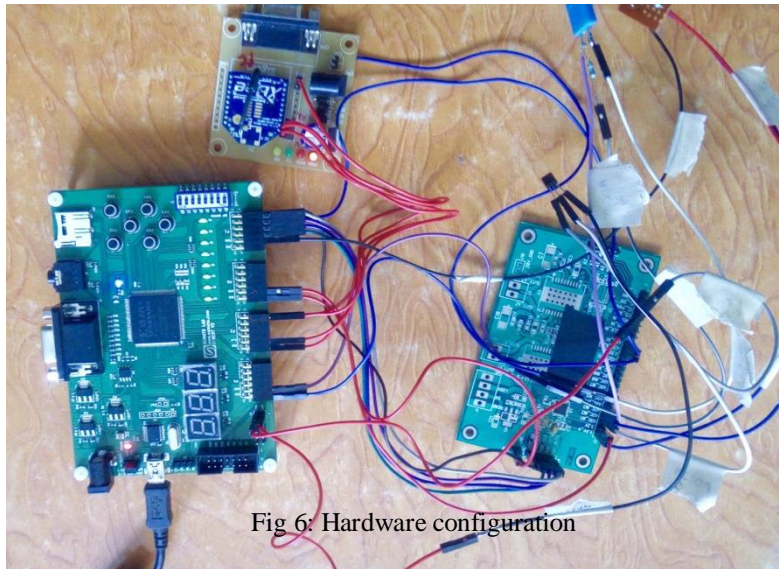


Fig 6: Hardware configuration

Above figure shows the hardware configuration of the project. In this project three sensors namely temperature sensor, humidity sensor and light intensity sensor are interfaced with ADC 12 bit SPI (Serial peripheral interface). The analog to digital converter is interfaced with FPGA which is used as a reconfigurable platform to monitor the data sensed by the sensors. FPGA receives the data on the communication channels which are provided on Spartan 3A development board. ZigBee is connected to the I/O port of FPGA to transfer the collected data towards the control room through wireless communication. The transmitted data is then received by receiver ZigBee which is connected to the computer. The collected data is then uploaded on internet.

IX. RESULT AND DISCUSSION

A sensor interface gadget is essential for gathering the information detected by the sensor and sending that information over IoT environment. Be that as it may, there are a few constraints of utilizing broadly useful processors/controllers as testing rate, signal sort and current associate numbers are not permitted by such gadgets. In the IoT environment every sensor interface to the gadget requires intricate and bulky information accumulation program code. To conquer such issues miniaturized scale controller unit is utilized as a principle interfacing gadget. This MCUs are generally simple to actualize on account of the upside of low power utilization and minimal effort. However, the primary downside of MCU is that it performs operation with the assistance of intruders on which makes sensor hub information securing serially and henceforth it turns out to be generally moderate.

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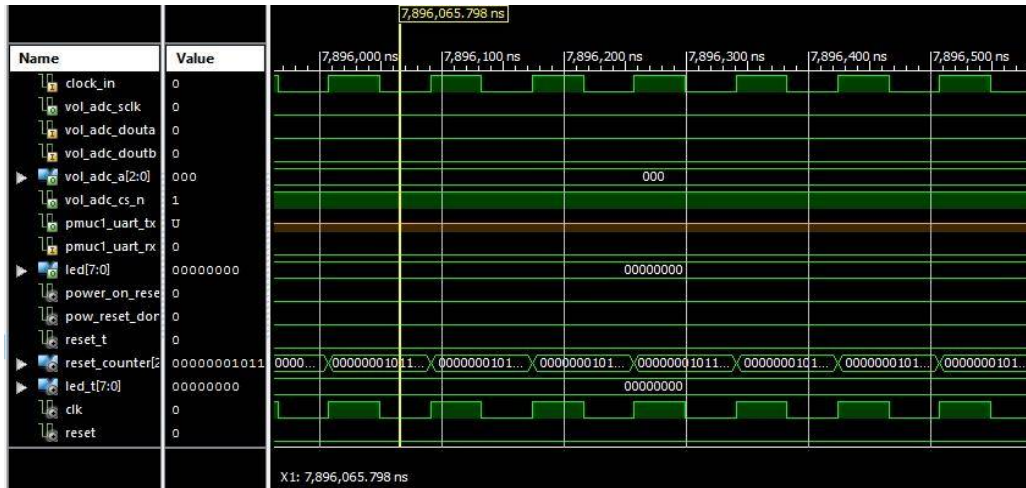


Fig 7: Simulated Waveform.

To overcome the problem of writing complicated and cumbersome data program code existing system adapted CPLD (Complex programmable logic design) as a core controller. It is used to control data acquisition, processing and transmitting intelligently and make some pre-processing work for the collected data. CPLD has restrictive structure consisting of one or more programmable SOP logic arrays feeding a relatively small number of clock registers. Proposed system in this project used FPGA as a core controller which not only provides reconfiguration but also shows maximum exibility. Since we have used FPGA as a recon gurable platform, only selected LUT's of FPGA are programmed and hence the power consumption by the proposed system is also minimized.To interface sensors with FPGA we have written a VHDL program on xilinx ISE design suit 14.4, the simulated result of the program. We have also synthesized and implemented the program on Spartan 3A FPGA. The working of proposed system is tested and the output result of the system was noted with the help of Docklight software.

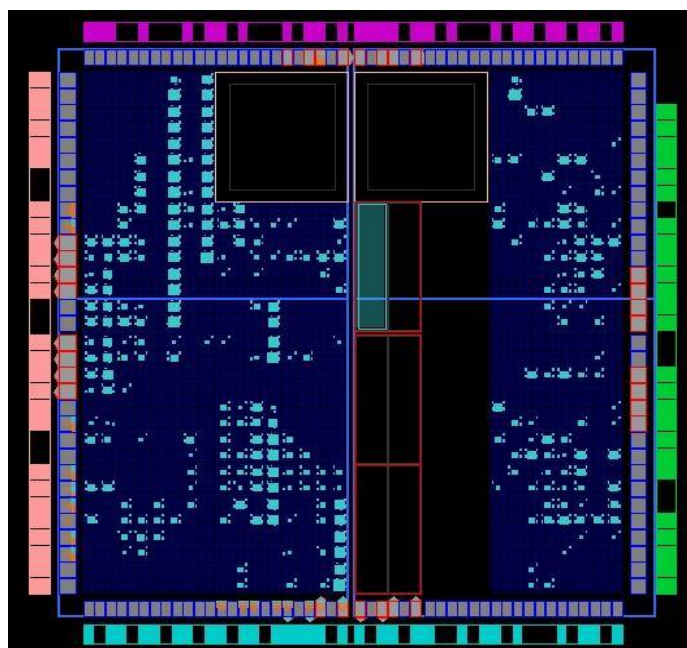


Fig 8: DFPGA Floor planning.

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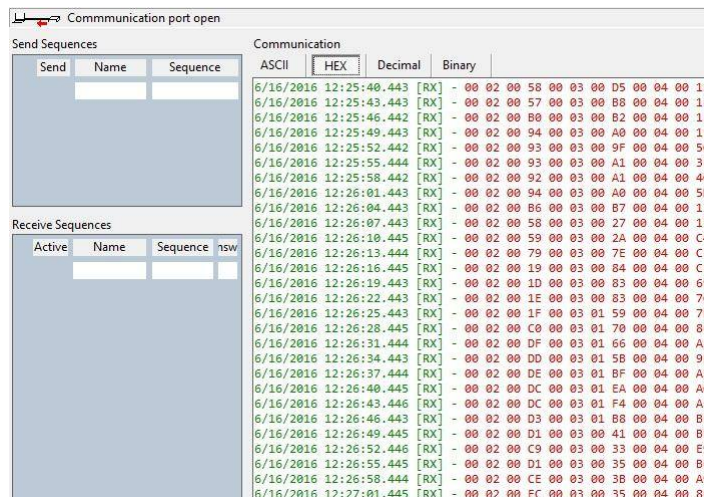
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Motivations for doing oorplanning can be the desire for: a faster running FPGA design, a design meeting timing closure more consistently or a reduction in tool time. During the oorplanning process we can lock parts of the RTL structure or physical parts (e.g. RAM, LUTs or ip ops) in certain FPGA fabric locations. However gure 5.4 shows the complete utilization of the FPGA. It shows the total number of LUT's and Flip-ops used for the implementation of the program. Since only 19% of LUT's and 26% of ip- ops are use in implementation, the power consumption of the overall system is minimized.

Device Utilization Summary			
Logic Utilization	Used	Available	Utilization
Number of Slice Flip Flops	379	1,408	26%
Number of 4 input LUTs	276	1,408	19%
Number of occupied Slices	311	704	44%
Number of Slices containing only related logic	311	311	100%
Number of Slices containing unrelated logic	0	311	0%
Total Number of 4 input LUTs	367	1,408	26%
Number used as logic	274		
Number used as a route-thru	91		
Number used as Shift registers	2		
Number of bonded IOBs	18	108	16%
IOB Flip Flops	8		
Number of ODDR2s used	1		
Number of BUFGMUXs	3	24	12%
Number of RAMB16BWEs	1	3	33%
Average Fanout of Non-Clock Nets	2.84		

Fig 9: FPGA Utilization.



Send	Name	Sequence	Communication
			6/16/2016 12:25:40.443 [RX] - 00 02 00 58 00 03 00 D5 00 04 00 12
			6/16/2016 12:25:43.443 [RX] - 00 02 00 57 00 03 00 B8 00 04 00 13
			6/16/2016 12:25:46.442 [RX] - 00 02 00 B0 00 03 00 B2 00 04 00 13
			6/16/2016 12:25:49.443 [RX] - 00 02 00 94 00 03 00 A0 00 04 00 15
			6/16/2016 12:25:52.442 [RX] - 00 02 00 93 00 03 00 9F 00 04 00 50
			6/16/2016 12:25:55.444 [RX] - 00 02 00 93 00 03 00 A1 00 04 00 3F
			6/16/2016 12:25:58.442 [RX] - 00 02 00 92 00 03 00 A1 00 04 00 40
			6/16/2016 12:26:01.443 [RX] - 00 02 00 94 00 03 00 A0 00 04 00 5D
			6/16/2016 12:26:04.443 [RX] - 00 02 00 B6 00 03 00 B7 00 04 00 11
			6/16/2016 12:26:07.443 [RX] - 00 02 00 58 00 03 00 27 00 04 00 13
			6/16/2016 12:26:10.445 [RX] - 00 02 00 59 00 03 00 2A 00 04 00 C4
			6/16/2016 12:26:13.444 [RX] - 00 02 00 79 00 03 00 7E 00 04 00 C1
			6/16/2016 12:26:16.445 [RX] - 00 02 00 19 00 03 00 04 00 04 C1
			6/16/2016 12:26:19.443 [RX] - 00 02 00 1D 00 03 00 03 00 04 00 69
			6/16/2016 12:26:22.443 [RX] - 00 02 00 1E 00 03 00 03 00 04 00 7C
			6/16/2016 12:26:25.443 [RX] - 00 02 00 1F 00 03 01 59 00 04 00 78
			6/16/2016 12:26:28.445 [RX] - 00 02 00 C0 00 03 01 70 00 04 00 86
			6/16/2016 12:26:31.444 [RX] - 00 02 00 DF 00 03 01 66 00 04 00 A2
			6/16/2016 12:26:34.443 [RX] - 00 02 00 DD 00 03 01 5B 00 04 00 9E
			6/16/2016 12:26:37.444 [RX] - 00 02 00 DE 00 03 01 BF 00 04 00 A1
			6/16/2016 12:26:40.445 [RX] - 00 02 00 DC 00 03 01 EA 00 04 00 A0
			6/16/2016 12:26:43.446 [RX] - 00 02 00 DC 00 03 01 F4 00 04 00 A3
			6/16/2016 12:26:46.443 [RX] - 00 02 00 D3 00 03 01 B8 00 04 00 BF
			6/16/2016 12:26:49.445 [RX] - 00 02 00 D1 00 03 00 41 00 04 00 BE
			6/16/2016 12:26:52.446 [RX] - 00 02 00 C9 00 03 00 33 00 04 00 E9
			6/16/2016 12:26:55.445 [RX] - 00 02 00 D1 00 03 00 35 00 04 00 B6
			6/16/2016 12:26:58.444 [RX] - 00 02 00 CE 00 03 00 3B 00 04 00 A9
			6/16/2016 12:27:01.445 [RX] - 00 02 00 EC 00 03 00 35 00 04 00 8E

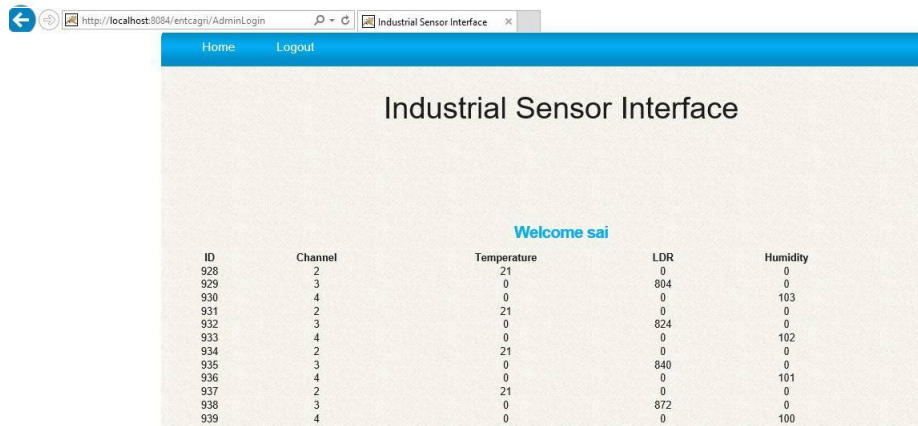
Fig 10: Generated Output data.

The output of sensor which is collected in physical environment and monitored by FPGA. To display the output result we have used Docklight terminal software which is a testing, analysis and simulation tool for serial communication protocols (RS232, RS485/422 and others). It allows to monitor the communication between two serial devices or to test the serial communication of a single device. We can see that temperature, LDR and humidity sensors are connected to the channel 2,3 and 4 respectively of the FPGA. the data transfer by transmitter ZigBee connected to the FPGA is collected by receiver ZigBee and can be monitored on CPU installed in control room. The output data sense by the sensor and transmitted by the FPGA with the help of ZigBee Uploaded on the internet. To represent the output data local server is developed by using eclipse IDE.

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The screenshot shows a web browser window with the URL `http://localhost:8084/entcagri/AdminLogin`. The page title is "Industrial Sensor Interface". The interface includes a navigation bar with "Home" and "Logout" links. Below the navigation bar, there is a "Welcome sai" message. The main content area displays a table with the following data:

ID	Channel	Temperature	LDR	Humidity
928	2	21	0	0
929	3	0	804	0
930	4	0	0	103
931	2	21	0	0
932	3	0	824	0
933	4	0	0	102
934	2	21	0	0
935	3	0	840	0
936	4	0	0	101
937	2	21	0	0
938	3	0	872	0
939	4	0	0	100

Fig 11: Display of data on internet.

Advantages

1. Reduced power consumption.
2. Reduced device count.
3. More efficient use of available board space.
4. System provides run-time recon guration.
5. In-the- eld hardware upgrade and update to remote sites.
6. System provides longevity.

Disadvantages

1. Security.
2. Reliability on FPGA.
3. Data transferring range.

IX. CONCLUSION AND FUTURE SCOPE

The proposed framework shows the Interfacing of recon gurable sensors utilizing FPGA for Industrial WSN as a part of IoT. Framework displays a completely equipment based sensor hub is usage utilizing broadly useful FPGA and ZigBee radio interface. This outline disposes of timing issues connected with interfere driven processor-based WSN hubs and overhead connected with working frameworks intrude on taking care of. The framework can gather the sensor information astutely. The proposed outline is exceedingly good for continuous information checking and fast information procurement framework. The entire framework turns out to be more exible with the assistance of FPGA which incredibly simplifies the outline of fringe circuit. With the assistance of FPGA we ready to actualize the framework on reconfigurable stage. Due to recon gurable framework just chose LUT's of FPGA are programed consequently the force utilization of framework is minimize. The force utilization of the framework is additionally minimized as contrast with existing and past framework because of FPGA. The planned framework can be utilized as a part of di erent applications. It is pertinent for various fields for checking and controlling the sensor information by setting the required reference purpose of the sensors.

FUTURE SCOPE

Future innovative work may keep on being centered around further enhancements of the unwavering quality and responsiveness, and innovation headways on vitality sparing, power administration, adaptation to internal failure, and

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savvy directing. Also, programming tried can be created to assess different elements of WSNs, for example, the self association, self mending ability. With the utilization of machine to machine innovation and utilizing GPRS association the information can be seen from any part of the world Even if the GPRS association fizzles the sys-tem will be controlled at the plant/plant and even the information will be logged to break down the issue later. The further change can be made by making the utilization of changes/switches to make a system make furthermore make framework metal secure, the utilization of remote camera can likewise be an additional favorable position for observing. It might likewise be popularized as an includes programming segment to assess the general framework execution, anticipate potential issue, and star vide proposals for meeting the sought client selectable criteria taking into account the current framework execution. FPGA is utilized just for the checking reason framework can be updated for controlling of information. Additionally, control over remote is still a developing examination region.

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