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Preface

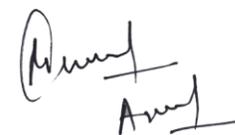
We would like to present, with great pleasure, the inaugural volume-5, Issue-4, April 2019, of a scholarly journal, *International Journal of Engineering Research & Science*. This journal is part of the AD Publications series *in the field of Engineering, Mathematics, Physics, Chemistry and science Research Development*, and is devoted to the gamut of Engineering and Science issues, from theoretical aspects to application-dependent studies and the validation of emerging technologies.

This journal was envisioned and founded to represent the growing needs of Engineering and Science as an emerging and increasingly vital field, now widely recognized as an integral part of scientific and technical investigations. Its mission is to become a voice of the Engineering and Science community, addressing researchers and practitioners in below areas

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Petroleum Engineering	Nuclear Engineering
Textile Engineering	Nano Engineering
Algorithm and Computational Complexity	Artificial Intelligence
Electronics & Communication Engineering	Image Processing
Information Retrieval	Low Power VLSI Design
Neural Networks	Plastic Engineering

Each article in this issue provides an example of a concrete industrial application or a case study of the presented methodology to amplify the impact of the contribution. We are very thankful to everybody within that community who supported the idea of creating a new Research with IJOER. We are certain that this issue will be followed by many others, reporting new developments in the Engineering and Science field. This issue would not have been possible without the great support of the Reviewer, Editorial Board members and also with our Advisory Board Members, and we would like to express our sincere thanks to all of them. We would also like to express our gratitude to the editorial staff of AD Publications, who supported us at every stage of the project. It is our hope that this fine collection of articles will be a valuable resource for *IJOER* readers and will stimulate further research into the vibrant area of Engineering and Science Research.



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A Review: Use of Geo-grid in Construction of Flyover

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Abstract— A pavement structure consists of numerous layers out of which sub-grade plays a vital role for the very first purpose of distributing and transmitting traffic loads coming over it to the strata underneath. What's more if layer of sub-grade in pavement comprises of extensive soil i.e. soil containing montmorillonite mineral, at that point because of changes in water content and consequent swelling and shrinkage that may result into numerous of failure resulting into rutting, bumps, reduction in bearing capacity of pavement. Changing the available soil probably won't be a reasonable alternative, therefore to defeat all these hurdles, use of geo-synthetics is found to be the best solution resulting into better performance by reduction in cost and reduction in vertical deformation of pavement structures over sub grades of shifted strengths. Anyway the choice of stabilizer relies on the sort of sub-grade's soil, sort of soil-improvement wanted, accessibility to stabilizer, ecological conditions, quality needed and toughness of balanced-out layer, various stabilizing procedures, and the most critical is money related factor. Geo-synthetics are generally utilized for some activities in particulars as filtration, partition, safety, drainage, fixing and so on. Especially for the last case, geo-synthetics with extra highlights have been created permitting a changeless checking of the deformations. Future geo-synthesis will be outfitted with such extra capabilities empowering a non-ruinous and changeless observing of structures worked with geo-synthetics. At any rate, geo-grid fortified construction represents momentous favorable circumstances regarding natural and monetary perspectives against the structures. It is likewise outstanding from field tests and wide-extend testing that geo-synthetic fortified contractions have a lot higher bearing strength than anticipated and that the distortions are too low than expectation. This paper went through the craft by different analysts on the strategies of adjustment of soil & utilization of geo-manufactured materials in quality improving.

Keywords— *Geo-grids, Geo-synthetics reinforcement, Sub-grade, Stabilization and improving strength of soil.*

I. INTRODUCTION

The fortification of soil has a long convention. Effectively 3500 years prior, reed mats were utilized to stabilize sub-structure and the walls constructed with brick, as it was at the point comprehended that both brickwork and soil had almost no elasticity and fortification component were expected to incite pliable powers into their development for adjustment. "In the most recent decades starting in the 70's, nonwoven and woven textures are up till now frequently used in highways and rail road development functioning as divider. They arrest granular and coarser material, put on the agreement to build the basecourse, being blended and punched into, with better-grained sub-soil after some time. In the meantime they additionally fulfill a fortification capacity, since, similar to a tie-bar, they decrease". The solidness of the geo-synthetic performs a critical job. Higher the pliable immovability of geo-synthetic, the more noteworthy the impact portrayed.

In India vast zone is involved by Regur Soil, which assimilates water, swells, turnout to be delicate and loses quality. These soil are compressible in all respects effectively when undergoes wetting: and when undergoes drying, it recoils in volume and creates tremendous breaks. These belongings result less fortune soil for development service. Worldwide, strategies are utilized for little delicate soil adjustment utilizing different admixtures. Substantial lab as well as field tests have been done by numerous scientists and have demonstrated compact outcomes for utilization of such extensive soil after adjustment with added substances for example, sand, residue, silt, cement oven dust, lime, geo-synthetics and so on. On numerous building sites, great quality materials and added substances are inaccessible or there is scarcity of these. Just because of this trouble, engineers might be compelled to explore conceivable plans utilizing inadequate materials, business development aid, and imaginative structure practices. One class of business development help is man-made created material i.e. geo-synthetics, produced using different kind of polymers and which are used to upgrade geo-technical belongings of soil. Different sorts of geo-synthetics enumerated are as below :- geo-net, geo-membrane, geo-textiles, geo-foam, geo-grid, geo-composites, and so on. The polymeric idea of the items makes them reasonable for use in the sand where large amount of sturdiness are required. Geo-synthetics play out numerous significant jobs, few of them are as drainage, fortification, moisture barrier, division and filtration.

The structure and development of pavement is very challenging for an engineer over delicate soils. In the accessible writing, Geo-grids are well liked for fortification / incorporation for improving structure's performance. This strategy of fortifying empowers increment in pavement lifespan. In this present investigation, execution of sub-grade soil utilizing geo-grids is considered on various sub-grades with various geo-manufactured fortifications. Determination of CBR parameter is resolved for unreinforced and fortified sub-grade beds within the field as well as in lab differing of soil soaking conditions, differing plasticity of soil and admissible tensile limit of reinforcement. Haas in 1985 demonstrated that versatile pavements can be successfully strengthened with the chemical compound geo-grid. This includes black top thickness savings from fifty millimeter to a hundred millimeter, or the adaptability to hold 2 or 3 times a lot of traffic masses for equivalent thicknesses. Tiny & Nejad researched the impact of geo-grid fortification of an versatile asphalt pavement of base with granular material, made on sandy soil. They comes out with this conclusion that geo-grid may extensively diminish the changeless deformation inside the pavement by 0.4 - 0.7 times.

Hence, the advancement of materials composite in nature, nonwoven texture and a versatile support item, for example, a geo-grid, results critical decrease in settlements and enhancing designing property of soil.

II. TYPES AND APPLICATIONS OF GEO-SYNTHESIS

Geo-synthetics incorporate a substantial variety of items made out of polymers and are intended to solve numerous Geo-technical & transportation issues. Geo-synthetics, as relevant to adaptable flexible pavement systems, have been extensively utilized as of late. Geo-synthetic strengthening is normally set in the intercourse between the total base course and the sub-grade. Well all is said in done, geo-synthetics are arranged into Geo-materials (woven and non woven), Geo-frameworks (Flexible and Rigid), Geo-nets, Geo-strips, Geo-membrane and so forth. Numerous utilization of geo-synthetics in partition, separation, fortification, filtration, seepage, and regulation has been accounted in writing. One of the primary applications being is fortification in improving delicate soil. The consideration of support includes quality and enhances CBR of composite soils.

2.1 Geo-grid

Geo-grid constitute a tinny however quickly developing fragment of the geo-synthetics territory. As opposed of being a non-woven (or weave material), woven (or material - like) fabric, geo-lattices are plastics shaped into an extremely open, matrix like design, i.e., they have passage more noteworthy than 63.5cm to permit bond with nearby soil, shake, earth and many more nearby materials. Frequently they are stretched out in a couple of bearing for enhanced physical property. Independent from anyone else, there is a rundown of use in territories like Steepened Inclines, Railroad tracks, Air-Plane Terminal Runways, Earth Holding Divider Development, Under Parking Areas, Rock development Streets, dam and so forth. It works in several dissimilar ways namely separator and strengthener by which poor soil get improved with Geo-grid and also expand the solidness and burden conveying limit of soil by methods for frictional interconnect between Geo-network material and soil.

2.2 Soil Reinforcement

So as to provide fortification to soil following three strategies are as - the very first commences by physical technique which is finished with shivering, solidifying, thermoelectric and defrosting. Next one is done with mechanical strategy utilizing thready material extracted from Geo-manufactured family [Geo-grids, Geo-textiles, Geo-composites, Geo-net, and Geo-cell]. And, last one commences by compound strategy utilizing traditional materials, catalysts & polymeric tars. Strengthening the soil by a few previously mentioned procedures are very old and viable.

III. LITERATURE REVIEW

Tiwari and Vyas contemplated the impact of geo-grid reinforcement on quality conduct of regur soil. The soil sample was gathered from Govindpura near Bhopal and as per ISC, named as Clay of Intermediate Compressibility (CI). Laboratory CBR tests are directed with and without reinforcement. The geo-grid sheets are set in single covering at various depths (i.e. 0.2H, 0.4H, 0.6H and 0.8H) from top of specimen. It was seen that geo-grid set at 0.2H depth demonstrated most extreme improvement. The CBR value increased from 4.77% to 13.13% for soaked condition and from 6.53% to 19.66% for un-soaked condition.

Ghate Sandeep Hambirao instructed for soil stabilization exploitation waste-cut elastic tire clips. Construction of building structure on delicate soil is taken into account as insecure. Improvement of bearing capability of the bottom will be with a range of ground improvement procedures. Within the gift examination, cut elastic from waste can taken as concerning the

strengthening material because the coupling specialist that was indiscriminately enclosed within the soil at 3 very surprising pieces of fiber content, i.e. five-hitter 100% by weight of soil. The matter has been centered on quality of the soil fortified with indiscriminately cut elastic tire. The samples were exposed to CBR VALUE and unconfined tests.

Kumar directed an examination on utilization of construction and dismantled waste. He comes out with the result that construction and dismantled squander blocks, concrete, tiles and so on is additionally utilized for mechanical adjustment of terribly poor soils, by including further cementitious materials or business stabilizers authorized by IRC. The construction and dismantled waste matter shall have degree as per IRC. On the other hand, it ought to be utilized mostly as soil while doing testing on leach ability, sturdiness furthermore to unconfined compressive quality. At the time when agreeable path results, this sort of blended materials is additionally utilized for adjustment of poor soil alone or by intermixture with some reasonable soils or with appropriate added substances. The UCS obtained shall be zero.8 MPa for sub base and one.75MPa for base course as per revised IRC.

Adams studied the effect of Tri-axial geo-grids on the CBR value of soil. The soil sample was taken from Kumasi, Ghana and was classified as sandy silt (SM) as per USC. Two different types of triaxial geo-grids are used, and these are TriAx Tx 130s and TriAx Tx 170 and both are placed at the layer 3 level. An increase of 11% and 112% was observed for soaked and unsoaked condition when TriAx Tx 130s was placed at layer 3 level, whereas this increase was 72% and 135% respectively for TriAx Tx 170. It was concluded that TriAx Tx 170 shows a much greater hike in CBR value especially under the soaked condition where its effect was about 1.6 times to that of the TriAx Tx 130s.

Dr. D.S.V. Prasad composed a model of flexible pavement consisting a 10 layer compacted soil sub-grade of 500 mm at bottom which is highly sensitive to swelling and shrinkage and a 2 layered drainage course i.e. sub-base of gravel, each of being 70 mm thickness and well compacted providing a reinforcing film like, chicken mesh coated with bitumin, Geo-grid, bamboo coated with bitumen mesh for fortification with plastic waste and rubber tyre waste was then spread throughout equally. WBM layer of 7.5 cm thick two in nos., well compacted, was laid on the drainage layer material. In order to perceive the foremost alternative reinforcement in flexible pavement a test was performed named as Cyclic Plate Load test. Test outcomes portrays that the elastic and total distortion estimation of the adaptable asphaltic pavement are declined by allocating various material of strengthening. Max. load conveying limit for geo-grid reinforcement comes out to be higher for lesser value of rebound deflection succeeded by any other strengthening material provided. As Crafted by the creator, basically it is about the utilization of geo-grid alongside other fortifying components like waste plastic; bamboo mesh.

N. Vijay Kumar mentioned the properties of business waste (slag) fortify plastic composites. An honest deal of waste is formed by industries which they're going to stack on soil. Government policies and laws, force US to seem for picks. Researchers try to utilize these wastes as reinforcement within the composites. Dross is associate industrial waste bolstered in plastic composites. The stick has been wont to study the friction and wear behaviour of the compound composites. The damage and tear loss and constant of friction are premeditated against the traditional masses and slippy speeds. Results of graphical illustration depicts that with the rise in load, weight loss decreases and with the increase in slippy speed, weight loss conjointly increases.

Kumrawat applied laboratory study on the performance of soil consisting high amount of montmorillonite mineral which is treated with carbide residue (CCR) and stone mud. They readily take a look at sample by intermixture stone mud and carbide residue (CCR) combined in varied share with Mary soil. They conducted varied take a look at like cosmic radiation, UCS etc. On the take a look at sample and finished that the mix of equal quantity of stone mud and carbide residue (CCR) (10%-10%) is simpler than the edition of stone mud and carbide residue individual in dominant the swelling behavior of black cotton soil.

IV. CONCLUSION

Comparisons between reinforced and unreinforced embankments showed the effectiveness of geo-synthetic reinforcement for alleviating vehicle bumps, increasing bearing capacity of sub-grade material, decreasing asphalt thickness, increasing CBR value, stiffness.

- A soil reinforced with geo-grid comes out to be well built & rigorous when laid in several thicknesses and turns out with higher quality than the indistinguishable soil fortification without geo-grid.
- The tensile capacity and intercourse of reinforcement comes out with greater soil's resistance against penetration, separation, ruts and cracking etc.

- With the implementation of higher grid capacities and lower fines content, higher CBR values are observed.
- The performance of soil under soaked situation can be escalate by adopting geo-grid.
- In comparison to traditional solutions, geo-grid reinforced construction presents stunning merits concerning economic and ecologic aspects.

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At-Speed test Prominence

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Abstract— With the remarkable scaling down of technology, test engineers are encountered with new challenges. With the reduction technology moving down to Deep Submicron level, the digital designs are moving closer to the probability of defects related to time. The traditional Stuck-at tests and IDDQ tests can no more detect few distinctive faults which may be occurring due to issues related to timing of the signal. The defect spectrum is thus broadened by the inclusion of other types of faults such as high impedance shorts, in-line resistance, and cross-talk between signals. This paper proposes the use of At-Speed test which is better suited to detect the new types of failures that occur in a digital circuit due to its complex design. The use of At-speed test ensures the timing reliability of the chip after manufacturing thereby reducing DPM (Defect per million) rate. At-speed tests when added with the traditional stuck-at tests, guarantees maximum fault coverage and reduced DPM rates (@30 to 70%). Though At-speed testing is not a new concept and few ASIC vendors have been using this, they have been using functional test patterns to create them which are a very tedious and time consuming routine. Diagnosing the failure source also becomes difficult with the failure of functional patterns. This paper discusses about the fault models provided by industries leading ATPG tools that targets the At-speed failure.

Keywords— At-Speed test, functional test patterns, fault coverage, Stuck-At-Test, IDDQ Tests.

I. INTRODUCTION

A physical defect within a circuit or a system is termed as Fault. A fault may cause a system failure or sometimes may not affect the system at all and goes unnoticeable. A fault that results in an incorrect state of the circuit generates an Error. This error deviates the entire system to work as per its specified design and the design fails in its functionality. This is called the failure of the system. Hence the failure of a system is caused by an error in the circuit and the root cause of this error may be a small fault in the smaller abstraction levels of the circuit. Thus identifying and fixing every single fault is very important. A scan test using Automatic Test Pattern Generation (ATPG) is done which detects any manufacturing defects in the circuit. The Test operates on two modes, A shift mode and Capture mode. In the shift mode, all sequential elements are connected as shift registers. This mode is used to control the circuit and observe the result. Whereas in the capture mode, the values stored in the sequential elements are propagated from the source and through the functional logic to the sink. Defects are broadly categorized as follows:

- a) Functional defects
 - Circuit open
 - Circuit Shorts
- b) IDDQ defects
 - CMOS Stuck-on
 - CMOS Stuck-open
 - Bridging
- c) At-Speed defects
 - Slow Transistors
 - Resistive Bridges

1.1 Stuck at Fault Model

This comes under functional defects which are caused due to shorts and opens in the device interconnects. This model assumes only one faulty input for every single gate. This model alone cannot cover several other kinds of defects present in the circuit.

1.2 Bridging Fault model

In this model, it is assumed that two signals are connected together, when they should not be. This kind of fault results in Wired-and or wired-or logic. Bridging to VDD or VSS becomes analogous to stuck-at fault model.

1.3 Transistor Faults

This model generalizes defects related to CMOS logic gates and comes under IDDQ defects. At transistor level, a transistor may be stuck open or stuck-short. Stuck-short assumes the transistor to be always conducting and stuck-open condition assumes the transistor to be always non-conducting. The IDDQ test measures the quiescent supply current to detect few failures which are not easily found by functional testing methods.

1.4 Open Fault model

In this model, a wire is assumed to be broken and one or more inputs are assumed to be disconnected from the primary outputs.

1.5 Transition Delay Fault Model

The fault caused due to rise and fall times are called Transition delays, accordingly there are two types of transition faults which are **Slow to Rise** and **Slow to fall**. A stuck-at-0 for slow to rise and a stuck-at-1 for slow to fall may be used. This approach however may not be able to detect accumulated delays throughout a large circuit.

1.6 At-Speed test

This model, which is also the prime area of the study detects the delays introduced by resistive defects. At-speed test is considered a must to maintain acceptable DPPM rates in any nanometre design.

There are two types of at-speed fault models which are widely accepted in Industry today. They are a) The Path delay model and b) The Transition delay model. They both work by generating scan pattern unlike stuck-at-fault model which is a static testing method. This testing consists of two parts, first part launches a logic transition and the second part captures the response. If the transition fails to update within the capture time, we say that the test is failed and the circuit is having At-speed defect.

An example is present below to show how the At-speed test works:

Goal : Propagation from 0 to 1 (Rising Transition)

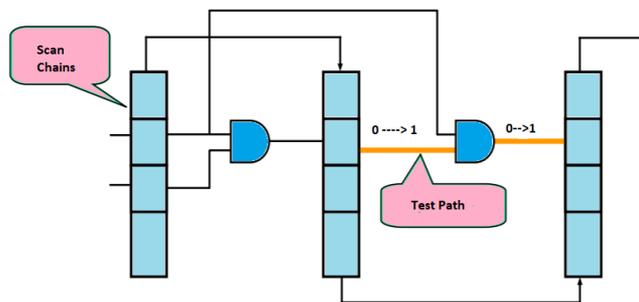


FIG 1: Goal: detect fault from 0 to 1 i.e. in a Rising transition

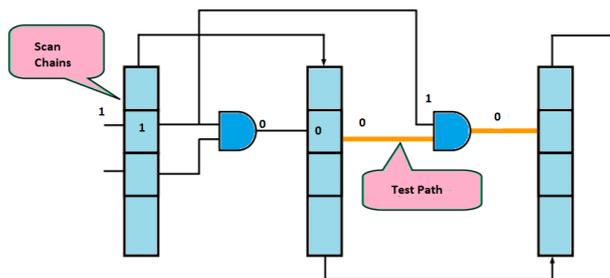


FIG. 2: Define initial values for path sensitization

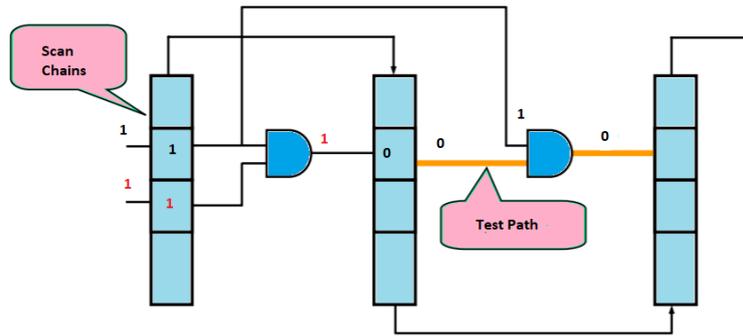


FIG. 3: Define values for launch event (scan chain values are known now).

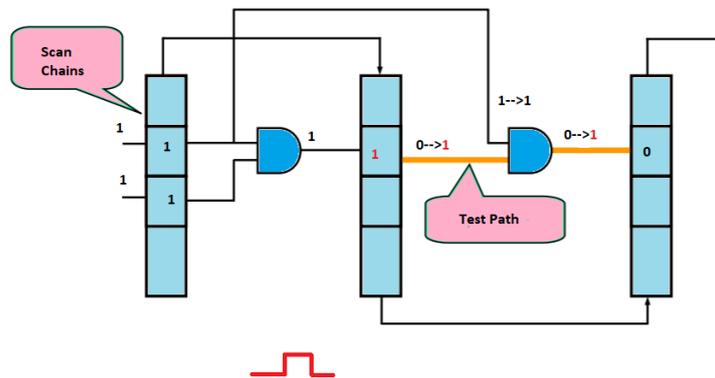


FIG. 4 : Pulse Clock to launch (Value gets changed and starts propagating).

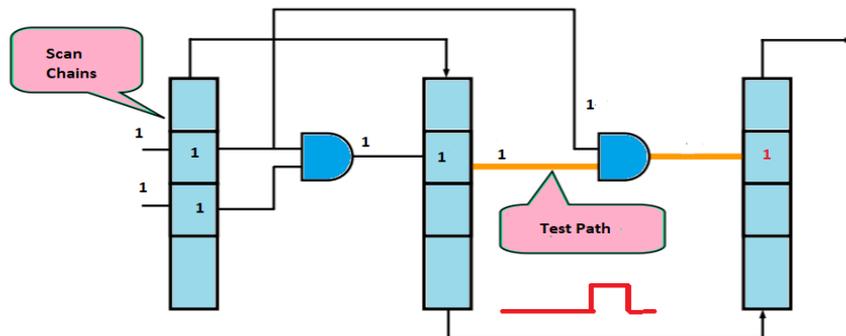


FIG. 5: Pulse Clock to Capture (Value gets propagated)

II. PATH DELAY FAULT MODEL (PDFM)

This model is used to capture small as well as large delay defects which may be present along a path in the circuit. It is preferred to generate tests only for few critical paths as there are enormous test paths in the circuit design and test generation for all the paths is impossible. Only test for critical paths are generated to ensure that the timing behaviour of the signals are working as per the golden reference (i.e. as desired). Path delay fault, models manufacturing defects that can causes cumulative delays along the critical path of the design. The critical path in a design can be identified by using a static timing analysis tool. Test patterns for faults along these critical paths are generated by an ATPG tool. The path delay testing typically is done between start and end of scan cells. Path delay patterns helps to verify the device’s operating frequency and sometimes also for speed binning. By manipulating the launch-capture sequences, device’s can be tested for various speeds.

2.1 Path Delay test implementation

1. A list of all critical path is generated by a Static time Analysis tool.
2. These paths are given as input to FastScan (ATPG tool)

3. ATPG tool also checks the integrity of the path as sometimes STA also reports some false path.
4. After identifying all real paths, the ATPG tool generates test patterns for those paths.
5. A fault list is generated which contains two faults per path, Slow to rise and slow to fall defects.
6. The ATPG tool provides a test coverage number that includes only the loaded path and not all paths in the design.

III. TRANSITION DELAY FAULT MODEL

The faults caused due to Rise and fall time of the signals are called transition delay faults. There is a finite time between the applied input and output response. This area is prone to create faults in the absence of proper time for the settlement of signals. As seen earlier in (2) that there are two kinds of transition faults slow to rise and slow to fall in path delay, but this method is confined to the supplied critical paths unlike transition delay testing which automatically chooses small paths in the design that include the targeted fault location. There are again two kinds of transition tests a) Launch-Off-Shift and b) Broadside. These are described in the below section:

3.1 Launch-Off-Shift

LOS patterns are shown in fig. 6. This approach involves launching during the last shift of scan chain loading. The circuit is then placed to capture mode within no time i.e., the scan enable signal should have the transition very quickly after the last shift of functional frequency so that the logic is allowed to settle before the capture clock occurs. The Scan enable signal should be routed as a high frequency signal. This approach gives highest test coverage and results in faster ATPG run time.

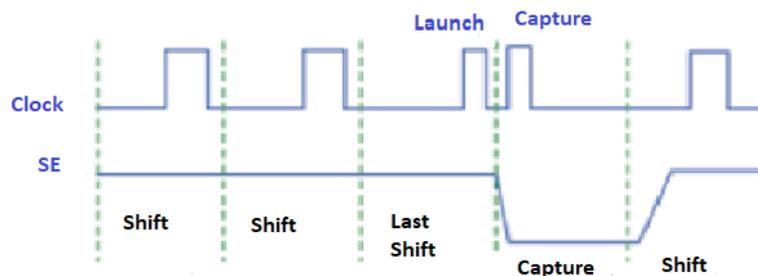


FIG.6: Launch off shift transition patterns.

3.2 Broadside (Launch on Capture)

This approach launches the transition in the functional mode. Before that, first the entire scan data shifting is done in test mode. Later two at-speed clocks are pulsed for launch and Capture in the functional mode. After capturing the values, the data is shifted out slowly in the test mode. This approach is most accepted by many companies for reasons mentioned in (4).

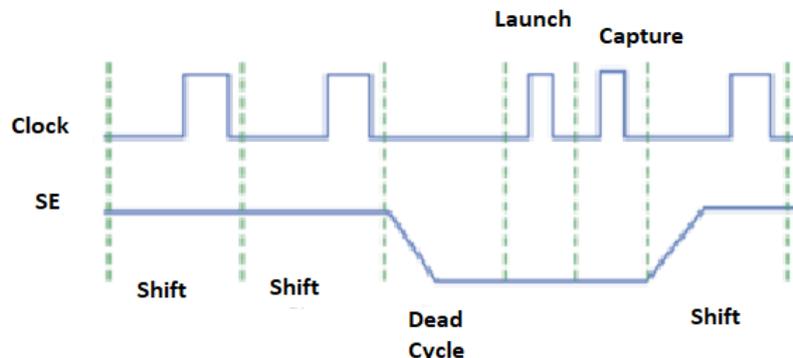


FIG.7 - Broadside (Launch on Capture) transition patterns

IV. LOC / LOS LIMITATIONS AND STRENGTHS

ATPG is much easier with LOS as compared to broadside patterns. LOS achieves higher coverage and escalates the ATPG run time. Even though Broadside approach is more commonly used as compared to LOS. The main reason must be the

difficulty in changing the circuit from shift mode to functional/capture mode between the last shift and functional clock pulse. Another concern with LOS is that it may end up testing non-functional logic at-speed thus resulting in increased yield loss. On the other hand broadside pattern launches the transition in the functional mode of operation thus propagating transitions along real functional paths. In broadside approach, it is sometime required to add some extra cycle which is called as dead cycle to ensure that Scan enable settles completely.

V. OTHER APPROACHES

Manufacturers are continuously on a hunt to improve the efficiency of At-speed scan testing. An approach called Timing aware is used which targets small delay defects. Here each fault is tested by propagating the transition down as slow as possible.

Also few novel techniques like pipelined scan enable is in use that makes LOS more feasible. The pipelined Scan enable adds additional test logic to the design and triggers a change within the local scan enable thus removing the difficult task of treating scan enable as a global clock.

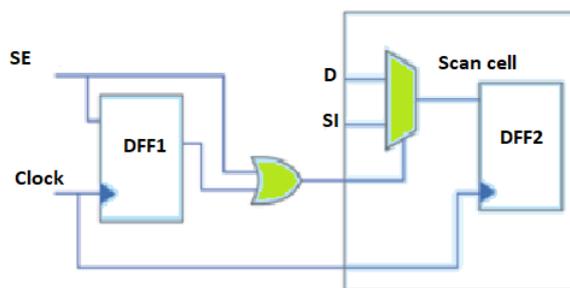


FIG 8 – Pipelined Scan enable

VI. CONCLUSION

We have several other new genres of defect arising due to nanometre process. Thus using only conventional testing approaches may put companies into high risk of increase in DPM levels. At-speed testing is the best solution. LOS and LOC approaches and their pros and cons are discussed. With the help of pipelined scan enable, the difficulties in LOS approach are rendered thus allowing users to assess the trade-offs between the two approaches and decide and plan the best solution for them.

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A Computer-Aided Justice Management System: A prototype for Universities in Uganda

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Abstract— *Justice Management in any organisation is recipe for proper management and organisational prosperity. As error is to human, disputes are inevitable but should be resolved amicably. With a focus on higher institutions of learning justice administration and management is handy in managing competition and so profit maximization especially in the current privatization of higher education. The study aimed at designing a prototype for universities which ultimately helps local citizens to interpret law. Six universities were purposively selected and a cross sectional and design science research methodology employed. The study found that if improved the proposed justice management system would significantly reduce the prevailing challenges of case backlog, losses and postponed hearing records, timely and responsiveness of summons among others. However, in future the small messaging system (SMS) enabled systems could also be considered together with translator into major local languages.*

Keywords— *Justice, Dispute, Rights, Electronic.*

I. INTRODUCTION

Justice and law are concepts that date way back in ancient times; even when Jesus was on planet earth he was presented before law custodians for trial: Herod, Pilate and others. It was later extrapolated during the colonial era to resolve disputes that emerged during demarcation of territories among the British, French and German in Africa (the 1871 Berlin Conference). The practice of law and justice spread sporadically to other forms of life such as families, companies and educational institutions were not spared (McPherson, 2010; Aseem & Mary, 2012).

The proponents of behaviorism such as Mary Packard Follet and Elton Mayo fore saw the flaws the scientific movement suffered then propounded and promoted humanistic thinking. They alluded that human beings need not be considered for the pay tandem with their output but there may be other unavoidable circumstances that would otherwise impede quality output of workers. In the same vain employers used to exploit employees to maximize their profits (McPherson, 2010). With rising intuitive judgments and increased awareness of peoples' rights and privileges, law and justice steadily perforated into society.

The justice management systems traced above started with informal type where judgments was delivered based on ones' own interpretation of the then laws. However, with the introduction of formal learning law was sanctioned as a profession that needed attention and criteria to join it. Till the recent past courts of law have largely depended on paper based records management citing ease to use and relatively reliable compared to their counterpart IT Enabled (Jay, 2016; Michele, 2015; Antoinette, 2009). Despite these, the case attrition and prevalence have remained the biggest challenges. Cases of lost and misplaced files; absence of presiding judicial officers; prolonged judgments; repudiated/denied summons; other circumstances beyond human control have escalated case backlog in most courts of law in Uganda.

Until a decade ago, court cases used to be known for theft, rape and defilement, treason but recently those of corruption and student-institution related disputes have joined the mantle. In olden days, university education was highly respected and smoothly ran. However with the privatization policy of education in Uganda, many universities and tertiary institutions have opened and law programs offered. This has perhaps raised the awareness of many students regarding their rights and privileges which was not the case before. Besides, the growing globalization culture, students get exposed to many unbecoming practices such as cheating examinations, forging academic papers, and impersonation and hacking into confidential institutional repositories.

Various universities in Uganda admit students under certain terms and privileges alongside the requirements given by National Council for Higher Education (NCHE). While some of the privileges have not been forth coming, others are often misused. More so, some terms and conditions are taken for granted to the effect that every student must be aware. On the

other hand, some university staff, especially young entrants error somewhere. Either way a dispute may spark up. More perplexing still, some universities tend to favor students more than their lecturers because students bring money to university treasuries and vice versa. This clearly leaves traces of doubt when justice is due in case a dispute arises. Such scenarios tend to arouse a desire to try computer-aided systems since they rarely lie, and have relatively low error prevalence. Instead of one waiting to be bounced at the next trial, the computer aided judgment can help him prepare a petition or bail in time. Therefore, this article presents a prototype of a justice management system for universities in Uganda. Specifically, the study examined the current justice management system in universities: to collect requirements and then design a prototype to that effect (Kamlesh, 2013; McPherson, 2010).

This prototype would help in saving on a number of dimensions. While a student/concerned citizen can check to see certain crimes with their pertinent penalties, the judicial officials can post their verdicts timely even when they are absent for a planned hearing; hence saving on time and reducing backlog of cases in their jurisdiction.

II. LITERATURE REVIEW

Informational freedom is the general right of access to legal information, that is, information about law and norms for example entering into a contractual relationship or modifying an already existing relationship. The principle of access to legal information is among the foundations of the rule of law (Michele, 2015). United Nations (UN) declared internet Access a basic Human Right. This comes in the midst of political uprisings in the Middle East and North Africa, where we saw governments block Internet access of their countries. According to the report "The Special Rapporteur underscores the unique and transformative nature of the Internet not only to enable individuals to exercise their right to freedom of opinion and expression, but also a range of other human rights, and to promote the progress of society as a whole." No one can deny the tremendous impact ICT's are having in exposing the gross atrocities and lack of civil liberties in the hands of dictatorships and role they have played in the toppling autocratic regimes (Antoinette, 2009).

Information and Communication Technologies (ICT) has influenced all the field of knowledge especially in education and social transformation. Because ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individual needs. ICTs have revolutionized the way people work today and are now transforming education systems. Legal education cannot exist in the vacuum; therefore development in legal education is necessary in accordance with new means of ICTs. This scores the importance of Information and Communication Technologies in disseminating legal information (McPherson, 2010). Effective use of ICTs into teaching-learning process has the potential to engage the students. Various applications of ICTs such as audio-video aid to present practical legal problems can motivate and challenge students and thus enhance their analytical and problem solving skills. But for effective use of ICT in education, there is a need to change the attitude of teachers and students (Fissetis, 2011)

The common ground upon which information and communication technologies (ICTs) and human rights can be analyzed was forged two years ago at the United Nations Millennium Summit, which resulted in a declaration that affirmed common global commitments to the protection of the vulnerable, the alleviation of poverty, and the rectification of corrupt structures and processes – particularly in those countries in which there is a dearth of 'rule of law'. The world's leaders resolved to 'spare no effort to promote democracy and strengthen the rule of law, as well as respect for all internationally recognized human rights and fundamental freedoms, including the right to development (Manikya, 2013).

ICTs support the human rights practice of the prevention of violations in a variety of ways by protection of human rights and the deterrence of violations and conflict prevention initiatives designed to detect and defuse imminent human rights violations and conflict. Attention to the protection of human rights through the use of new communication technologies is an area of growing interest, not only from the point of view of the technology and communications sectors, but from the vantage point of those working toward the betterment of governance mechanisms and the continued development of an equitable global civil society. This includes those who work at the community 'grassroots' level, as they form networks of collaboration that extend the span of their missions to the international stage, as well as major public/private sector and governmental entities (Kamlesh,2013).

Human rights organizations are harnessing ICTs in their advocacy and promotion practices to benefit from particular affordances for communication and analysis. These comprise the abilities to communicate quickly, directly, publicly, and interactively with targets as well as to analyze the performance of messages and the nature and segmentation of audiences. Such affordances are not exclusive to ICTs, as pre-existing communication channels allowed them as well, and human rights organizations tend to deploy digital and traditional communication tactics together. ICTs can be harnessed to protect human

rights, to prevent violations and communication-based conflict prevention. That being said, the use of ICTs also creates new security and can violate the right to privacy. In terms of fact-finding, ICTs afford the spontaneous and solicited participation of civilian witnesses in the production of human rights evidence. Of course, a greater volume and variety of information from unknown and untrained sources creates problems of misinformation and verification, which technology only goes so far to mitigate. In terms of advocacy, ICTs provide new channels for quickly and visibly mobilizing publics, for directly engaging with advocacy targets, and for spreading awareness of human rights (Jonathan, 2010).

ICTs can enable a greater variety and volume of voices in human rights advocacy, in part because of the ease with which digitally-endowed and digitally-literate publics can show their support for particular causes. The promotion of human rights using ICTs may indeed contribute to a culture of awareness, but if promotion resources for these initiatives are diverted away from more traditional channels, this is to the detriment of vulnerable groups who are not online (Jay, 2016)

III. DESIGN

This study employed a cross sectional survey design with design science research methodology. There were six universities: three of which have persistently appeared in the press for accusations in courts of law and three which hardly appeared for any accusations in the last five years. This choice informed our requirements analysis as to how justice is managed in the latter and what could have gone wrong in the former. Selected law students and administrators were involved as our respondents (interviewees) for their wide exposure on law matters. A prototype was then designed and tried at Kampala International University and a feedback given from the same respondents.

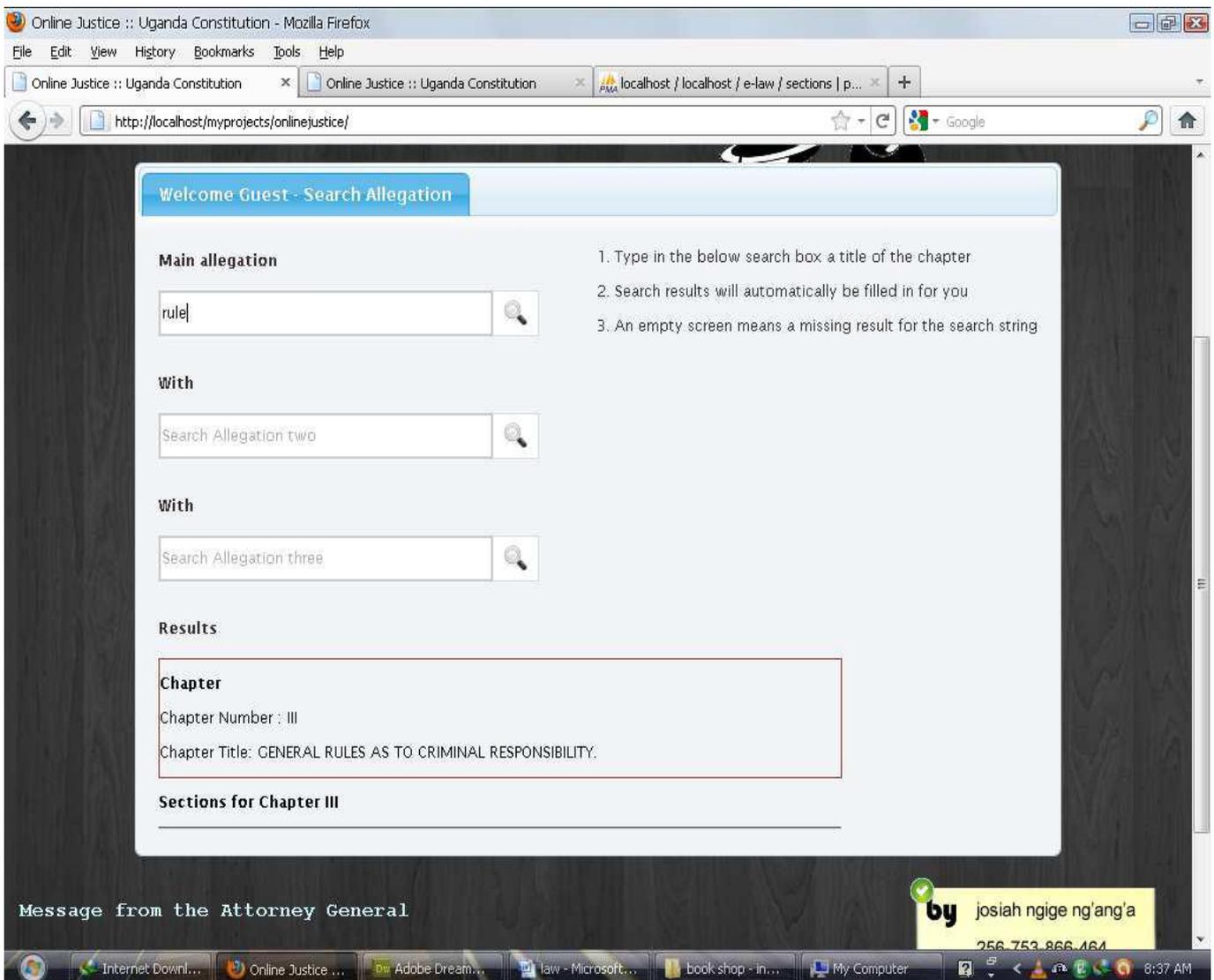


FIGURE 1: Pop up of the laws and their corresponding penalties

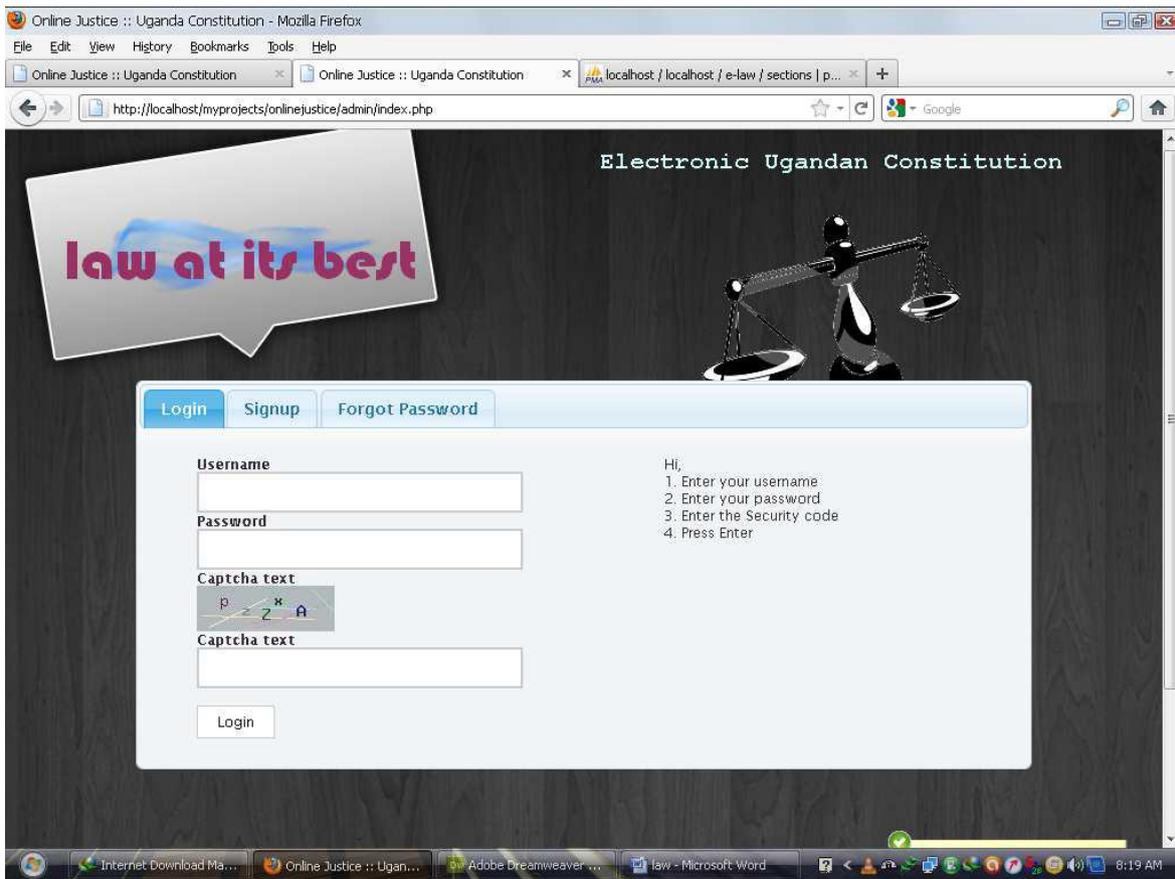


FIGURE 2: Admin interface for signing in, creating users and recovering passwords

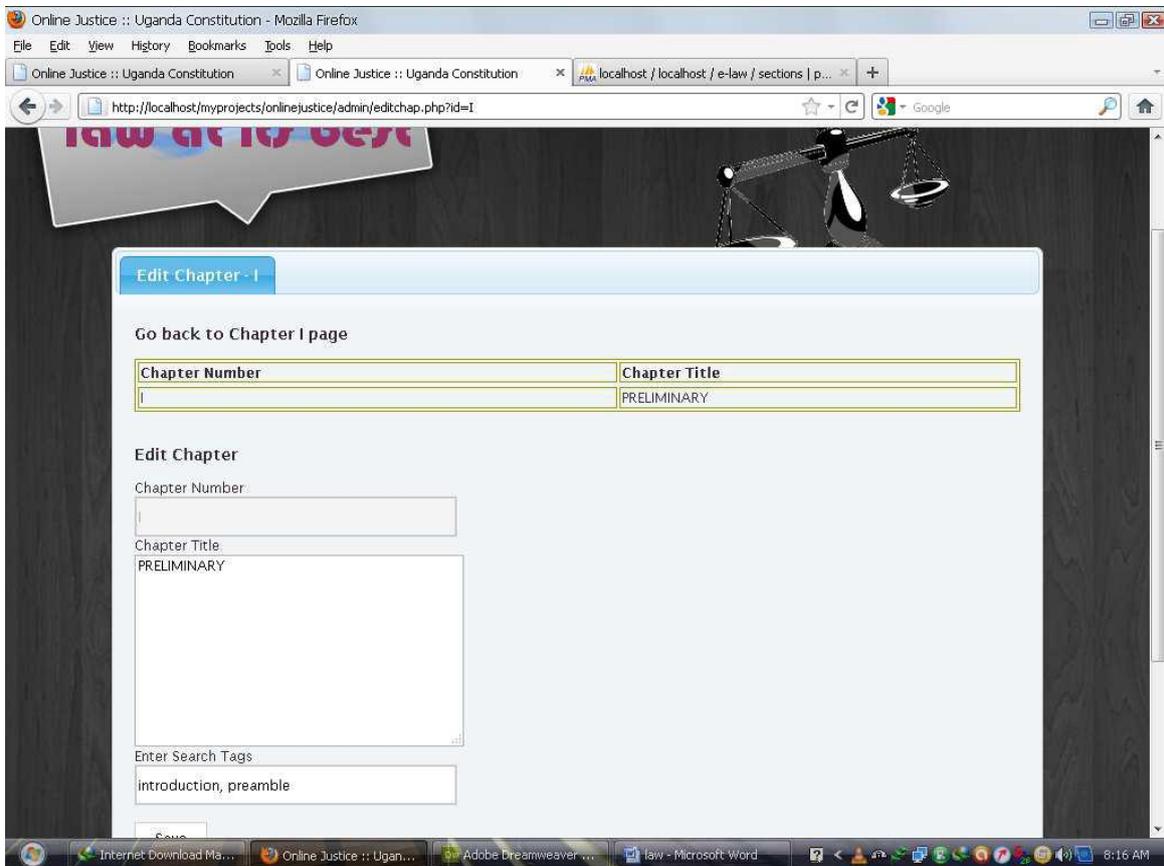


FIGURE 3: Admin interface for editing chapters

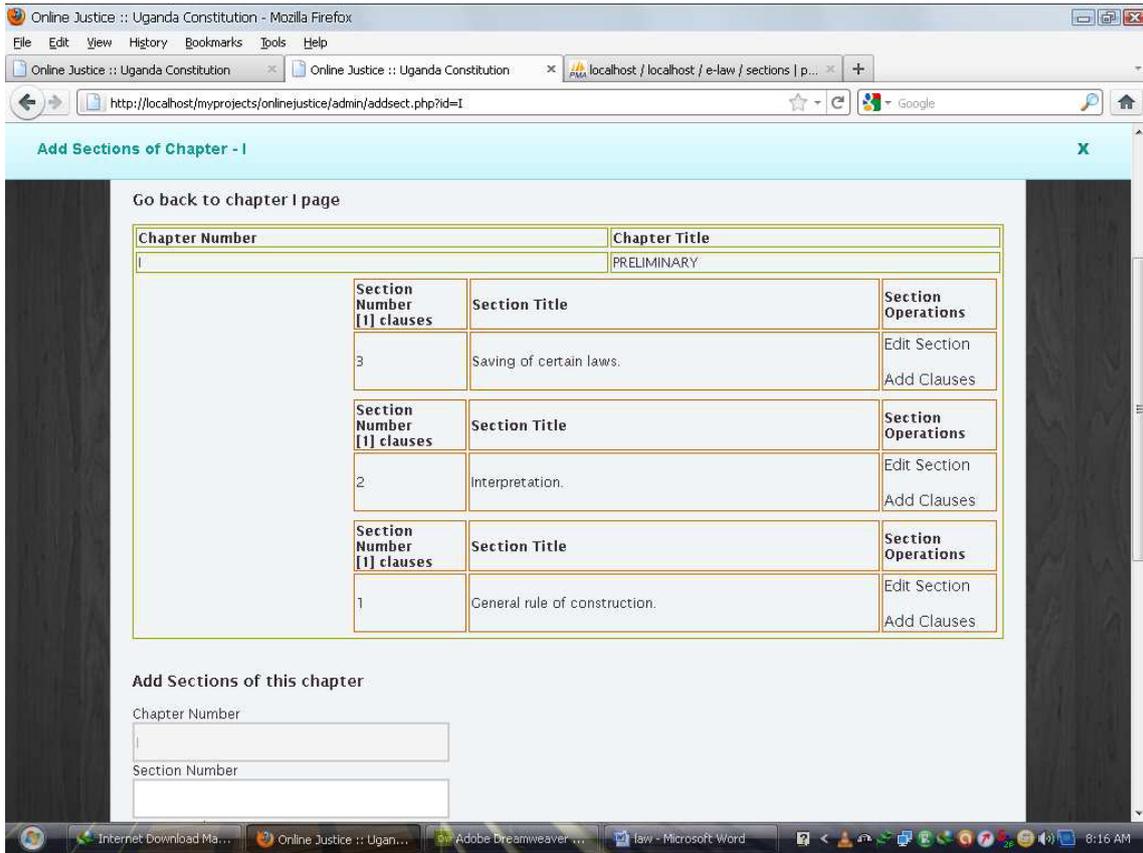


FIGURE 4: Admin interface for adding sections to chapters

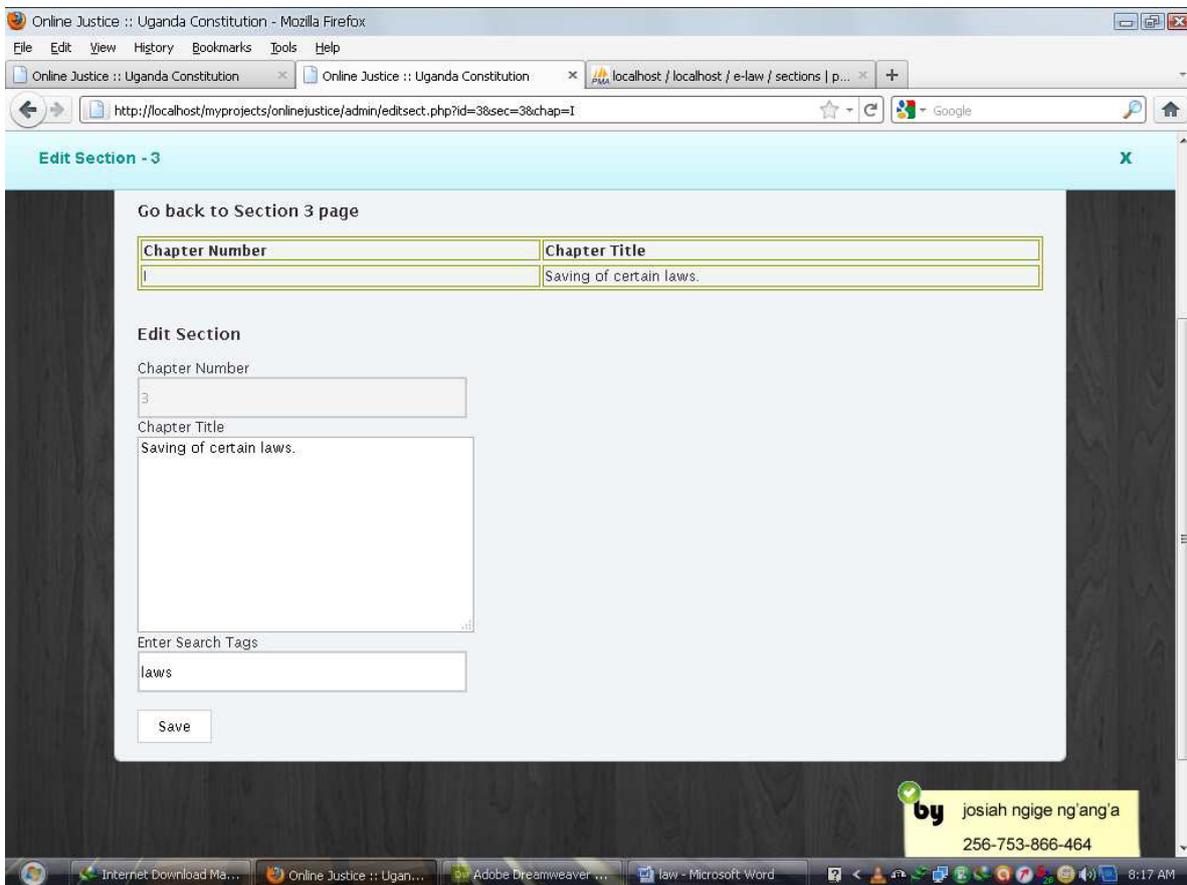


FIGURE 5: Editing a section

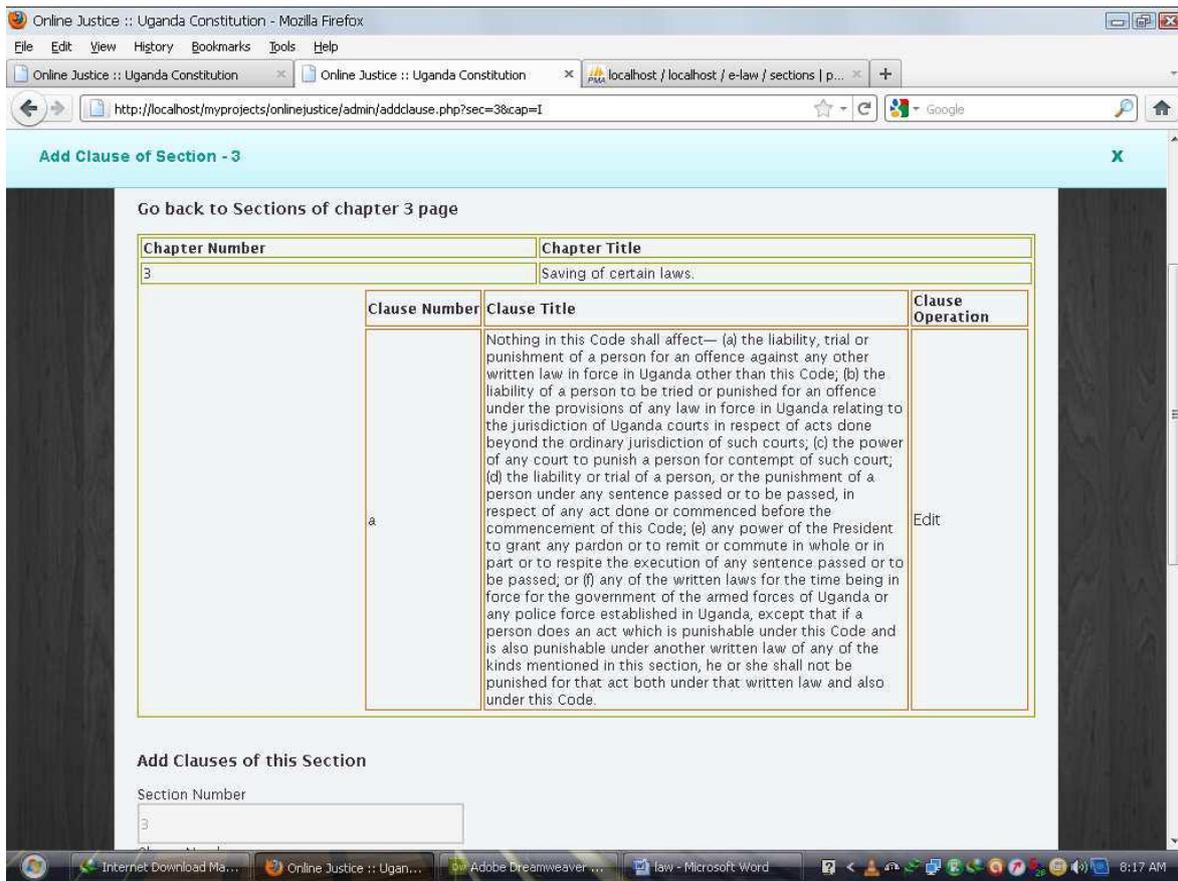


FIGURE 6: Admin interface for viewing and adding clauses that fall under a certain section

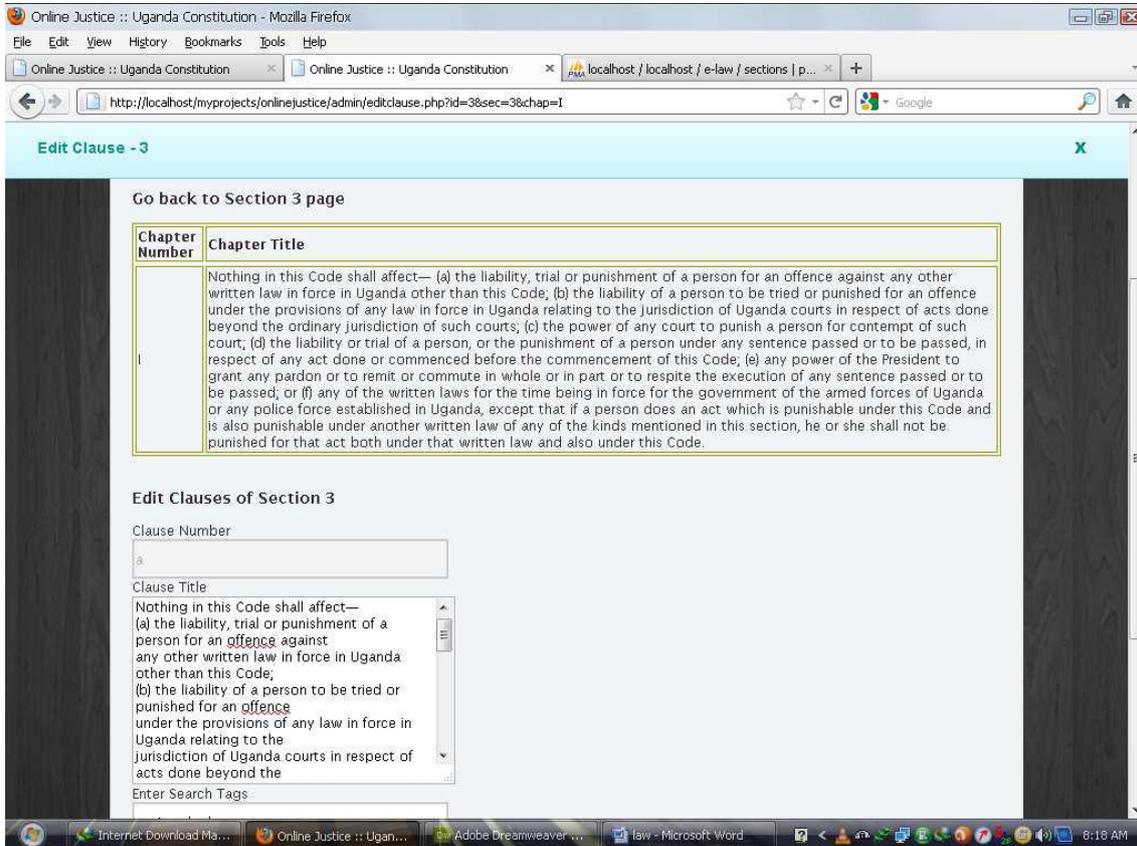


FIGURE 7: Admin interface for editing clauses

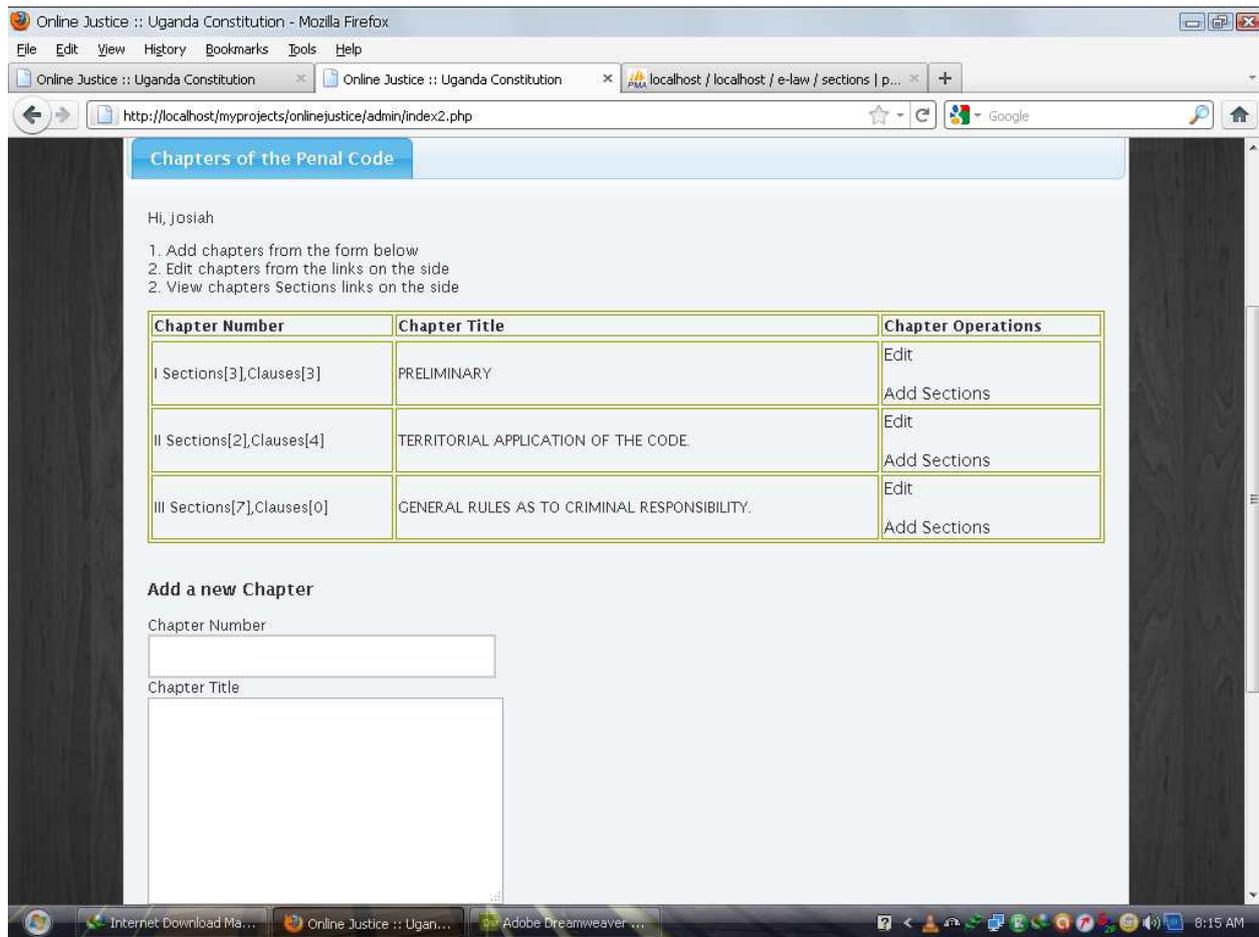


FIGURE 8: Viewing chapters and allowing for edit and addition of sections

IV. FINDINGS AND CONCLUSIONS

The prototype was assessed against the prominent innovation characteristics namely; superiority, usability, communicability and compatibility. The assessors found the innovation scored well above 4.0 (i.e. agree). The prototype periodically notified the registered students the upcoming or updated chapters and sections to enable them be locked out of ignorance of law which is never a defense.

V. RECOMMENDATIONS AND FUTURE STUDIES

The study recommends that to reduce significantly on the backlog of cases, the citizens ought to be educated on their rights and justice management procedures. It further recommends that universities should invest ample time to orient and provide all necessary MOUs to students to avoid such accusations. There should be a formal acknowledgement and consent to the legal documents provided. The study therefore, proposes that the future research work should consider SMS enabled justice management system to increase on timely response and mobility of the citizens. Additionally, a computer-aided justice management system that can translate into major local languages and simplified English for an educated citizen should be considered.

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Cost Effective Energy Monitoring System

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Abstract— Remote energy meter monitoring is an advanced energy meter formulated by our own which will overcome the problems faced in conventional metering system such as human interference which leads to incorrect billing. In this energy meter advanced technologies such as ARM microcontroller, Raspberry Pi, ADC, Seven segment display (SSD), Cloud (Thing Speak) have been used. This is the new device which is using CY8C4247AZI-M485 ARM Microcontroller and will display voltage, current, and power on SSD and send data on IoT cloud Platform through Raspberry Pi. It can be implemented for residential as well as for industrial purpose. The developed system replaces traditional meter reading methods and enables remote access of existing energy meter by the energy provider. Also it can monitor the meter readings regularly without the person visiting each house. The system collects and manages energy consumption data and provides billing information for the user. A user can easily monitor, manage, and control energy consumption and achieve energy cost saving using the proposed scheme.

Keywords— ARM Microcontroller, Automatic Meter Reading System, Electronic Metering, IoT Cloud, Raspberry Pi 3b Model, Smart Meter.

I. INTRODUCTION

Now a days traditional manual meter reading was not suitable for longer operating purposes as it spends human power. It brings additional problems in calculation of readings and manual billing. In the near future total energy demand is expected to become double the current demand. In view of this situation adopting proper energy management steps and accuracy in billing has become very important. The purpose of project is to develop the 'Remote energy meter monitoring' for single phase. ARM processor is one of the devices which handle entire sub devices connected across it [14]. The energy management technique will eliminate waste, measure and monitor current level of energy use and improve the existing operating procedures in the industry as well as in homes.

Here a new method of post-paid electronic energy metering is introduced in this paper which will automatically sense the used energy, records these reading continuously, then sends it to the IoT cloud through the Raspberry Pi and we can store, retrieve and processed data using Thing speak Cloud Platform which is one of the IoT Cloud Platform [13]. This meter will monitor the usage of electricity as well as it will keep track of real time consumption. This metering system will display voltage, current, power on seven segment display which will allow user to see how much energy is consuming for a particular power tools and this data is send to consumer by using Raspberry Pi and IoT cloud technology. This system will help in reducing the man power and also it will reduce unnecessary hassles over incorrect billing at industries as well as at homes. [11]

II. HARDWARE DESCRIPTION

As shown in Figure 1 Voltage and current which is to be measured is applied to current transformer and voltage transformer. To step down current, current transformer is used and to step down voltage, voltage transformer is used and these parameters are given to microcontroller for the purpose of measurement.

This Analog signal is converted into digital by using inbuilt ADC from PSoC4 which is using a 32bit ARM microcontroller. Measured value of current, voltage and power is displayed on seven segment display and similarly this energy consumption information saved on IoT Cloud through the Raspberry Pi 3b model using serial communication. Keys are used for calibration purpose.

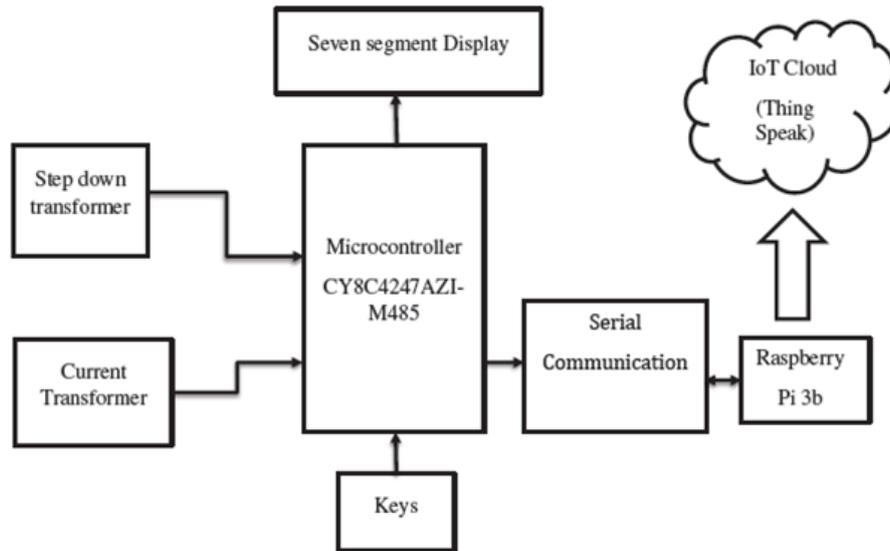


FIGURE 1: Block Diagram of remote energy meter monitoring

III. SOFTWARE DESCRIPTION

3.1 PSoC Creator

PSoC Creator is an Integrated Design Environment (IDE) that enables concurrent hardware and firmware editing, compiling and debugging of PSoC 3, PSoC 4, PSoC 4 BLE, PRoC BLE, PSoC5LPsystems with no code size limitations.[7]

PSoC Creator is a free Windows-based IDE that includes: Hardware design with complete schematic capture.[3]

- Over 120 pre-verified, production-ready Components.
 - Full communications library including I²C, USB, UART, SPI, and Bluetooth Low Energy.
 - Tools to develop custom components in Verilog or via state machine diagram
 - Dynamically generated API libraries.
- Integrated C source code compiler and editor.
- Built-in debugger.

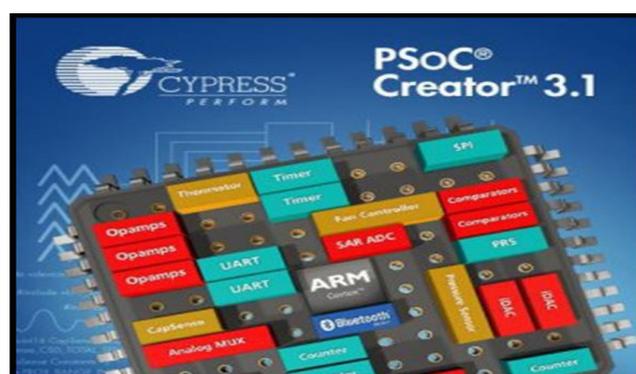


FIGURE 2: PSoC Creator Icon [3].

3.2 PSoC creator Download and Install [8]

If you search “Download PSoC creator software” in searchengine like Google, Yahoo, you will find easily. PSoC creator can be downloaded by click on the following link.

<http://www.cypress.com/file/318611>

IV. DATABASE ACCESSING METHOD

In this method we can access data globally and also we can store, retrieve, processed data. So that’s why we used this new method.

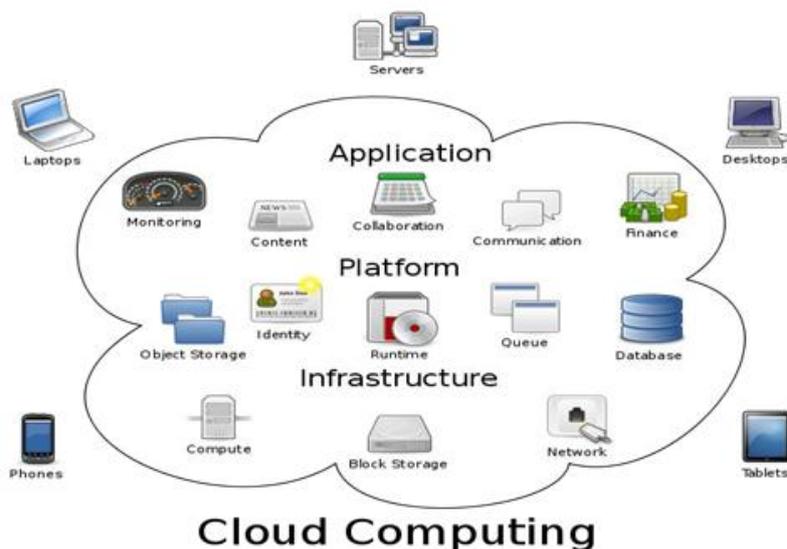


FIGURE 3: Block Diagram of Cloud Computing Services

IoT Cloud is a platform is designed to store and process Internet of Things (IoT) data. The IoT Cloud is a real-time event processing engine. The platform is built to take in the massive volumes of data generated by devices, websites, applications, customers and partners and imitate actions for real-time responses. [5]

For that we required cloud computing services. Cloud computing is the delivery of computing services—servers, storage, databases, networking, software, analytics and more—over the Internet (“the cloud”). Companies offering these computing services are called cloud providers and typically charge for cloud computing services based on usage, similar to how you are billed for electricity at home. So we used IoT cloud platform to store, retrieve and processed energy consumption information on it. [5]

4.1 Thing Speak Cloud Platform



FIGURE 4: Thing Speak Application

Thing Speak is a platform providing various services exclusively targeted for building IoT applications. It offers the capabilities of real-time data collection, visualizing the Collected data in the form of charts, ability to create plugins and apps for collaborating with web services, social network and other APIs. [6]

We will consider each of these features in detail below. The core element of Thing Speak is a 'Thing Speak Channel'. A channel stores the data that we send to Thing Speak and comprises of the below elements:

- 8 fields for storing data of any type - These can be used to store the data from a sensor or from an embedded device.
- 3 location fields - Can be used to store the latitude, longitude and the elevation. These are very useful for tracking a moving device.
- 1 status field - A short message to describe the data stored in the channel.
- To use Thing Speak, we need to sign up and create a channel. Once we have a channel, we can send the data, allow Thing Speak to process it and also retrieve the same. [6]

4.2 Why we use Thing Speak Cloud Platform?

Using Thing Speak application we can collect ,analyses and act on the data globally .So that's why we use thing speak Cloud Platform for store, retrieve and processed energy consumption data on this platform. So we get energy consumption information from anywhere and in any condition and also we can generate energy consumption bill

V. RESULT

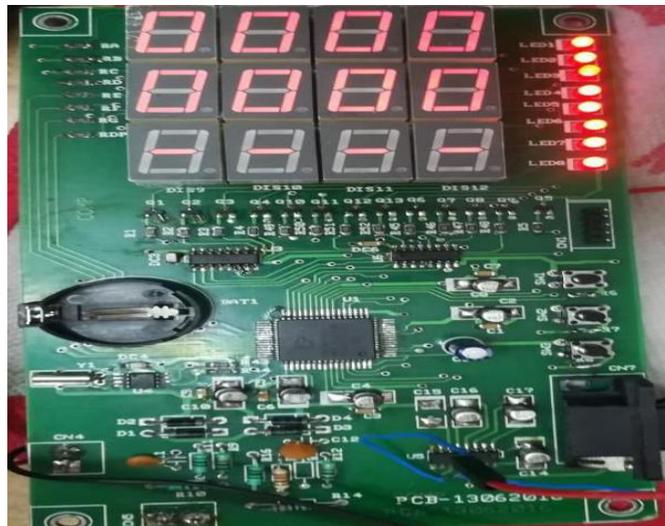


FIGURE 5: Energy Meter Hardware

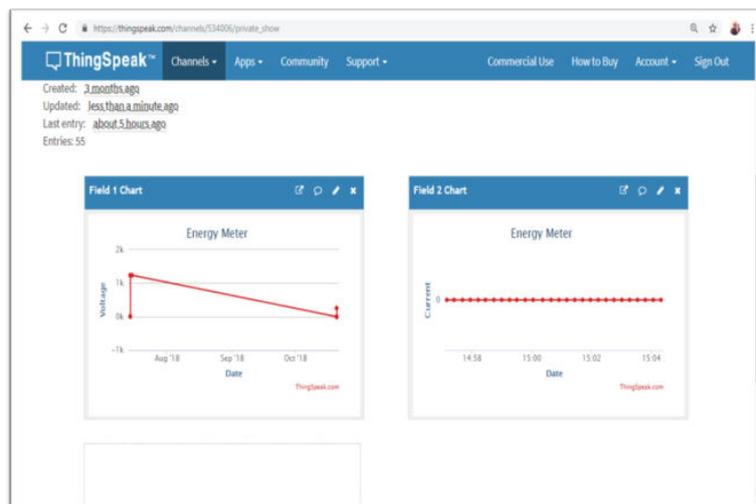


FIGURE 6: Output Window of Thing Speak Cloud Platform

- Current value display on first row of seven segment display.
- Voltage value display on second row of seven segment display.

- So finally we get output of energy consumption.
- The first field chart display voltage graph which gives voltage value.
- The second field chart display current graph which gives current values.
- This energy consumption data can be access from anywhere and in any condition which gives information about how much energy used.

VI. CONCLUSION

The 21st century has brought Great Discoveries and advancement in the field of technology. These advancement also brought many challenges and required approaches to handle these challenges. Smart metering system is one of such approaches. In our project we explained all concept of smart metering.

The developed system provides application which will be connected and provide user with useful information. All the information or data processed by user as well as admin will be automatically saved and update in the system. We are also providing application for our system which will be connected to our system and provide user with useful information. We will do testing for the system and make sure that prototype is functional.

FUTURE PROJECT SCOPE

- We can use this system as prepaid energy meter, which will empower the consumer to manage energy consumption.
- This meter can be used as 3 phase metering system by doing very few modifications in the hardware and more in software of this meter.
- We can use this meter for different loads by simply selecting the appropriate current transformer.

ACKNOWLEDGEMENTS

I would like to acknowledge and extend our heartfelt gratitude to all those people who have been associated with this Project and have helped us with it thus making it a worthwhile experience.

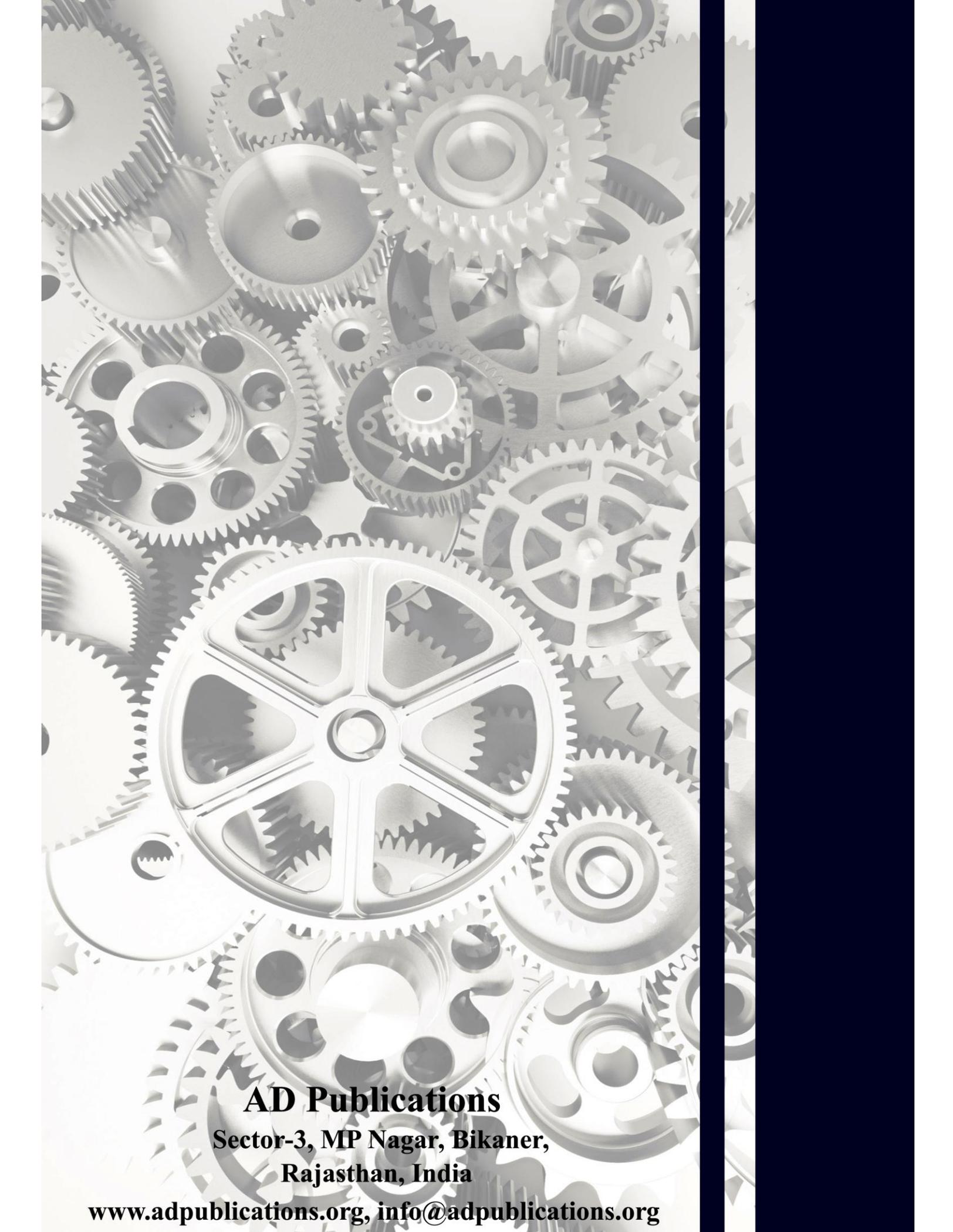
Firstly I extend our thanks to the various people which include my project Guide Prof.Vaishali.S.Jadhav, M.E. Coordinator Prof. K.T Jadhav & H.O.D Prof. Surabhi Tankkar who have shared their opinions and experiences through which I received the required information for my report. I am also thankful to all the staff members of EXTC Dept. for their highly co-operative and encouraging attitudes, which have always boosted me.

I also take this opportunity with great pleasure to thank our Honourable Chairman Mr. A.V Gupta, Honourable Founder Trustee Dr. L.S Bothra and Principal whose timely support and encouragement has helped us succeeds in our venture

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