MONITORING LEARNING OUTCOMES

RANK HOLDERS OF SIR MVIT

Rank Details of Sir MVIT Students:

VTU 2023 Rank Holders

SRI KRISHNADEVARAYA EDUCATIONAL TRUST®

SIR M VISVESVARAYA INSTITUTE OF TECHNOLOGY

(Affiliated to VTU-Belagavi,
Recognized by AICTE and Accredited by NBA & NAAC)
Krishnadevarayanagar, Off International Airport Road, Hunasamaranahalli, Bengaluru - 562 157

Hearty Congratulations to VTU Rank Holders 2022-2023

from the Management, Principal and Staff

Sir MVIT feels proud of its students for securing 17 Ranks - 2nd highest amongst VTU affiliated Colleges in Karnataka. Only College to secure 13 Gold Medals in Civil Engg., 7 Gold Medals in E&C.

MADAKASIRA CHINMAYA VIKAS - BE (CV)
1MV19CV017
(12+1 GOLD MEDALS)

GUDIKAL SAI VAMSI
BE (ECE)
1MV19EC041
(8+1 GOLD MEDALS)

M SMRITI
BE (EEE)
1MV19EE049

GANAVI S
BE (ETE)
1MV19ET015

ABHISHEK KUMAR CHOUDHARY - BE (ISE)
1MV19IS001

ASHA G
BE (ETE)
1MV19ET004

SHRADDHA V GOUDAR
BE (ECE)
1MV19EC105

SINDHU T
BE (EEE)
1MV19EE089

ISHA ASTHANA
BE (EEE)
1MV19EE041

VIVEK KUMAR SINGH
BE (ETE)
1MV19ET046

GITTIKA AGARWAL
BE (ISE)
1MV19IS022

THEJASHREE M
BE (BT)
1MV19BT027

K S BHAVISHYA
BE (ECE)
1MV19EC050

MAHALAKSHMI N
BE (BT)
1MV19BT013

ANKIT KUMAR SINHA
BE (ISE)
1MV19IS004

BHUVANA R
BE (ETE)
1MV19ET007

BAVITH BHARGAV D
BE (ISE)
1MV19IS016

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VTU 2022 Rank Holders

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VTU 2021 Rank Holders

B N Keerthana

TCE - 2nd Rank

Tharun Srivathsa

IEM -2nd Rank

Ankita Dey

TCE - 4th Rank

Sahana BT

BT - 6th Rank

Pavan Kumar N

EEE- 6th Rank

Nikitha P R

ECE - 6th Rank

Ayushi Pratap

TEC - 8th Rank

Pallavi kumari

TCE 9th Rank

shrinkala Raj

EEE - 9th Rank

B Sai Ashrith

ISE - 10th Rank

Rithu Shree C

CV - 10th Rank

Bindu B

MCA - 2nd Rank

Prathima A

MCA- 5th Rank

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VTU 2020 Rank Holders

K Preksha Machaiya

BT - 1st Rank & 2 Endowment Award

Gagana T Reddy

ECE -1st Rank 7 Endowment Awards

Anusha J R

ECE - 2nd Rank

Disha

TCE - 3rd Rank

T S Megha Nayaka

IEM- 3rd Rank

R Rajath

TCE - 5th Rank

Yashika B B

BT - 6TH RANK

P. Sree Lekha

VTU 6th Rank

Saikripa O

BT - 7th Rank

Nikhil Bharadwaj R

ECE - 7th Rank

Mandhara K S

IEM - 7th Rank

Sangeetha

MCA - 9th Rank

Ananya Rao Kedige

BT- 9th Rank

Naomi Teresa Vinod

BT - 10th Rank

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VTU 2019 Rank Holders

Anvitha

IEM - 1st Rank Gold Medal

Akaansha Gaurav

TCE - 2nd Rank

Akarapu Nikitha

EEE - 4th Rank

Bhavana Nagaraja

BT - 9th Rank

Doranala Swathi

CSE - 8th Rank

Hitashi Nandan

TCE - 4th Rank

Pooja H.V

BT - 5th Rank

Rithika Pandey

ISE - 2nd Rank

Sai Rathinam P.R

ISE - 6th Rank

Srilekha K.P

ME - 3rd Rank

Shreya Sabu

B.E. in CSE 10th Rank

Sinchana R. Nayak

Civil - 8th Rank

Sonli S Naik

BT - 2nd Rank

Harini Chandramouli

EEE - 5th Rank

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VTU 2018 Rank Holders

Devipriya Sarkar

B.E. in CSE 9th Rank

Gaganashree R

B.E. in TE 7th Rank

Brinda U

B.E. in TE 9th Rank

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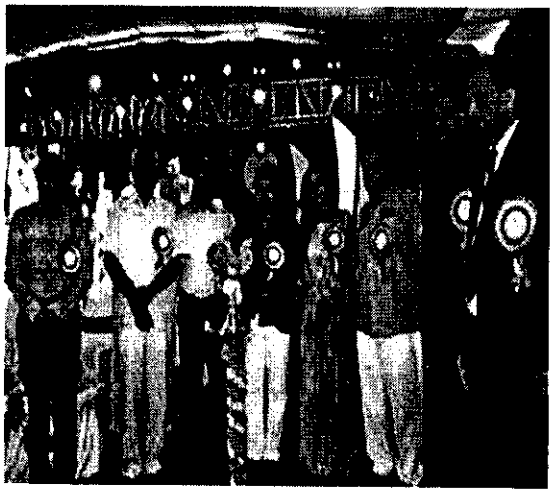
EXTRA CURRICULAR ACTIVITIES IN SIR MVIT

Kalanjali 2018

The 21st edition of Sir MVIT's biggest annual event and the most awaited inter-college cultural fest 'KALANJALI' was held this year on the 12th and 13th of October, 2018. The two-day event was enhanced in all its aspects and taken to the next level surpassing all expectations right from the very exciting prize money to the magnificent main stage.



Honorable Trustees, Sri KET, Renowned Kannada Cine Artists, Sri Ramakrishna, Kum. Shravya Rao

RIPOSTE AT KALANJALI 2K18

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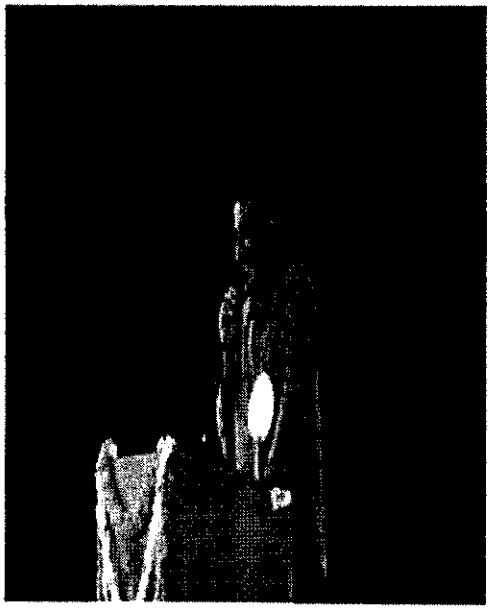
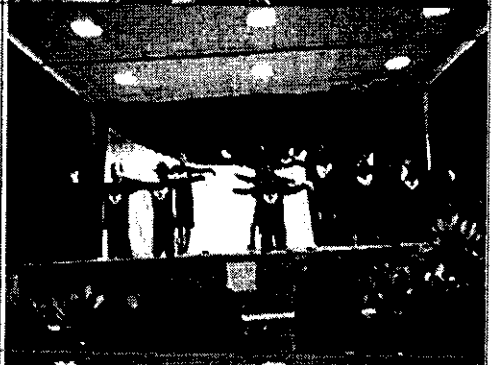
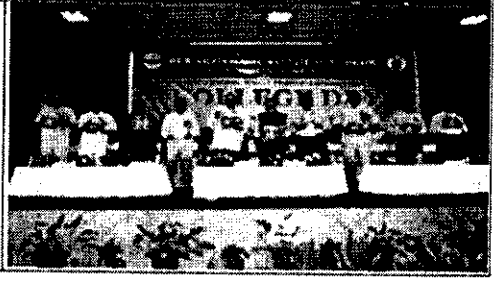
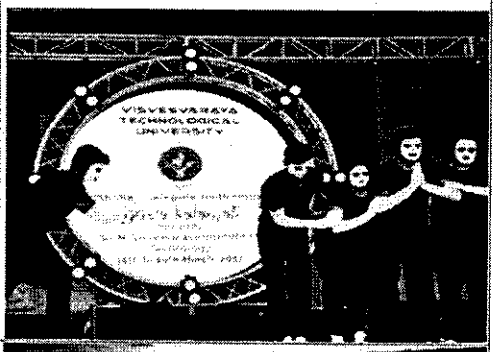


Extra Curricular Activities

Sl. No.	Name of the Event	DATE	Photos
1	Republic Day	26th January	
2	Independence day	15th August	

3	**Teachers Day**	**5th September**	
4	**Kannada Rajyotsava Day**	**November**	
5	**International Women's Day**	**8th March**	
6	**Birthday of Sir. M Visvesvaraya**	**15th September**	

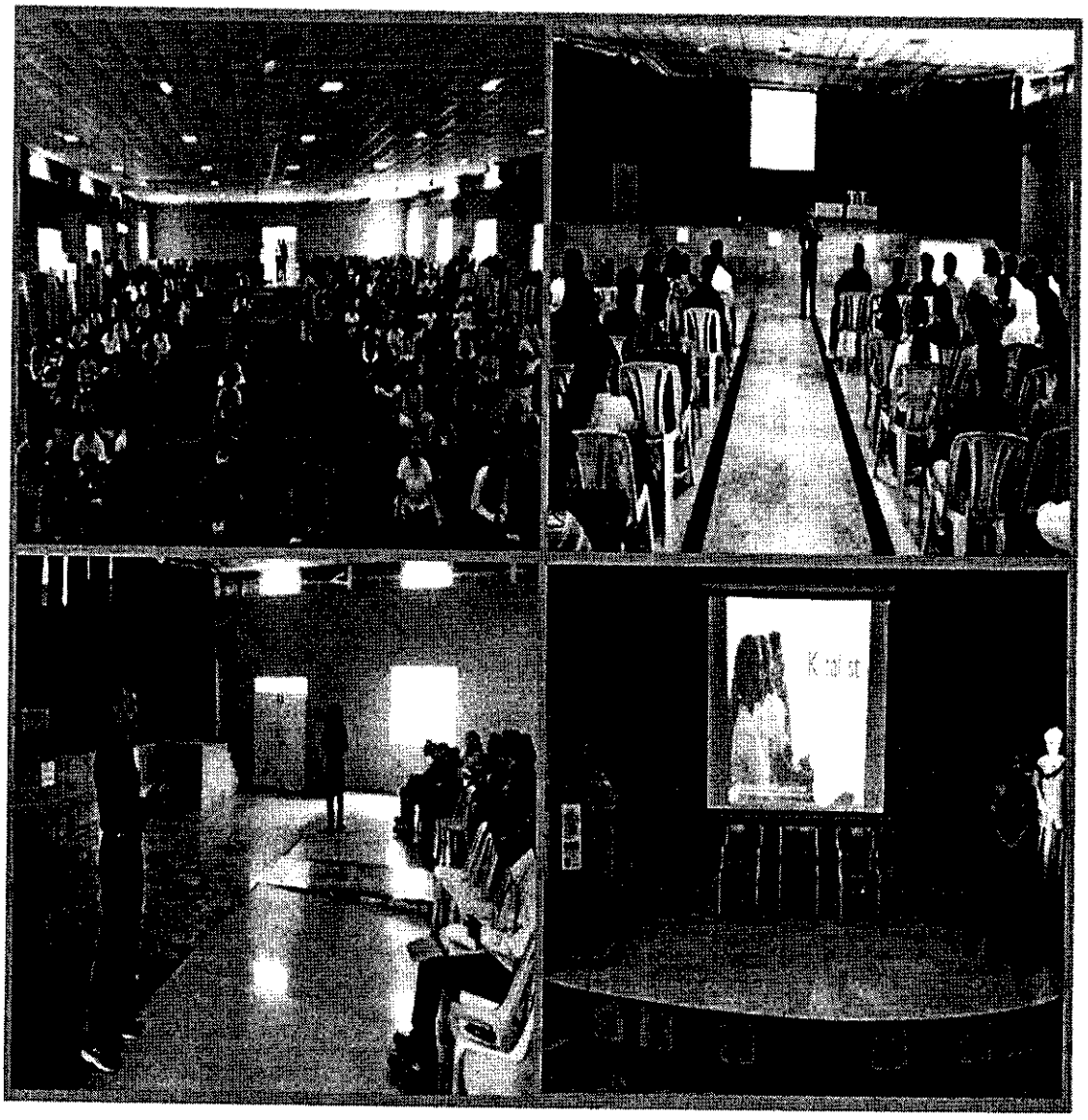
7	Induction Program	August '18 (for 21 days)	
8	Graduation Day	May 3rd week	
9	Freshers" Day	August	
10	VERVE Intra collegiate cultural events)	September 4th week	
11	COLLEGE DAY	May 1st week	

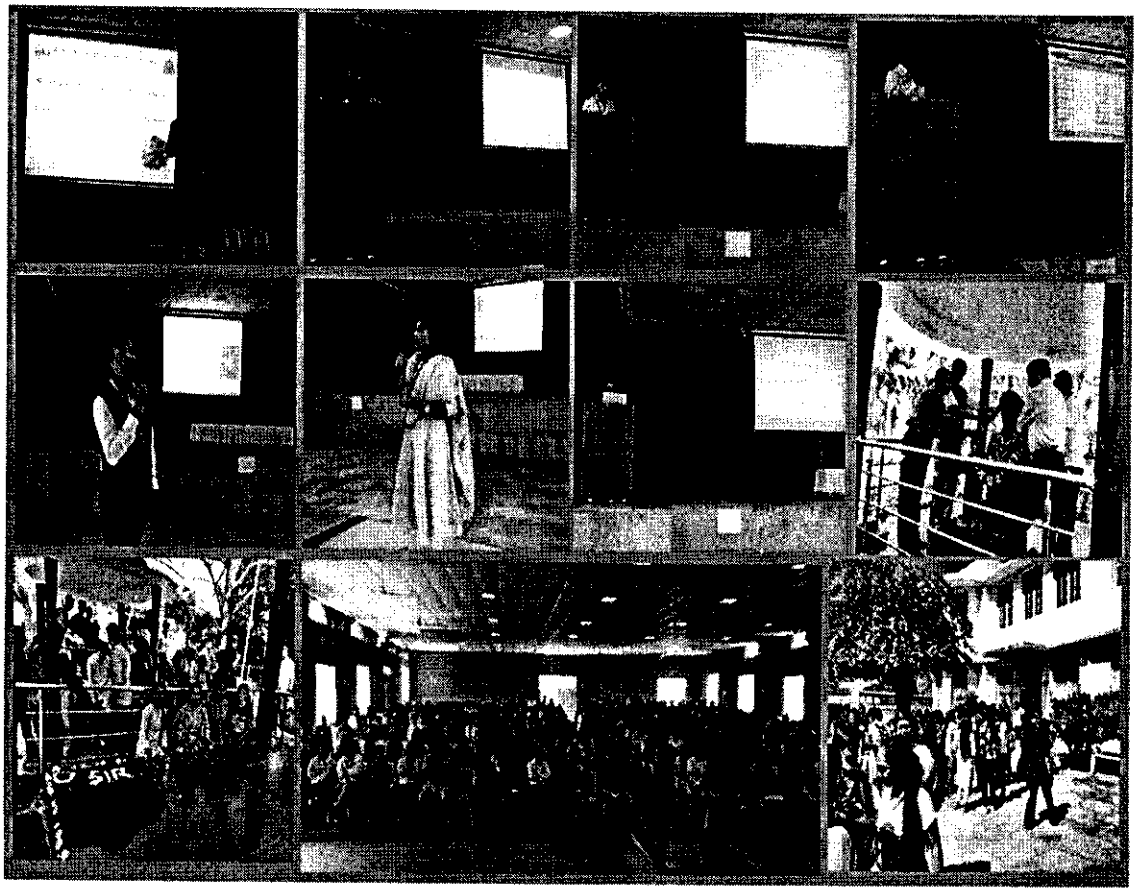
12	ISIRI (hogirana kanada Program)	March 2nd week	
13	CLUB ACTIVITIES	GAP (Getting Across People) LEO CLUB	
14	SUSAMSKRITI FORUM CULTURAL ACTIVITIES	SPICMACAY	

15	INTERNATIONAL YOGA DAY	JUNE 21ST	
	ALUMNI DAY	MAY 1st Week	 

INDUCTION PROGRAM FOR FIRST YEAR

INDUCTION PROGRAMME FOR FIRST YEAR B. E STUDENTS A "10-Day Students Induction Programme (SIP) Phase-I", for the first year B.E. degree students was conducted in the auditorium from 1-12-2022 to 10-12-2022. The objective of the programme was to make the students feel comfortable in their new environment, to set up a healthy daily routine, create bonding among the students, as well as, between the faculty and the students, develop awareness, sensitivity and understanding of the self, people around them, society at large and also, nature. The sessions consisted of activities and events in line with the AICTE & VTU directives. More than 700 students benefitted from this 10-day programme. Most of the speakers were HoDs and Senior faculty members of the Institute. The schedule of 10-days programme was structured as Initial phase, Regular Phase and Closing Phase.





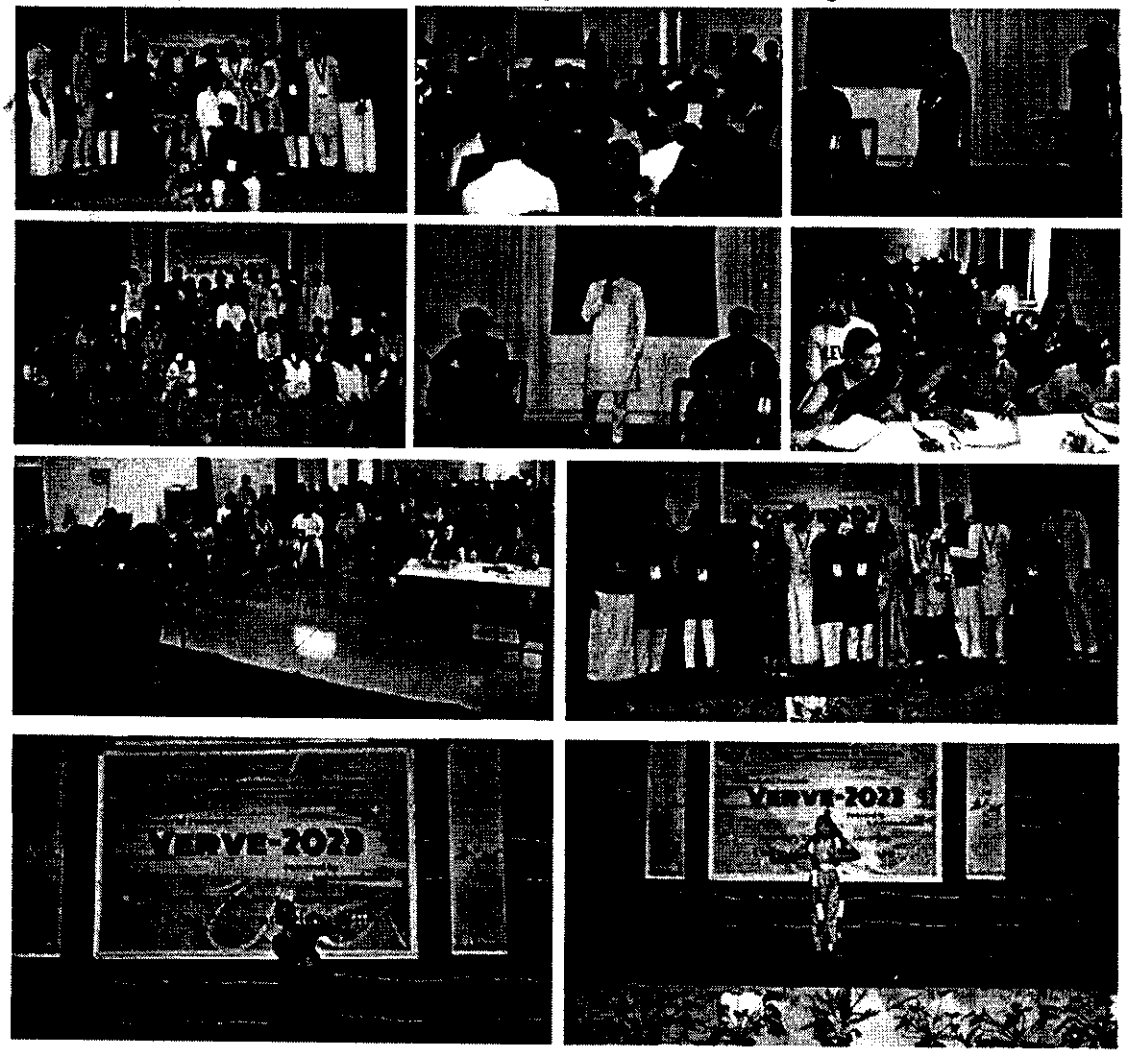
I YEAR B.E. INAUGURATION PROGRAMME

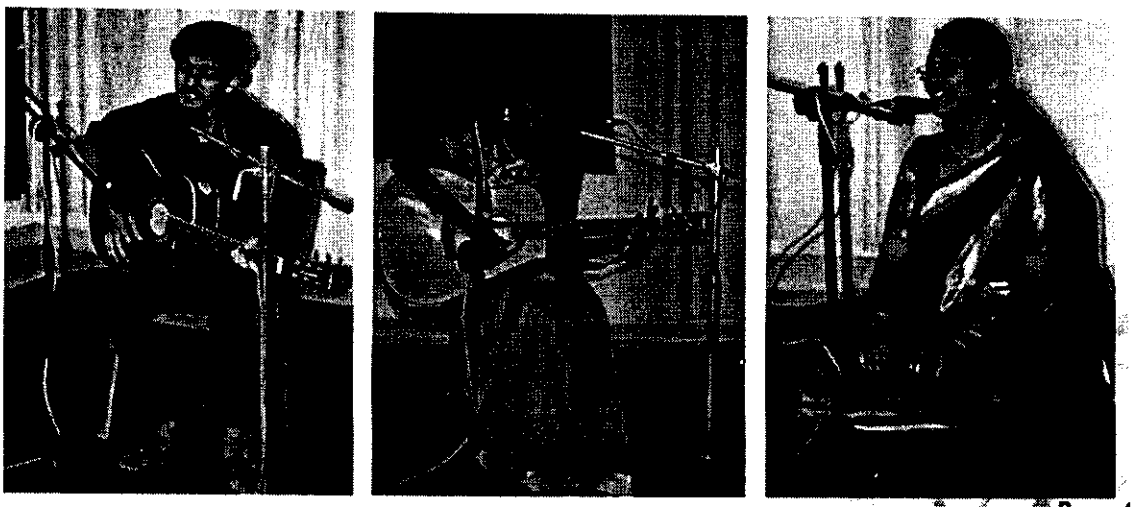
The college organized an inaugural function "AARAMBH"- 2022 on 10-12-2022, to welcome the batch of 2022-2026. The campus was filled with excitement, joy, and enthusiasm for a new beginning that emanated on this bright day. The journey began with lighting the lamp and seeking the blessing from Goddess Saraswati. Following this devout gesture, the students and their parents were escorted to the program venue. Ms. Hitha M (S5-BT), Varsha S (S5- IS), Spoorthi (S5- EEE), and Disha A Patil (S5- EEE) in mellifluous unison, rendered the invocation song. The occasion was presided over by Dr. A. C. Chandrashekar Raju President of Sri KET and graced by Vice President of Sri KET- Sri K.V. Shekar Raju, Secretary of Sri KET- Sri K. Syama Raju, Treasurer of Sri KET- Sri M. Venkataramana Raju, Chairman, Academic Committee Sri G. Prabhakar Raju, Chief Guest-Sri Rakesh Sigh, IAS, Additional Chief Secretary, Department of Urban Development, Govt. of Karnataka, Principal Prof. Rakesh S.G., HoDs, Faculty members, Students, Parents, Press and Media. Dr. H. G Nagendra, Head, Department of Biotechnology introduced Chief Guest, Sri Rakesh Sigh, IAS, Additional Chief Secretary, Department of Urban Development, Govt. of Karnataka. The Chief Guest Sri Rakesh Sigh spoke about the importance of the human value system in the present generation, he briefed about moral story- "The great faith in God". He also distributed the awards for a few rank holders of 2016 batch. Dr. M Krishnaiah, Head, Department of Chemistry gave a brief report on Induction Programme. Prof. S H Khan, Director of Training and highlighted the placements on the campus and briefed about the formulated sevenphase Training program for the holistic development of the students. Prof. Rakesh S.G., gave an overview of the college, and also briefed us about the rules and regulations of the college and hostel. He also addressed the students through a moral story- "The journey of the Engineering Students". Dr. E Kavitha Ramesh, Head of the Department of Electronics and Telecommunication announced the rank holders and awards were given away by the dignitaries for 2019, 2020, and 2021 batches. The event added on with the release of the 1st issue of e-newsletter "VARTHAMANJARI" (Volume.1 November 2022) Mrs. Sheetal Bagali, Assistant Professor, Department of Electronics and Communication

Engineering, and Dr. Anitha S, Assistant Professor, Department of English, compered the whole event. Dr. Uma S K, Head Department of Mathematics proposed a vote of thanks. The event ended with the National Anthem and a sumptuous lunch.

VERVE 2023

Snapshots of VERVE 2023, an Intra-Collegiate Cultural Extravaganza





VTU TOUTH FESTIVAL 2023

Susamskriti Team Participation in the 22nd VTU youth fest YUVOTHSAVA 2023

Susamskriti Team of Sir MVIT participated in the 22nd VTU youth fest YUVOTHSAVA 2023 held at NCET, Bengaluru, from 29th to 31st March 2023. 43 students participated in 17 events spread over five major divisions like Fine arts, Theatre, Music, Dance, and Literary. Mr. K.V.R. Prasad, Vice Chair-Susamskriti accompanied the students to the fest.

GLIMPSE OF 'SAMBHRAMA' - THE COLLEGE DAY- 2023

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SPORTS ACTIVITIES & ACHIEVEMENTS IN SIR MVIT

Sl.No.	Name of the Sport	No. of students participated and won in tournaments (VTU/State level)									
		2022-23	Medals	2021-22	Medals	2018-19	Medals	2017-18	Medals	2016-17	Medals
1	Basket ball	26	3	7	1	12	02	20	01	20	01
2	Football	-	-	2	-	18	01	18	02	18	02
3	Handball	-	-	-	-	28	01	28	-	28	01
4	Kabaddi	23	3	-	-	12	01	28	-	28	0120
5	Badminton	-	-	2	1	10	01	10	02	10	02
6	Volley ball	12	1	1	-	24	-	24	-	24	01
7	Hockey	14	2	14	1	16	-	16	02	16	02
8	Soft Ball	-	-	2	-	30	03	32	04	28	02
9	Judo	2	2	3	3	12	06	15	07	14	06
10	Taekwondo	6	4	1	-	10	05	08	06	09	05
11	Wrestling	2	2	3	3	08	06	10	05	08	07
12	Cricket	-	-	-	-	20	02	16	01	17	02
13	Kho Kho	13	2	1	-						
14	Karate	-	-	1	-						
15	Archery	-	-	1	-						
16	Swimming	-	-	1	1						
17	Wushu	-	-	1	-						
18	Table tennis	2	-								
19	Chess	9	1								

Sports Achievements

Ananya B (5S), Kota Madhu Latha (3S), Ramya T. S. (3S), Kota Rishetha (3S), Sushma Ranjini M.S. (3S), Chess women team Runners in VTU Bengaluru Division tournament held at Vemana IT, Bengaluru on 1-12-2022 and 2-12-2022, and qualified for Stata level Chess competition, to be held at NMAMIT, NITTE on 5-12-2022 and 6-12-2022.

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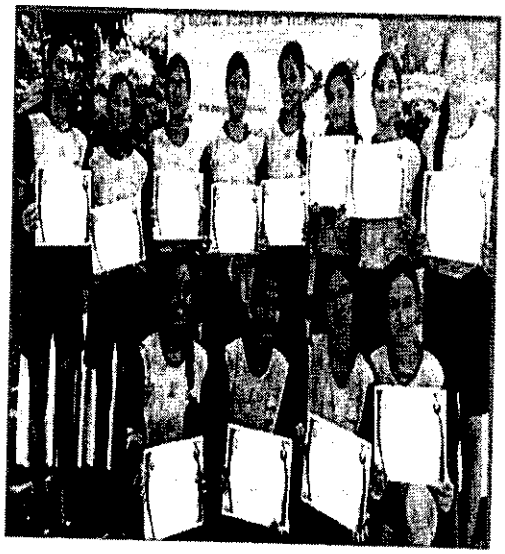
Divya, Indu Y.V., Vinuthra K., Sushma R., Varsha K. L. and Shivani Kencharaddi of 3S, Sir MVIT women team members secured 2nd RUNNERS UP in VTU Bengaluru division Intercollegiate Kabaddi Women Tournament held at APSCE, Bengaluru on 30-11-2022 and 1-12-2022 and qualified for VTU State level Women Kabaddi Tournament, to be held at APSCE College, Kanakapura Road, Bengaluru on 2-12-2022 and 3-12-2022.

Hockey Men team, Runners of VTU Bengaluru Division Hockey tournament, held at SJCIT, Chikkaballapura on 10-11-2022 and the team qualified for Stata level Hockey Men tournament to be held at BITM, Bellari on 6-12-2022 and 7-12-2022 .

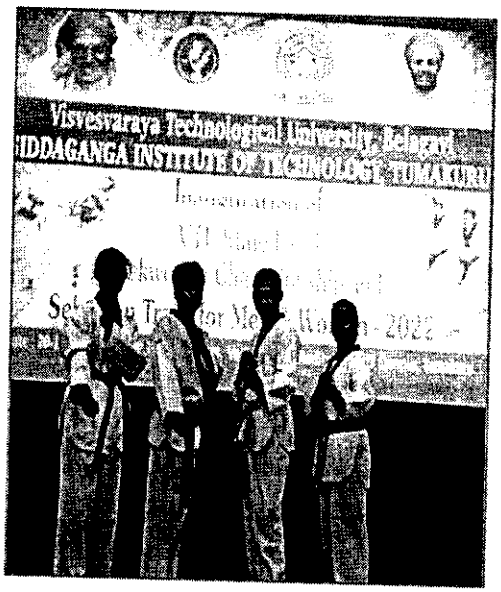
Sir MVIT Volleyball Men team secured RUNNERS-UP position in State level inter Collegiate Volleyball Men tournament 2022, held from 14-12-2022 to 17-12-2022, at CMRIT, Bengaluru.

Sir MVIT Volleyball Women team secured RUNNERS-UP position in Kabaddi Tournament, held at BMSCE, on 29-12-2022.

Sir MVIT Kho-Kho Women's Team has qualified for the 2022-23 VTU state level tournament.



Sir MVIT Taekwondo team won 2 Gold Medals, 1 Silver Medal, 1 Bronze Medal. Taekwondo Women's Team were the champions at VTU State Level Inter-collegiate Taekwondo Championship 2022, held at S.I.T., Tumkur, on 20-12- 2022 and 21-12-2022.



Students of Sir MVIT participated in VTU team for All India /South Zone Inter University sports and Games in the year 2022-23.

Aishwarya R., S3 (EC) and Gopika V., S1 (IS) participated in "All India Inter University Taekwondo Women tournament 2022-23", from 9-1-2023 to 14-1-2023, held at Kurukshetra University, Amritsar, Panjab.

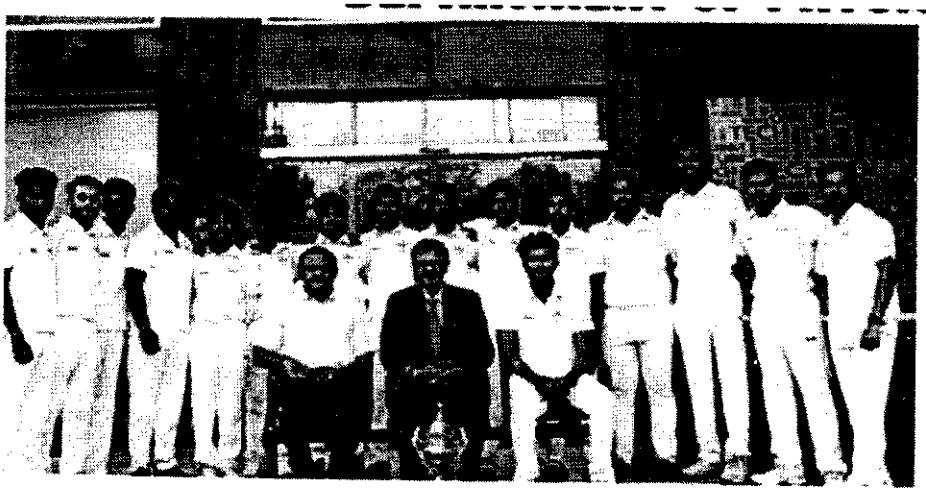
Kavya B. S5 (EC) participated in "South Zone Inter University Kabaddi Women's tournament 2022-23", from 19-12-2022 to 23-12-2022, held at Amrutha University, Chennai.

Anusha Basanagowda Hatti, S3 (EEE) participated in "South Zone Inter University Kabaddi Women tournament 2022-23 from 19th to 23rd December 2022 held at Amrutha University, Chennai.

Chethankumar, S3 (MBA) participated in "South Zone Inter University Kabaddi Men's tournament 2022", from 8-11- 2022 to 14-11-2022, held at Bengaluru City University, Bengaluru.

Gagana R., 5S (EC) participated in "South Zone Inter University Kho-Kho Women tournament 2022-23", from 23-1-2023 to 26-1-2023, held at Alliance University, Bengaluru.

Sir MVIT cricket team won the Runners-up trophy in the VTU Bengaluru North Division men's cricket tournament held at Acharya Institute of Technology, Bengaluru, from 8th to 17th March 2023. This team also participated in the VTU state-level cricket tournament held at SJCIT, Chikkaballpur from 21st to 28th March 2023.



Sir MVIT men's volleyball team won the Runners-up trophy in the ABVP State Level Volleyball Tournament - 2023 held at Kodigehalli, Bengaluru on 11th March 2023.

Hearty Congratulations to our Students Who Represented VTU Team in the year 2021-2022 From the Management, Principal, Sports Department, Teaching & Non-Teaching Fraternity

Sl. No.	Name of the Student	Branch /Section	Event	Venue and Dates
1	**YeshvanthRaj 5th Sem EE**		Volleyball	**South Zone Inter University Volleyball Men tournament 2021** on 17th to 22nd December 2021 held at SRM University, Chennai Tamil Nadu.

2	**Prathik .R** **7th Sem EC**		Basketball	**South Zone Inter University Basketball Men tournament 2021** on 24th December 2021 to 4th January 2022 held at Christ University, Bengaluru
3	**Poovanna A.G** **7th Sem ME**		Football	**South Zone Inter University Football Men tournament 2021** on 31st December 2021 to 7th January 2022 held at Mahatma Gandhi University, Kottayam, Kerala
4	**Mohit Singh** **7th Sem IEM**			
5	**K. Kanchana** **5th Sem EC**		Archery	**All India Inter University Archery Women tournament 2021-22** on 19th to 28th February 2022 held at Chandigarh University, Mohali
6	**Yashovardhan Sinha** **5th Sem EE**		Karate	**All India Inter University Karate Men and Women tournament 2021-22** on 8th to 17th March 2022 held at Kurukshetra University, Kurukshetra, Haryana
7	**Kiran.R** **1st Sem MBA**		Kho-Kho	**South Zone Inter University Football Men tournament 2021** 8th to 14th March 2022 at Bengaluru North University,Bengaluru
8	**Jasmine Karam** **7th Sem CS**		Wrestling	**All India Inter University Wrestling Women tournament 2021-22** on on 8th March 2022 to 16th March 2022 held at Chaudhary Bansi Lal University, Bhiwani.
9	**Aishwarya .R** **1st Sem EC**		Taekwondo	**All India Inter University Taekwondo Women tournament 2021-22** on 23rd March to 4th April 2022 held at Kurukshetra University, Kurukshetra, Haryana.
10	**Rakesh. R** **5th Sem ME**		Softball	**All India Inter University Softball Men tournament 2021-22** 19th to 30th March 2022 held at Acharya Nagarjuna University, Nagarjunanager
11	**Sidharth.V** **5th Sem ME**			
12	**Karthik D. Patil** **5th Sem ME**		Wushu	**All India Inter University Wushu Men tournament 2021-22,** 24th to 31th March 2022 held at Punjabi University, Patiala

The following students have won the medals in VTU Inter collegiate competitions for individual event in the year 2021-22.

JUDO Medalist					
SL NO	**Name**	**Semester & Branch**	**USN**	**Weight**	**Place**
1	Jasmine Karam	7th Sem CSE	1MV18CS037	70	III
2	Leimapakpam Tinashi Devi	3rd Sem CS	1MV20CS055	72	III

3	Koustav Das	3rd CS	1MV20CS051	74	III

WRESTLING Medalist

SL NO	Name	Sem & Branch	USN	Weight	Place
1	Jasmine Karam	7th Sem CSE	1MV18CS037	65	I
2	Leimapakpam Tinashi Devi	3rd Sem CS	1MV20CS055	72	III
3	Divyanshu Singh	3rd Sem CS	1MV20CS031	65	III

Swimming

Sl No	Name	Sem & Branch	USN	Style	Place
1	Samiksha S Satpute	7th Sem IS	1MV18IS049	Freestyle Stroke	2 Bronze

TEAM ACHIEVEMENTS for the year 2021 -22

Sl No	Game	Organization	Date	Position
1	Badminton (W)	BMSIT&M	15 & 16 November 21	2nd Runners
2	Swimming (W)	Jyothy IT	1st December, 21	2 , Bronze Medals
3	Basket Ball (M)	BMSSA	7th & 8th December,21	2nd Runners Up
4	Hockey (M)	Our college	17 & 18 December2021	Runners Up

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SAMPLE PUBLICATIONS OF SIR MVIT STUDENTS

2018 Biennial International Conference on Power and Energy Systems:Towards Sustainable Energy (PESTSE)

A Particle Swarm Optimization Based Maximum Power Point Tracking Scheme Employing Dynamic Inertia Weight Strategies

Suraj Joshi, Vaishnavi Shetty, R. Subha
Department of Electrical and Electronics Engineering
Sir M. Visvesvaraya Institute of Technology
Bengaluru, India

Abstract—**Photovoltaic (PV) systems are one of the most popular forms of Renewable Energy Sources. It is extremely important that these systems be operated at the Maximum Power Point (MPP). Under uniform insolation conditions, we observe a single peak in the P-V characteristics of a PV array. In contrast, under Partial Shading Condition (PSC) the P-V curve is highly non-linear and has multiple peaks that can be classified as Local and Global Peaks. Conventional MPPT Algorithms have failed to deliver satisfactory results under PSC. Hence, nature inspired optimization techniques such as the Particle Swarm Optimization (PSO) algorithm have been applied to MPPT under PSC and have proven to be an effective solution to the problem. In this paper, we employ a set of simple and dynamic Inertia weight strategies which are independent of factors such as maximum number of iterations and can be exploited to increase the speed of tracking of the PSO based MPPT approach. An inertia weight which is dynamic, simple and intuitive has also been proposed. The proposed Inertia Weight(IW) is independent of the current iteration number as well as a predetermined value for the maximum number of iterations necessary to converge to the MPP. A significantly lower convergence time and lesser Tracking Losses are obtained using the proposed IW. The performance of all these techniques have been evaluated using simulations under different shading conditions and validated with a hardware implementation.**

Keywords—MPPT; PSC; PSO; Inertia Weight(IW); PV Systems; Dynamic; Simulated Annealing Inertia Weight(SAIW); Global-Local Best Inertia Weight(GLbestIW).

I. Introduction

Solar Photovoltaic Systems are of great importance in the field of renewable power generation due to the abundance of sunshine available during the day which can be converted into electrical energy. In addition, they can be incorporated into any location with minimum amount of difficulty and have a wide number of applications in which they can be utilized. The power output of a PV cell is a function of its temperature and the magnitude of irradiance. When uniformly irradiated, there exists only one peak in the P-V Characteristics of the array. The function of an MPPT Controller is to continuously track this unique point under any given condition. In a PV array, there is often the possibility that one or more group of cells or a module gets shaded. Under such conditions, the P-V characteristics no longer has a single peak but is multimodal in nature and the peaks obtained can be classified as Local Peaks and Global Peaks. An MPPT algorithm under PSC must be able to track this global peak for any shading pattern. Conventional MPPT algorithms like the Hill Climb and Incremental Conductance as well as other MPPT algorithms have been analyzed in [1]-[2]. These algorithms fail miserably to track the global peak under PSC (when the global peak is not the first peak). Several attempts have been made to modify these algorithms to incorporate Global tracking capability under PSC [3]-[8] but these only make the tracking process longer and more complicated. Thus, there exists a need to use an approach which is both simple and effective. In [9] a PSO based MPPT scheme has been described. In [10]-[12] this MPPT technique has been modified for better results. Thus, PSO based MPPT proves to be a simple and effective solution to the problem.

II. Partial Shading Conditions

A. P-V and I-V Curves Under Partial Shading Conditions

MATLAB R2016b has been used for our simulations. This version of MATLAB is fully equipped with its own PV Array block which allows us to directly view the P-V and I-V Characteristics of the array under uniform insolation conditions. Under PSC, the P-V and I-V curves can then be plotted for the gradual variation in voltage. An example of these curves is as shown in fig. 1a and 1b.

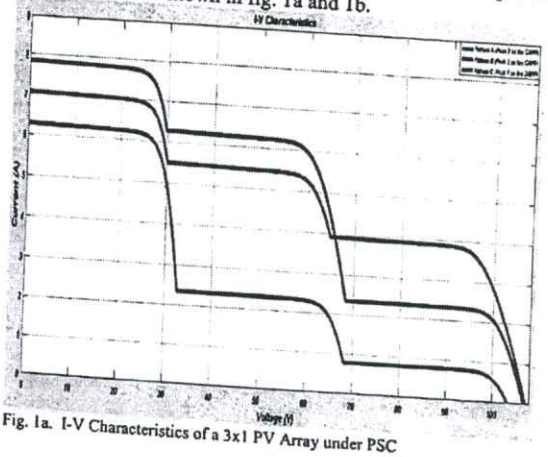

Fig. 1a. I-V Characteristics of a 3x1 PV Array under PSC

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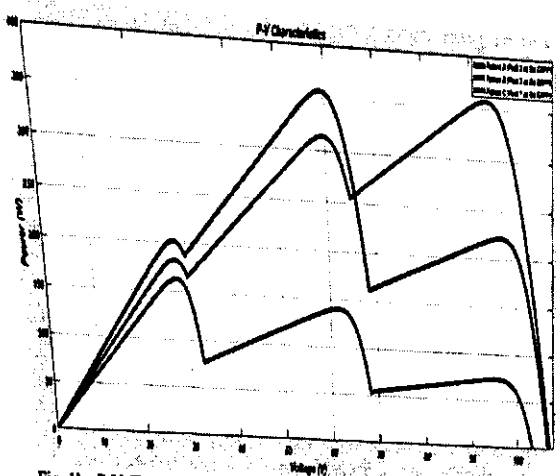


Fig. 1b. P-V Characteristics of a 3x1 PV Array under PSC

III. PSO BASED MPPT SCHEME

The PSO Algorithm was inspired by the flocking nature of birds and schooling nature of fishes and is hence an example of an algorithm that employs swarm intelligence for optimization. It performs a global search process by employing global communication among individual units of the swarm (called particles) [13]. The positions of each particle are updated to search the entire search space for an optimum solution. The algorithm has a deterministic as well as a stochastic component. Within the stochastic component, there exists both a cognitive behavior based component (P_{best}) and a social behavior based component (G_{best}). Two main parameters are used in the PSO algorithm which are called the position (x) and the velocity (v) of a particle. These parameters are varied every iteration until convergence to the optimum solution occurs.

A. Particle Velocity and Position Update

The PSO velocity and position update for each particle i at an iteration t (for the next iteration t+1) are:

$$v_i^{t+1} = \omega^t . v_i^t + c_1 . r_1 . \left(P_{best_i}{}^t - x_i^t\right) + c_2 . r_2 . \left(G_{best}{}^t - x_i^t\right) \quad (1)$$

$$x_i^{t+1} = x_i^t + v_i^{t+1} \quad (2)$$

where, c_1 and c_2 are acceleration constants or learning parameters & r_1 and r_2 are random numbers between 0 and 1. ω is the inertia weight which can be time varying or constant.

The position x_i corresponds to the reference voltage V_{ref} which is generated by the MPPT controller to vary the duty cycle of the converter. Thus, for n particles we have:

$$x_i^t = \left[V_{ref_1}{}^t\, V_{ref_2}{}^t\, V_{ref_3}{}^t \ldots\ldots\ldots\ldots\ldots V_{ref_n}{}^t\right] \quad (3)$$

B. Inertia Weight Strategies

As highlighted in [14]-[15], the inertia weight plays a key role in exploiting the global search ability of the PSO algorithm. This component is desired to have a high value in the initial stage and its value should slowly decrease as the particles approach the MPP. Various Inertia Weights (including 1, 2 & 3 presented below) are summarized in [15]. The IWs considered in this study are:

1. **Constant Inertia Weight (CIW):**

$$\omega = k \quad (4)$$

where k is a constant

2. **Simulated Annealing Inertia Weight (SAIW):**

$$\omega^t = \omega_{min} + (\omega_{max} - \omega_{min}) . \lambda^{t-1} \quad (5)$$

where $\lambda = 0.95$

3. **Global-Local Best Inertia Weight (GLbestIW):**

$$\omega_i^t = 1.1 - \frac{G_{best}{}^t}{P_{best_i}{}^t} \quad (6)$$

4. **Modified GLbestIW (MGLbestIW):**

$$\omega_i^t = 1.1 - \frac{P_{best_i}{}^t}{G_{best}{}^t} \quad (7)$$

C. MATLAB Simulink Implementation

The simulation for the proposed PSO based MPPT is carried out using MATLAB Simulink. A 3x1 PV array has been considered to study the process of MPPT under PSC. The PSO Algorithm is implemented using a MATLAB function block. The inputs to the block are the PV array voltage and current. In addition, for computing the duty cycle we utilize the output voltage across a load resistor as an input to the system. A boost converter acts as the intermediate stage between the PV array and the load. The input capacitor is selected using [16]. The converter is employed to vary the operating voltage of the PV array and hence arrive at the voltage at which maximum power can be harnessed from the array i.e V_{MPP}.
The Simulink implementation is shown in Fig. 2.

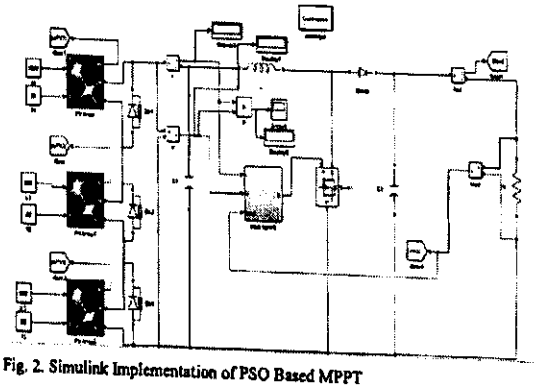


Fig. 2. Simulink Implementation of PSO Based MPPT

D. Steps in Implementing PSO Based MPPT

The steps involved in implementing the PSO based MPPT are similar to those described in [17] and [18] with the necessary modifications. The steps are as follows:

1) The particle positions are initialized. We have selected 4 particles at [0.8 0.6 0.4 0.2]*V_{OC}. The values of c_1 and c_2 are fixed as constants.

2) The inertia weight for each iteration and particle is computed for the corresponding method using (4), (5), (6) or (7).

3) For each particle 'i', the corresponding duty cycle (D) at an iteration 't' is computed using (8) and a pulse is generated. The generated pulse is fed to the DC-DC Boost Converter.

$$D(i) = 1 - \frac{V_{ref_i}^t}{V_o} \quad (8)$$

4) A small delay is provided and the power derived from the PV array is computed as the product of the input voltage and current for each particle position.

5) For a given particle, its position at which maximum power was obtained is stored as its Personal Best.

6) Amongst all the best positions, one particular position stands out as the absolute best position at which the input power is maximum. This position is stored as the Global Best position.

7) The velocity vector and corresponding particle position are updated using (1) and (2) respectively.

8) The convergence criterion is evaluated. If it is not satisfied, the algorithm continues from the 2nd step. Otherwise, the positions of all the particles are fixed at the last computed Global Best position.

The convergence criterion is satisfied when all the components of the velocity vector become less than a given tolerance limit.

It must be noted that V_{ref} has been kept between the threshold values of 0.1*V_{oc} and 0.9*V_{oc} as the MPP for any array configuration and shading pattern lies between 10% and 90% of V_{oc}. Also, the values of c_1 and c_2 are fixed so as to view the effects of the inertia weight alone on the tracking speed. When these factors are also tuned to be time varying, the convergence time will reduce even further and the system will reach the MPP much faster. This is of utmost importance as reduced convergence times lead to lesser energy loss during the process of tracking (resulting in higher energy efficiency).

E. Hardware Implementation

For the hardware implementation, a 100kHz Boost Converter is implemented. An Arduino UNO board is utilized as the MPPT Controller. The steps described in the previous section apply to the hardware implementation as well. The inputs to the controller are the input voltage, input current and the output voltage. The pulse generated by the microcontroller is fed to the MOSFET via a driver circuit.

IV. RESULTS AND DISCUSSION

Fig.3 – Fig.6 are the simulation results for CIW, SAIW, GLbestIW and MGLbestIW PSO approaches respectively corresponding to the characteristics of pattern A shown in Fig.1a and 1b. Fig.7 – Fig.10 are the hardware results for the CIW, SAIW, GLbestIW and MGLbestIW PSO approaches respectively. The following can be observed:

- The CIW-PSO takes the largest amount of time to converge to the MPP.
- The SAIW-PSO takes comparatively lesser time to converge to the MPP. It depends on the current iteration number and must be utilized with a suitable velocity clamping. Hence, it requires some tuning.
- The GLbestIW-PSO has a comparatively better performance and seems to converge to the MPP faster than the above approaches. This is because the positions of the particles near the Global Peak are perturbed to a lesser extent than other particles. (When $G_{best} = P_{best}$, $\omega = 0.1$)
- The proposed MGLbestIW-PSO has the most preferable convergence speed amongst all the 4 approaches. This is because positions of the particles near the Global Peak are perturbed to a lesser extent as mentioned above. In addition, particles away from the Global Peak are perturbed to a greater extent when compared to the same particles in the GLbestIW-PSO approach. (as P_{best} is always less than or equal to G_{best})

Thus, it can be inferred that the inertia weight plays a key role in the tracking speed of the PSO algorithm. Additionally, compared to all the available IW strategies the MGLbestIW has many advantages. The fact that it does not depend on the iteration number and the maximum number of iterations along with easy hardware implementation is what makes it more preferable. Also, it is directly related to the ratio of the position best and global best variables.

Table 1. highlights the time required to converge to the MPP and the Energy Lost while tracking when each IW strategy is utilized for 15 different shading patterns. When c_1 and c_2 are also tuned to be time varying, these values will further decrease and faster tracking will be achieved. The system successfully tracks the MPP for multiple shading patterns in the hardware implementation as well.

V. CONCLUSION

The study reveals the effect of the inertia weight of the PSO algorithm on the convergence time of the system for a Partially Shaded PV Array. When the inertia weight has a high value in the initial set of iterations and it decreases gradually to a low value in the final few iterations (when the particles have nearly reached V_{MPP}), there exists a good tracking response. A dynamic inertia weight independent of the iteration number and directly dependent on the P_{best} and G_{best} variables is observed to give the most satisfactory results. The MGLbestIW effectively exploits the global search capability of a standard dynamic inertia weight. Hence, this IW strategy is preferable when compared to the existing strategies utilized in PSO based MPPT for Partially Shaded PV Arrays.

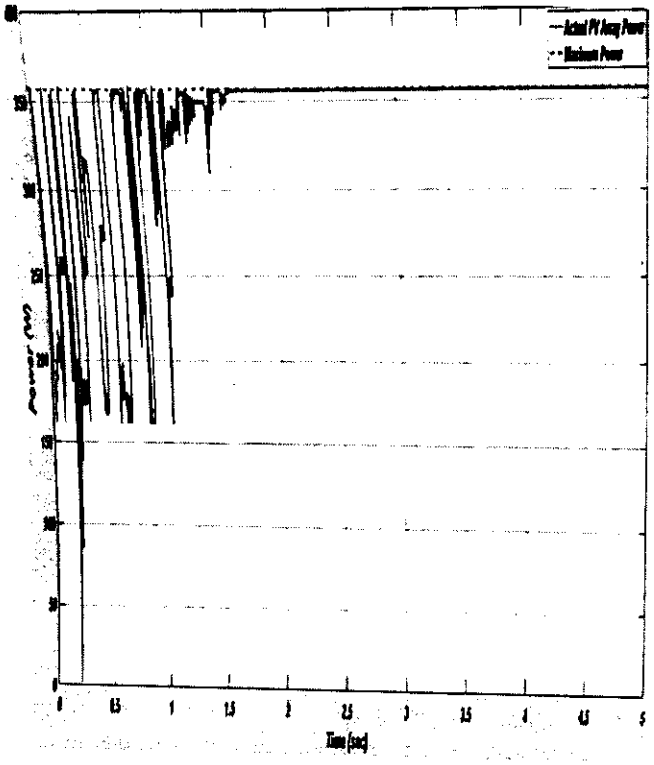


Fig. 3. Power Output for CIW-PSO (Pattern 6)

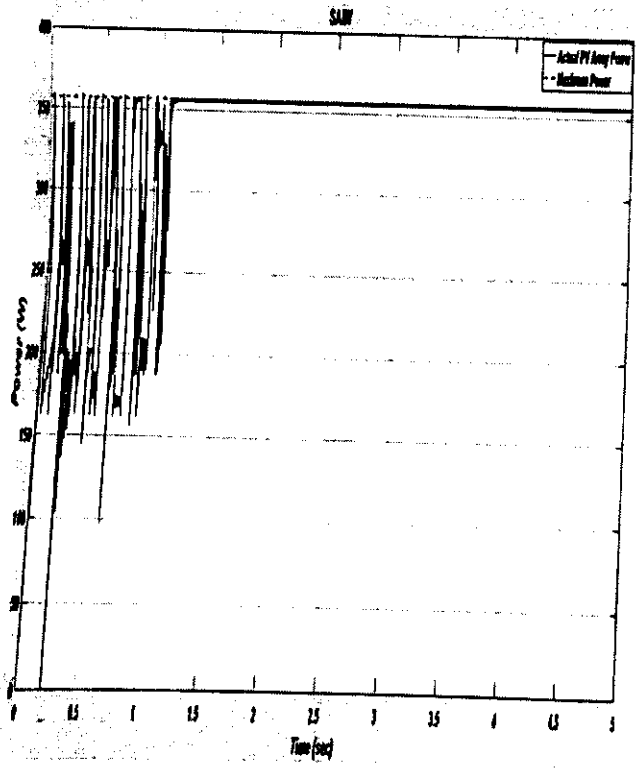


Fig. 4. Power Output for SAIW-PSO (Pattern 6)

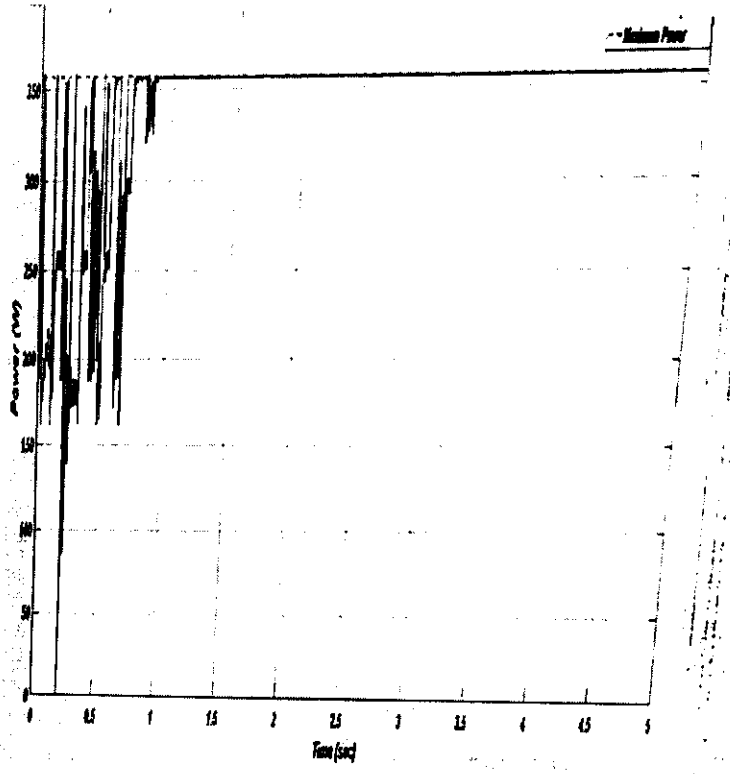


Fig. 5. Power Output for GLbestIW-PSO (Pattern 6)

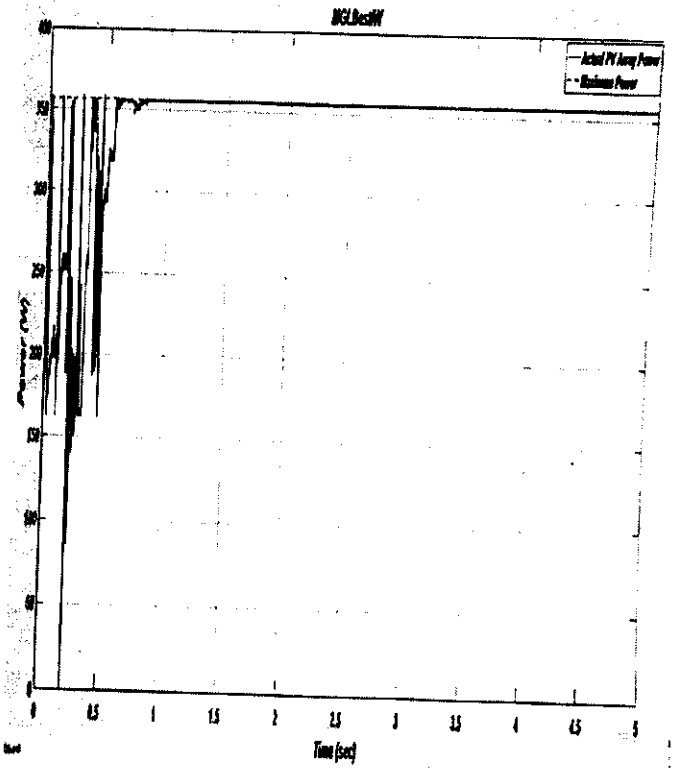
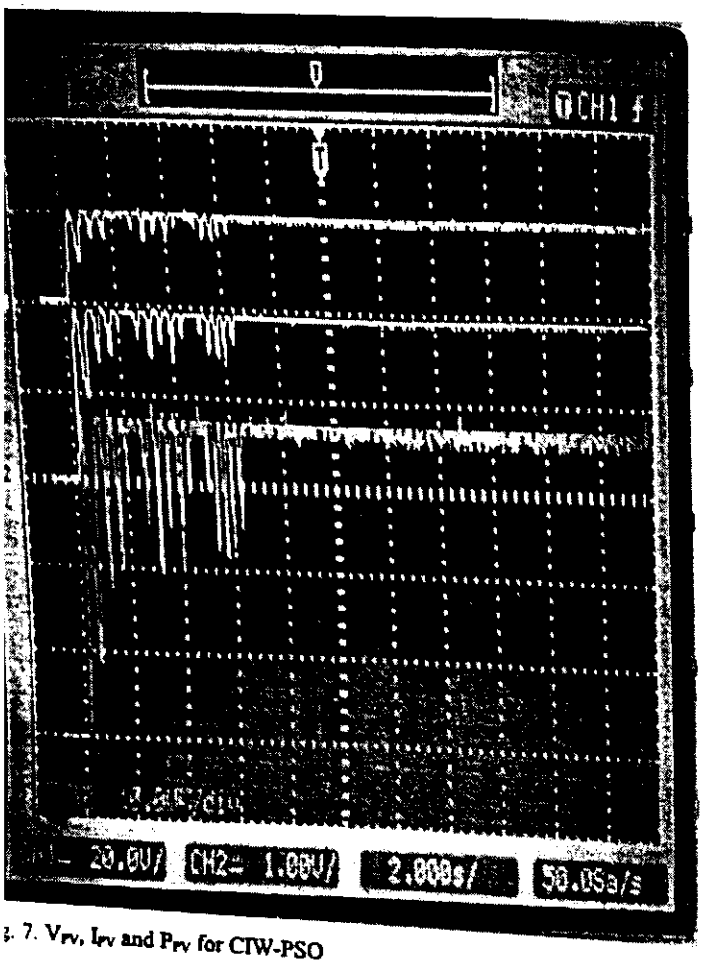


Fig. 6. Power Output for MGLbestIW-PSO (Pattern 6)



3. 7. V_{PV}, I_{PV} and P_{PV} for CIW-PSO

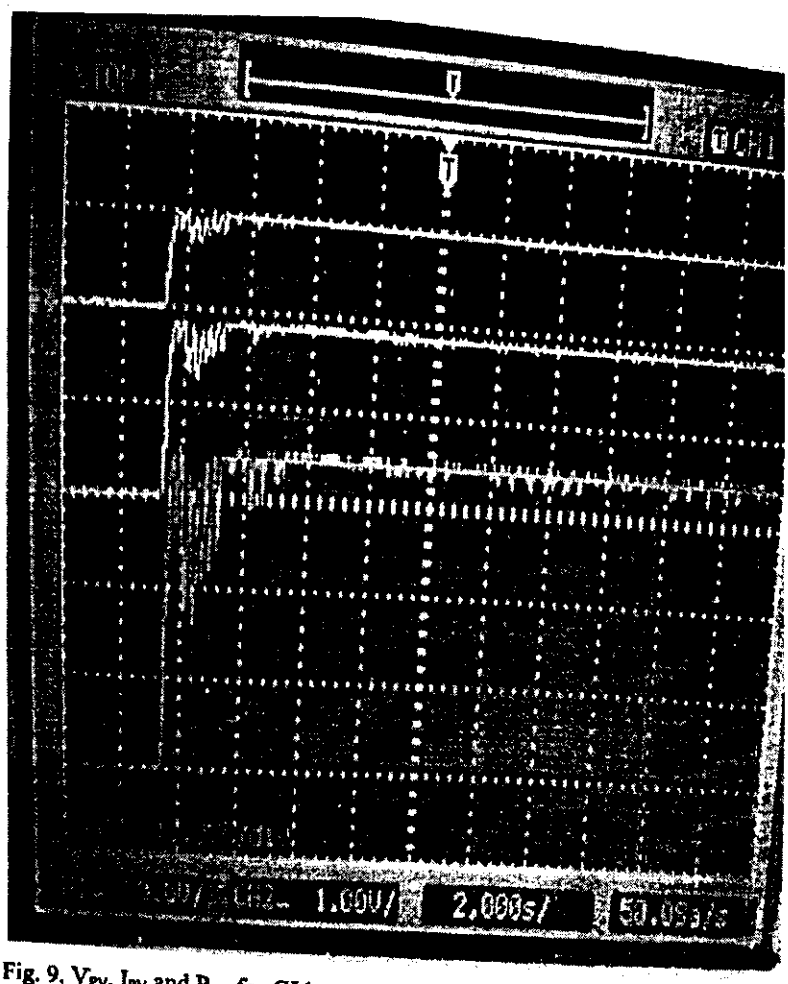
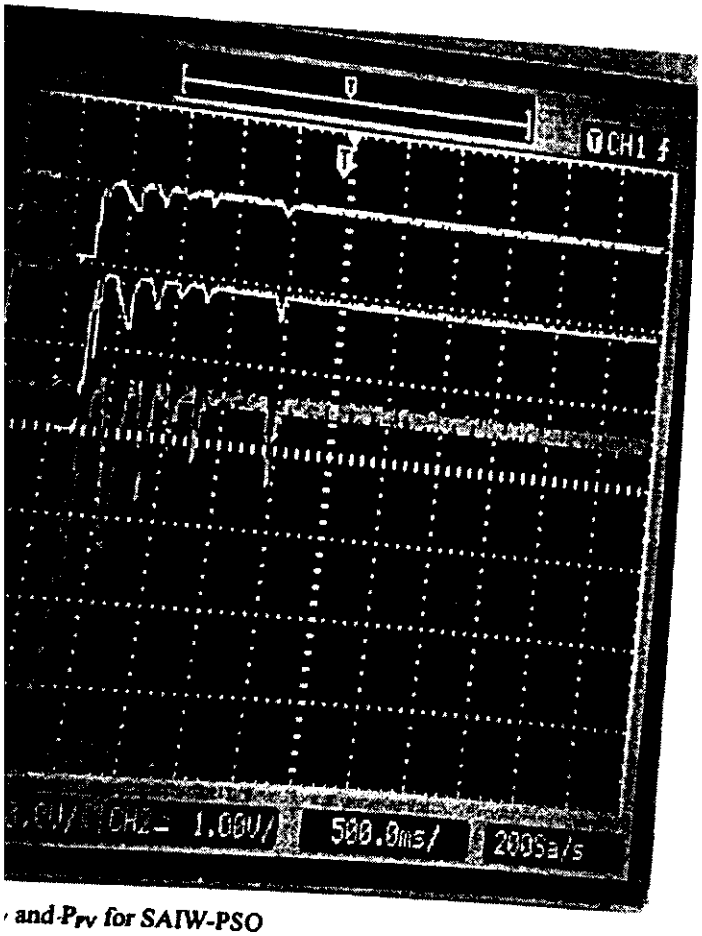


Fig. 9. V_{PV}, I_{PV} and P_{PV} for GLbestIW-PSO



and P_{PV} for SAIW-PSO

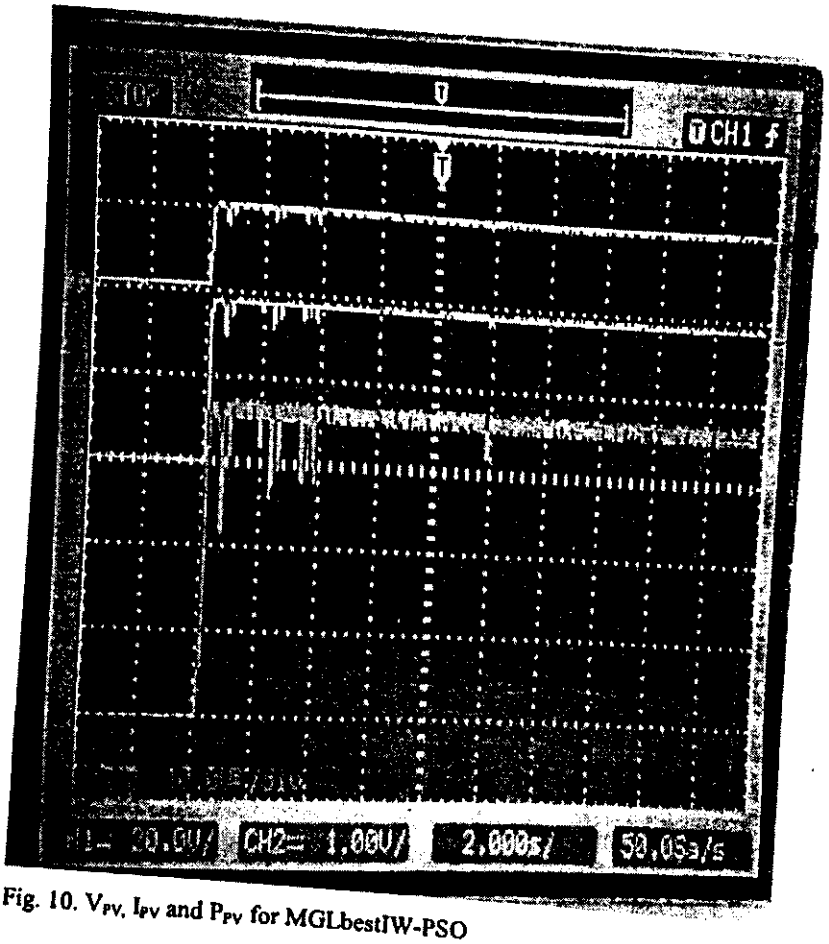


Fig. 10. V_{PV}, I_{PV} and P_{PV} for MGLbestIW-PSO

Pattern Number	Global Peak	V_{MPP} (V)	P_{MPP} (W)	CIW		SAIW		GLbestIW		MGLbestIW	
				T_{Conv} (sec)	E_{Loss} (J)	T_{Conv} (sec)	E_{Loss} (J)	T_{Conv} (sec)	E_{Loss} (J)	T_{Conv} (sec)	E_{Loss} (J)
1	1st	27.59	181.9	1.51	61.5	1.06	56.7	0.91	49.7	0.80	38.1
2		27.70	162.3	1.46	46.2	1.05	44.3	0.96	41.0	0.82	30.2
3		27.48	201.1	1.47	77.0	1.01	74.5	0.98	67.2	0.70	48.6
4		27.77	137.5	1.38	50.0	1.10	45.4	0.90	43.0	0.81	39.4
5		27.66	71.20	1.40	38.5	1.12	30.3	0.88	27.4	0.79	23.2
6	2nd	57.50	357.3	1.67	81.3	1.13	76.2	0.89	66.0	0.74	51.4
7		59.10	311.8	1.41	72.3	1.15	70.4	0.80	59.2	0.66	54.6
8		60.22	273.2	1.43	58.6	1.11	57.4	0.87	49.6	0.61	42.0
9		60.62	206.5	1.35	60.9	1.09	58.7	0.92	50.2	0.65	42.4
10		58.59	154.6	1.48	46.2	1.14	45.1	0.97	41.7	0.70	35.0
11	3rd	93.47	356.9	1.42	61.4	1.16	59.5	0.86	54.1	0.75	47.2
12		92.71	460.0	1.47	81.5	1.12	75.6	0.82	63.2	0.72	53.6
13		94.27	216.3	1.43	51.0	1.09	46.3	0.90	34.5	0.69	25.6
14		93.62	143.2	1.39	38.6	1.16	35.9	0.84	29.3	0.73	24.5
15		90.82	82.10	1.44	29.7	1.02	26.3	0.93	24.3	0.77	16.4

Table. 1. Comparison of Inertia Weight Strategies for PSO Based MPPT
(T_{Conv} is the Convergence Time and E_{Loss} is the Energy Loss that occurs while tracking the MPP)

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A Novel ATM Security System using a User Defined Personal Identification Number With the Aid of GSM Technology

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Abstract—**In contrast to the past, Automatic Teller Machines (ATMs) are widely used due to their simplicity and extensive availability. Presently, ATM systems use no more than an access card which usually has a magnetic stripe (magstripe) and a fixed Personal Identification Number (PIN) for identity verification. Some other cases utilize a chip and a PIN which sometimes has a magstripe in case the chip fails as a backup for identification purposes. This method is not very secure and prone to increase in criminal activities. The need for a novel, simple as well as secure method of access is thus imperative. In the present work, a PIN is generated by the user and this PIN is made available to the ATM system by the means of a Subscriber Identity Module(SIM) in the user's Mobile Phone. This information is communicated to a Global System for Mobile Communications (GSM) module embedded into the ATM's functional framework. This method of security is more stable than the traditional methods presently in use. The method presented is dynamic due to the possibility of changing the User Defined PIN(UDPIN) in each and every transaction. Losing the access card no longer becomes a big problem to the user and the need for immediate deactivation is also eliminated. It can also be enhanced by including other security features without large number of modifications. A simple prototype employing this security function has been implemented and the results are verified. The proposed system has been tested extensively and proves to be a simpler and better security measure.**

Keywords—ATM Security; User Defined PIN(UDPIN); GSM; Dynamic

I. INTRODUCTION

The present day ATM's are Static PIN based security systems. When we are about to carry out a transaction, the PIN is fed as an input which is encrypted at the client side and the data is decrypted at the server side. In most modern ATMs, the customer is identified by inserting a plastic ATM card with a magnetic stripe or using a plastic smart card with a chip that contains a unique card number and some security information (such as an expiry date). Security is provided in the form of entering a PIN. As technology is improving, hackers are able to easily retrieve this data and the number of fraudulent activities are increasing. Hence the only way to secure the data is to replace the pre-generated and saved numbers with other forms of security. The risk of data misuse can be greatly reduced through such a replacement.

The main aim of this paper is to establish a novel method for enhancing ATM security. This paper primarily focuses on the concept of User Defined PINs and their dynamic behaviour which aids in improving security. Also, the work gives a little formal insight on the use of such PINs along with biometrics for the possibility of having enhanced security [1].

In particular, the extension of such concepts for biometric security utilizing fingerprint scanners will be discussed to some extent. The coupling of such a dynamic yet simple methodology with sophisticated techniques such as edge detection in fingerprint scanning as described in [2] would be the ultimate goal of this work.

The key ideology of this paper is to present the possibility of double authentication methodologies for secured ATM transactions. The primary data sources are the user defined PIN and the secondary data sources are biometric representations such as facial recognition or fingerprint verification [3].

This paper focuses on the use of UDPINs as a verification method. Here the password or the 4-digit code (or 6-digit code) is sent to a connected GSM unit and further processing occurs. These security methods can be implemented to be used along with the ATM card and/or Biometric Security Measures.

The workflow of the rest of the paper is as follows: Section II highlights The Need for Better ATM Security. Section III describes the Previous Work Towards Improving ATM Security. Section IV explains the Proposed Method. Section V gives a brief overview of the Hardware Implementation. Section VI highlights the Software Requirements. Section VII includes Results and Discussions. Section VIII deals with the Future Work that can be done using the proposed system.

II. THE NEED FOR BETTER ATM SECURITY

ATMs have made day to day transactions a much simpler process. The necessity of frequently visiting banks for both transactions as well as gaining access to relevant information such as the amount remaining in an account are altogether

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eliminated by the means of a well-established chain of ATMs in close proximity to users in any region. In recent times, it has been observed that the present security measures in place in any ATM kiosk for gaining access to funds in a safe and hassle-free manner are not very fool proof and have a lot of loopholes which are exploited by hackers. This is well documented and elaborately explained in [4] which covers the need for better ATM security and the various methods by which said security is compromised. In particular, magstripe technology is shown to have a very high risk of being exploited due to the fact that it contains all the relevant information which can be easily stored and retrieved by the attacker. Measures to mitigate this have also been countered by attackers. The possibility of installing devices to skim the required data from an ATM card and the installation of fake keyboards over real ones to store the required security information are an everlasting threat to both ATM users and the associated banks. Hence, this brings about a need for more robust security measures. Security measures must be implemented in such a way that the present system needs to be modified to a very small extent and such threats can be dismissed.

III. Previous Work Towards Improving ATM Security

In [5], a secure ATM system has been developed using RFID tags as the primary security testing mechanism. It is derived from [6]. A wide array of sensors such as PIR sensors, Vibration sensors and Smoke Detection sensors have been utilized in conjunction. An Embedded Web Server(EWS) was also developed to facilitate the necessary functions described in the study.

[6] introduces the concept of Man to Machine(M2M) communication and its prospects in ATM security. This work also utilizes RFID tags for the locking and unlocking of the ATM shutter door. In addition, it also utilizes smoke detection and fire detection sensing systems for user safety. Vibration Sensors are utilized to detect attackers in the proximity of the user. A simple EWS was also developed.

The above studies consider RFID tags as their major means of securing the ATM. If and when the tag falls into the wrong hands, such a system can be exploited.

There has always existed the possibility of attackers obtaining the necessary PIN using footage from well concealed cameras that have been placed on the machine. [7] addresses such 'observing attacks' which are classified as brute force attacks. The entire study develops on the concept of resistance strength against brute force attacks and a thorough analysis of this is presented for 2 cases namely the presence of one recording and the presence of 2 recordings.

Similarly, [8] proposes an authentication method for video recording-based attacks as well as attacks linked to random logins. The method proposed is interesting and simple. It utilizes a virtual keyboard presented to the user for entering the password. Additionally, instead of selecting general characters as is done in any authentication system, the entry of the password involves the selection of header-images. This can make the process of video surveillance-based hacking of passwords more cumbersome for any attacker.

[9] proposes a novel Secure M-Cash Withdrawal application. This has to be used in conjunction with NFC and RFID tags present in modern smartphones. It boasts the advantages of having independence from ATM cards and the full utilization of a mobile phone's functionalities for secure transactions. The method involves a two-way handshake signal between the Mobile Phone and the ATM. In addition, it also utilizes two-way handshakes between the ATM and the banking system. A detailed architecture of the entire components and communication channels that can be employed is presented. There exist multiple possible communication means by which this secure transaction can be implemented. Each of these have been highlighted with the possible drawbacks and advantages. This method introduces the capability of utilizing mobile phones for secure transactions. Due to possible security threats, an additional layer of security is provided by the means of a Biometric Authentication Layer. Such a combination of security measures will (as suggested by the author), reduce the possibility of Brute Force Attacks on the system. This is due to the existence of a very large number of possible combinations which will be more difficult to crack in a finite duration of time.

[10] points out the fundamental drawback of system generated One Time Passwords (OTP) as an authentication mechanism. Cases such as international roaming and sometimes delay or loss of information can cause unnecessary hassle to the user. It summarizes these disadvantages into 4 forms namely:

- SMS Cost (an issue for both the customer and the bank)
- Transmission Delays in the SMS
- Cases such as International Roaming and
- Lack of SMS Security due to cracking of Algorithms by hackers.

The authors present a 2-factor authentication technique which utilizes mobile phones for generating OTPs in the forward direction. This is realized using two hash functions. One updates the seed value while the other works towards OTP generation. The method utilizes two phases namely a Registration Phase and a Login & Authentication Phase. The registration phase involves the generation of two hash functions and an initial seed on the user's mobile phone. The login and registration phases require the user to enter all known details such as the username and password followed by the phase of OTP generation.

[11] proposes the use of Mobile Phones as a means of Biometric authentication in ATM security. The user's mobile phone must have a sensing mechanism such as a camera for facial recognition or a fingerprint sensor for recognizing the individual by their fingerprint. The ATM system's software has to be upgraded to one that can encode and display a QR

code on the screen of the ATM. This is done for improving the security of the system.

In this method, the users register and enroll themselves with the bank and decide on a biometric authentication process that can be carried out on their phone and a capture tool has to be installed. The authentication phase includes an added security layer which is the biometric authentication phase. A brief summary of the authentication process is as follows:

The system generates an OTP and the user has to enter this OTP into the system. When the OTP is received by the banking system, it is encrypted (using a secure key) and sent to the ATM terminal. Here it is encoded into a QR code image which is displayed on the screen and must be scanned by the user. The mobile phone decodes the QR code image and the user is prompted to complete a biometric test using the mobile phone. This is followed by the decryption of the OTPs by the mobile phone and finally the user enters the OTP into the system to begin the transaction.

IV. The Proposed Method

A. *Steps in Implementing the Proposed ATM Security System*

The steps involved in the proposed ATM security system are summarized below:

- The ATM Security System begins its operation by verifying the functioning of the GSM module. If everything seems to be in order, a "GSM OK" message is displayed on the LCD.
- If a 2-factor authentication is desired, a card has to be inserted or a finger must be placed on the fingerprint scanner for cross referencing.
- Otherwise, the user is prompted to enter any simple detail readily available in the database such as account holder's name.
- If the user turns out to be a "Valid Customer", he/she is prompted to generate a UDPIN which will be sent to the Microcontroller by the means of the GSM module.
- The PIN generated by the user has to be entered using the provided keypad.
- If both pins are a match, the system will allow the user to enter the desired amount or to check account details such as the current balance.
- In such a situation, once the transaction is complete, the UDPIN is immediately destroyed on the server side so as to prevent any further malicious activity.
- In the event the PINs do not match, the system will immediately trigger an alarm signal. This occurs by the means of a buzzer that is turned ON and will ring continuously to indicate the occurrence of fraudulent activity. (Theft Alert Sequence)
- The user is also immediately informed of such activity so as to ensure whether the error was made by the user or someone else.

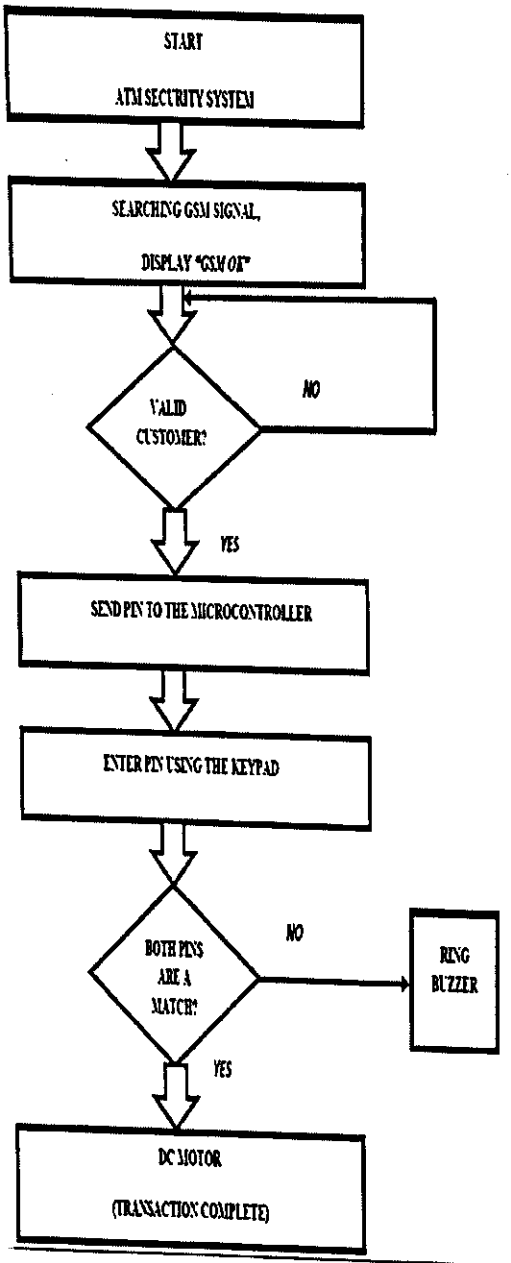

Fig. 1. Flowchart of the Proposed ATM Security System's Operation

B. *Prerequisites for the Functioning of the Proposed System*

- The user must register with the bank for the activation of such a secure ATM service.
- In the registration phase, all documents are verified and the user is requested to fill in certain necessary details.
- Few of these details are general details such as the name of the user, the address and so on.
- Of key importance are information such as the registered mobile phone number which will be utilized by the user when carrying out any such transaction.
- All these details are stored in a database. These details are made available to the ATM terminals connected to the server.
- Whenever a user tries to carry out any transaction, the first check made at the terminal is whether the mobile number being used to generate the UDP matches the one stored in the database.
- If and only if the message received by the GSM module originates from the correct mobile number, will the transaction proceed.
- Additional details can also be stored for heightened security such as the IMEI number of the phone currently in use by the customer.

V. Hardware Implementation

A list of the desired hardware components to implement the proposed ATM security system include:

- ARM7 LPC2148 Microcontroller
- 4x4 Matrix Type Keypad
- 16x2 LCD Unit
- GSM Module
- GSM Mobile Phone
- Relay
- Regulator IC
- DC Motor
- Buzzer
- Battery
- Card Reader or Fingerprint Module (to include a two-factor authentication scheme in subsequent applications)

The Block Diagram of the entire setup is as shown in fig.2

The main components of this system are the GSM module and the Fingerprint module/Card Reader. The GSM module is connected to the microcontroller ARM7 LPC2148 through UART 0. If desired, any biometric authentication device such as a fingerprint module can be connected to UART1 of the microcontroller. Otherwise, a Card Reader can also be connected to UART1. All operations of the system will be displayed on a 16x2 LCD display.

A 4x4 keypad matrix is used to enter the PIN. A DC motor is directly connected to the relay. A buzzer is connected for signalling theft. The DC motor runs only when the transaction is successful. In case of a wrong PIN detection, an alarm signal is generated by the buzzer.

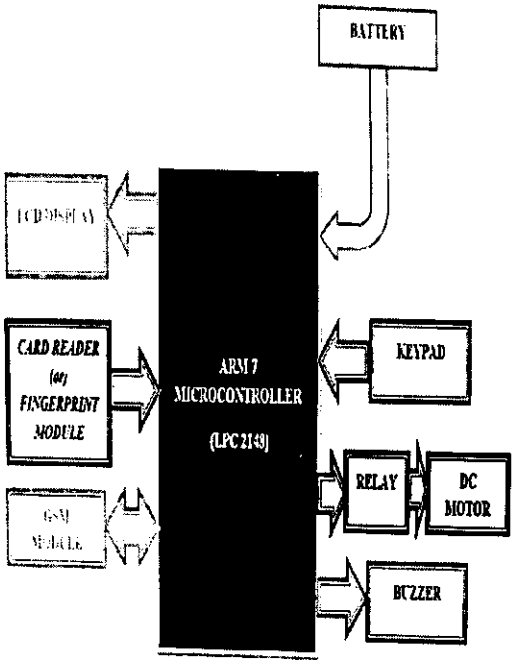

Fig. 2. Block Diagram of the Proposed ATM Security System

Fig.3 shows the hardware implementation of the given ATM Security System. The given system is a prototype and can be further improved for utilization in an actual ATM kiosk.

VI. Software Requirements

Embedded C was the programming language used to program the ARM7 LPC2148 Microcontroller. In addition, the following software tools were used in our application:

- Keil µVision 3
- Flash Magic
- SFG Demo Software
- Putty
- Hyper Terminal

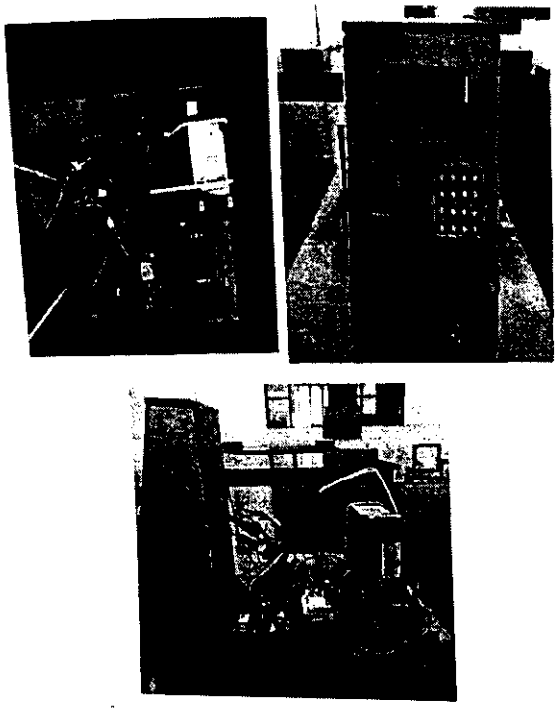

Fig. 3. Hardware Implementation of the Proposed ATM Security System

VII. RESULTS AND DISCUSSION

Automatic Teller Machines have become a mature technology which provide financial services to an increasing segment of the population in many countries. It is thus imperative that such a service be free from any form of hacking and/or fraudulent activities. The need for ATM security has been discussed extensively with examples of how these systems can be exploited by criminals. A brief review on the previous attempts made to improve ATM security reveals the possibility of having much more simple and effective security measures. The extensive use of mobile phones in the modern day gives us the possibility of integrating this technology with ATM security measures. The security measures in place in our mobile phones acts as another layer of security in the transaction process. Server-side generation of OTPs has shown to have certain disadvantages and hence we proposed a solution utilizing a User Defined PIN. The UDPIN is generated by a user's mobile phone and allows one to have a hassle-free authentication process. The UDPIN is immediately destroyed by the server which makes it more secure and unusable by hackers once the transaction is complete.

The proposed methodology can act as a standalone Security System or can be used in conjunction with ATM cards and/or Biometric Security Systems such as fingerprint scanners, facial recognition systems and so on. The method is simple and can be implemented with minimum modifications to the present-day ATM systems. Hence, it is a better ATM Security system.

VIII. FUTURE WORK

A thorough analysis of a two-factor based authentication system using Fingerprint Scanning and UDPIN generation can be developed. Our future work will aim at developing and implementing such a system for better security and reliability.

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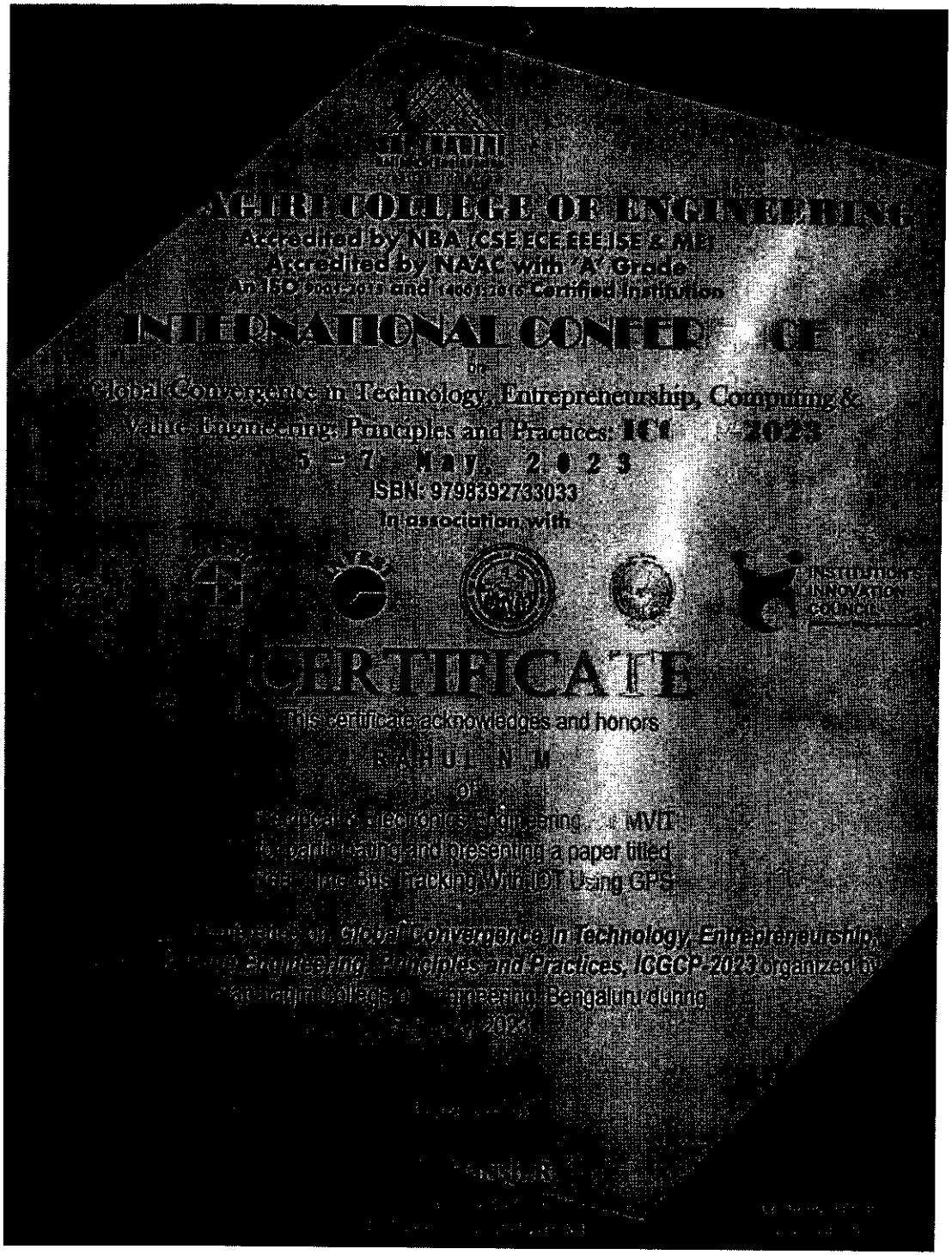
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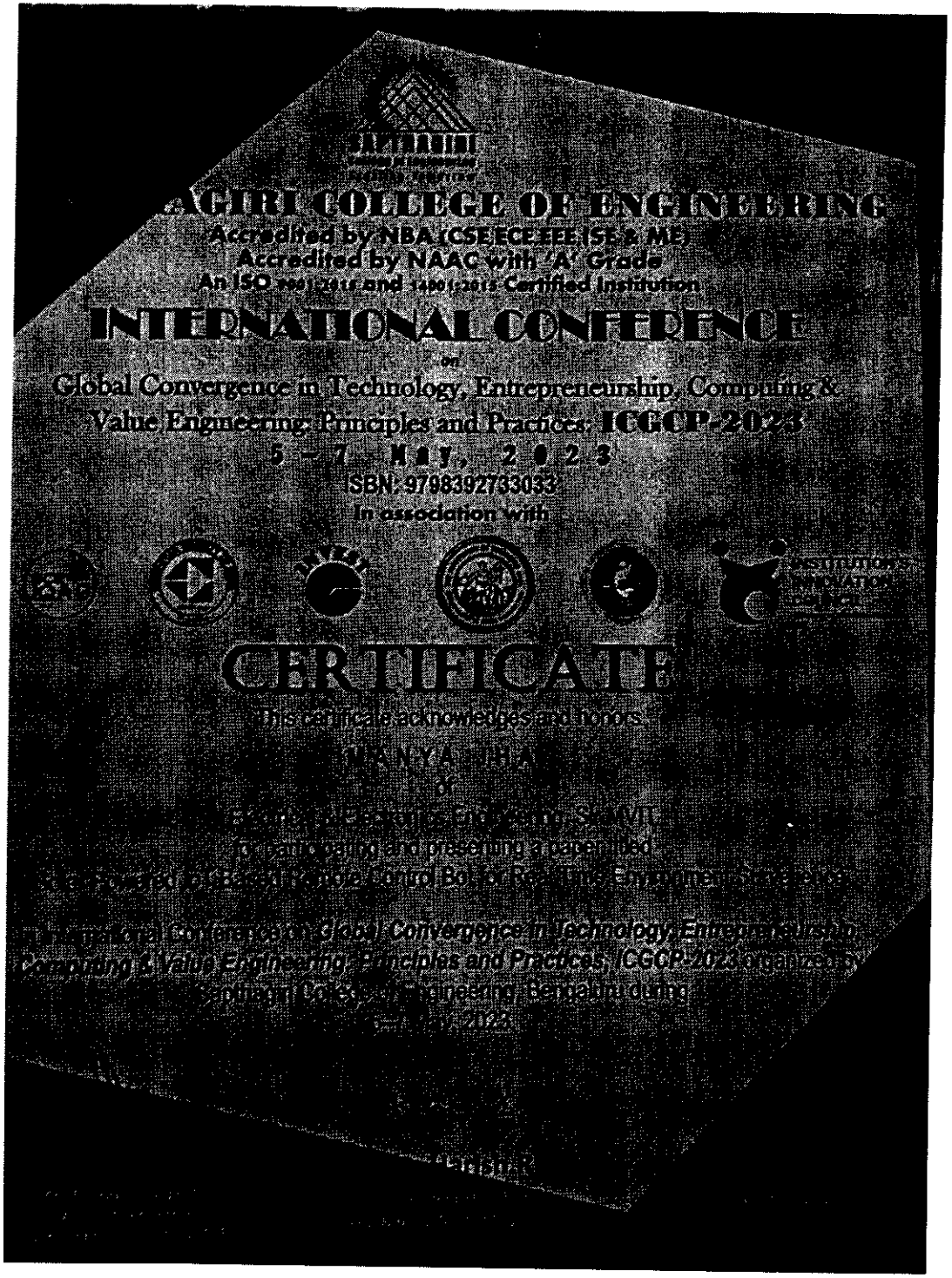
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IMPLEMENTATION OF SMART POLE UNIVERSAL BATTERY CHARGING SYSTEM USING SOLAR POWER AND IOT

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Abstract - In most of the countries the battery-operated vehicles are introduced, it requires recharging the battery. Here design of a smart pole system for automatic unmanned charging system for four and two-wheeler vehicles, while this system is also used to capture the number plate of the vehicle and send it to nearest police station to monitor the theft, vehicle safety and security purpose. This project describes how to use a hybrid power system to charge a vehicle's battery. The vehicle battery charger industry is worth billions of dollars, and it supports millions of vehicles. The need to provide a public charging service is essential. Many critics argued that a public charging service is not a lucrative business because most users can charge their vehicle at home, or in their office. Vehicle battery charger booth using hybrid power (solar and grid power) system is new business milestone because many are travelling though highway.

Keywords - Smart LED Street light, Solar charging system, IOT based payments, EV charging system

I. INTRODUCTION

The design and implementation of solar tracking generating power system is done. In This Model of Implementing a Smart Pole Universal battery charging system using solar power and IOT, two power sources are used.

The design and implementation of the solar tracking power generation system is Y.analysed by J. Huang. Here, the tracking mechanism is integrated with the expert controller, sensors, and input / output interfaces to increase the energy generation efficiency of the solar cell. To track the sun, cadmium sulphide light sensitive resistors are used. A fuzzy algorithm is then developed and implemented to achieve the best tracking results.

A field programmable gate array is used to design the controller so that the solar cells always face the sun in the daytime. According to Robert Weiss Bach, renewable energy is quickly gaining importance as an energy resource, as oil prices fluctuate.The global environmental change research has encouraged the use of more efficient and energy-saving technologies in many sectors of daily life. There has been an increase in energy consumption in the transportation sector recently. This is especially true in the automobile industry.

Thus, the need for more efficient use of Electric Vehicle Charging Stations (EVC) is becoming more competitive due to the improvement of embedded information systems and modes of operation of electric vehicle (EV) battery chargers in smart grids.In addition, power conversion device topologies have received much attention due to their various advantages such as improved accuracy, stability, and reduced power loss during charging operations. Several different topologies for energy converters have been discussed and compared in literature.

II. METHODOLOGY

Four main parts have been discussed under this topic. Design architecture is the main block function for the proposed design. While, the hardware specifications of each component is given below. Flow of the system is also explained.

A. Design Architecture

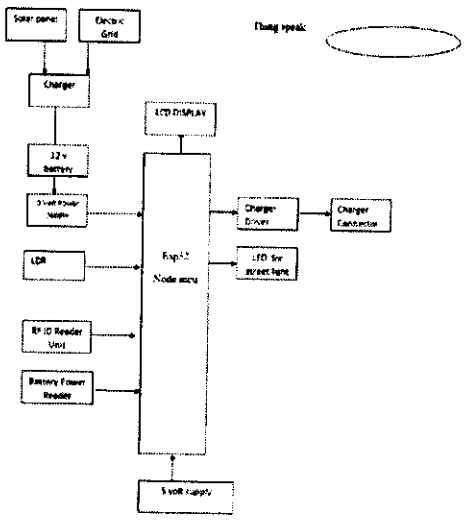
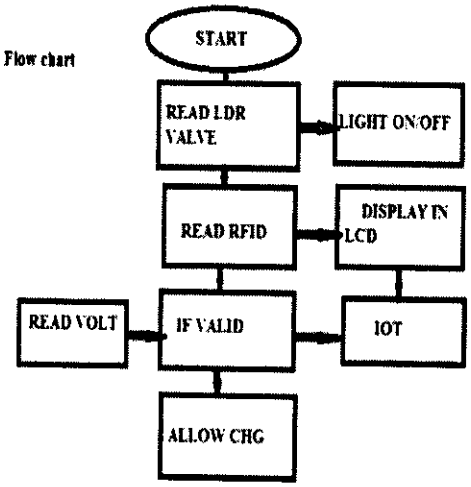


Figure 1: Block Diagram of Proposed System

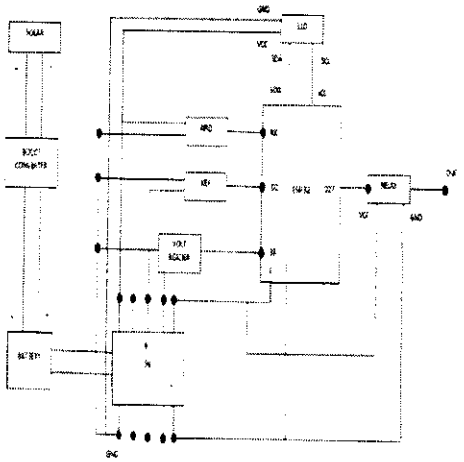
B. Flowchart:



C. Hardware Specification:

- Solar Battery Charging System:Adoption of monocrystalline silicon solar panels in parallel allows for more efficient use of the solar panel's electric-generation principle. This results in increased power output. The conversion circuit and filter circuit allow electrical energy to be converted from solar energy and stored in the energy storage battery.The emergency power ensures the safety of the charging process by monitoring over-charging, over-discharging and overcurrent protection. The battery can also provide a safe, effective and auxiliary 12V AC power for emergency equipment such as miniature PSA oxygen concentrators, and 5V USB power for electronic equipment.
- RFID: RFID technology is used to complete the task at hand. An EM-18 reader is used to read the RFID tags, and an Arduino is used to control the tags. Its goal is to reduce customer billing time and make shopping easier so that customers benefit. It can be implemented in busy shopping malls where there is a large crowd and a rush into the mall. In the world of automation, this technology will replace the present barcode system, which is currently in use. This technology can help people to store and manage their shopping easily, without having to do much work themselves. In order to be successful in life, it is important to have a clear vision and to work hard to achieve it. It is also important to surround yourself with positive people who will help you to achieve your goals.
- IOT: Thing Speak is an IoT analytics platform that allows you to aggregate, visualize and analyse live data streams in the cloud. Thing Speak provides instant visualizations of data posted by your devices. With Thing Speak, you can use MATLAB code to easily analyse and process data as it comes in. Thingspeak is often used for prototyping. IoT systems that require analytics are becoming more common. People often make the mistake of thinking that they need to be perfect in order to be successful. This is not true. In fact, being imperfect can actually be a better strategy when it comes to success.
- Smart Street Light Using LDR:It is a simple and powerful concept, which uses transistor (BC 547 NPN) as a switch to switch ON and OFF the street light system automatically. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. (e.g., in evening after Sunset). It automatically switches OFF lights when Sunlight falls on it (i.e., on LDR) e.g., in morning, by using a sensor called LDR (Light Dependent Resistor) which senses the light just like our eyes.

D. Pin Diagram:



E. Software and Hardware requirement:
In this system the following components are used

Solar 12 Volt 1 Amps

Lead Oxide Battery 12volt:The lead battery is made up of two lead sheets that are immersed in a sulfuric acid solution. This makes the battery chemically different from other types of batteries. The positive plate is made of lead dioxide PbO2 and the negative plate is made of pure lead.

WIFI ESP 32: ESP32 add-on includes the WiFi library which is automatically installed when you install the add-on in your Arduino. The ESP32 board can act as a Wi-Fi Station, Access Point, or both.

RFID reader and Tag: RFID Reader and Tag: Home Sensor RFID Card, Tags and Reader Radio Frequency Identification (RFID) is the wireless, non-contact use of radio frequency waves to transmit data. Communication with RFID tags.

Lcd Display: An LCD display is a flat panel display that uses the light modulation properties of liquid crystals. Liquid crystals do not give off light by themselves.

DC To DC Convertor: The DC to DC converter is designed to convert a DC voltage into another DC voltage. DC to DC converters use electronic switching technology to change the voltage level

ESP 32: This is a 32-bit MCU module from ESP.ESP WROOM 32 is a powerful all-in-one WIFI-BT-BLE microcontroller module that is designed for a wide range of applications ranging from low power sensor networks to the most demanding tasks such as voice encoding, music streaming and MP3 decoding.

LCD 16 X 2: The LCD 16x2 display is named so because it has 16 columns and 2 rows.

Solar Panel 12 Vol 5 Watts: Solar Panel 12 Volts 5 Watts: The process of converting light (photons) into electricity (voltage) is called the solar photovoltaic (PV) effect. Photovoltaic solar cells turn sunlight directly into electricity.

Rf Reader With Rf Tag: An RF tag is attached to a label and picks up FM radio waves.Once activated, the RF tag transmits a radio wave at a very specific frequency. The radio receiver gate recognizes the frequency of the radio signal.

Relay 2 Volt: 2 Volt Relay: The relay is an electrically operated switch.

LDR: A Light Dependent resistor (LDR) is a device that can change its resistance depending on the amount of light hitting it. Therefore, they are photosensitive devices.

LED: LEDs are a common type of light bulb used in electrical equipment. The technology has a variety of uses, from mobile phones to large advertising billboards.

Working:
In This Model of Implementing a Smart Pole Universal battery charging system using solar power and IOT, two power sources are used.

One power source is solar panel and other is its alternative that is Grid AC to DC converter of 12V. Solar panel gives the power to the circuit but it is not constant ass output from the solar panel can be of variable power which can fluctuate it can go below 12V or above 12V. To maintain this constant supply, we will use dc to dc converter er(chopper).

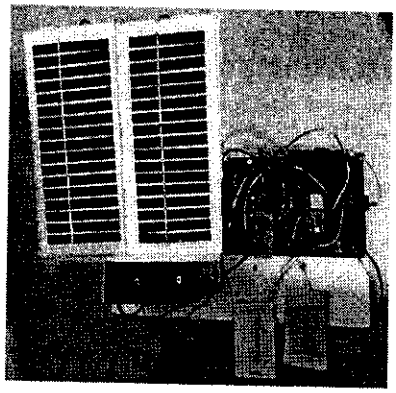
Now this supply will charge the 12V rechargeable battery which will be given to 5V power supply because 12V power cannot be directly supplied to the Node MCU ESP 32. ESP32 is used because The Node MCU ESP32 is a dedicated hardware platform that helps you to securely connect to the internet and access your data. The ESP32 is used because it is a series of low-cost, low-power microcontroller-chip systems with built-in Wi-Fi and dual-mode Bluetooth.The ESP32 series uses the TensilicaXtensa LX6 microprocessor in both dual-core and single-core versions, the Xtensa LX7 dual-core microprocessor or the RISCV single-core microprocessor, as well as built-in antenna switches, RF balun, power amplifier, low-frequency noise pickup amplifier, filters, and power management modules.

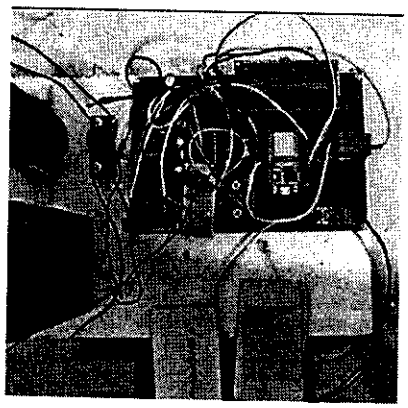
Now when any user or customer will come to charge their EV vehicle, they will be having the respective RFID cards. These RFID cards will be unique for different vehicles and their owners.
RFID Cards will be scanned via RFID sensors and the number plate of the vehicle will be displayed on the LCD used.
Then the user has to select the time duration for charging their vehicles.
As soon as they select time, relays will turn on and give the power to charge their vehicles.
When the selected time is Over, relays will get turned off and charging will stop.

The payment for charging will be deducted from the user's RFID card and the remaining balance of user's RFID Card will be displayed on the LCD screen. The Monitoring of smart pole, i.e., the power in the battery and solar panel can be displayed on personal devices like mobiles or laptop.

This is done through IOT. Cloud services which are in use is Thing-Speak. Data is collected from the smart pole and sent to personal device. In Thing-Speak data is constantly monitored as well as stored. These data can be displayed on personal devices from an application which is Thing View. This model of smart pole can also act as a smart Street Light. For this purpose, LDR is used. LDRs are resistors that change their resistance depending on the amount of light that falls on them. Their technology operates on the principle of photo conductivity - which gives less resistance in high light intensity and more resistance in low light intensity. An LED light has a lot of resistance at night and very little resistance during the day. This is because these lights are made from materials like cadmium sulphide, which help to control the light's sensitivity. When light falls on the surface of an LDR, the element's conductance or resistance changes in the control circuit. When it gets dark, the resistance of the LDR increases and turns on the light. Thus, this model is serves both purposes i.e., to charge the EV vehicles as well as smart Street light.

Images of Model:





IV. CONCLUSION

Intelligent power management systems with innovative power stage components are most likely to optimize vehicle battery performance and life while performing tasks to verify battery safety. In EV or HEV power systems, thorough and frequent monitoring of critical operating parameters, robust communication between all nodes on all control loops in the system, and rapid intent following effective control and protection mechanisms. The decision is essential.

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