

Goa University

School of Physical and Applied Sciences

Report on

GSRF Winter School Tilted

"Solving Reality: A Hands-On Workshop on Applied Differential Equations and Computational Methods"

1. Title of the Event/Activity/program	Solving Reality: A Hands-On Workshop on Applied Differential Equations and Computational Methods
2. Date and Time	24 th November 2025 to 29 th November 2025
3. Mode of conduct (Physical/Online)	Physical
4. School/ Directorate/ Section	School of Physical and Applied Sciences (SPAS)
5. Collaborating Agency/School/Directorate	Goa State Research Foundation.
6. Detail of the Resource Person (Brief biodata)	Following Faculties of SPAS were the speakers Prof. Ramesh V. Pai, SPAS, Goa University Dr. Mridini M. Gawas, SPAS, Goa University Dr. Pallavi P. Gaude, SPAS, Goa University Dr. Bhargav K. Alavani, SPAS, Goa University
7. Number of Faculty attended/participated	
8. Number of Student attended / participated	26 Students participated from undergraduate colleges of Goa.
9. No. of external students other participants	26 Students participated from undergraduate colleges of Goa.

10. The objectives of the Program/activity/event

- To introduce undergraduate students to the fundamentals and applications of differential equations in modeling real-world physical and mathematical systems.
- To develop foundational skills in computational physics, enabling students to translate theoretical models into numerical simulations.
- To cultivate analytical thinking and logical reasoning, encouraging participants to approach scientific challenges with confidence.

11. Description of the Program/activity/event

The Winter School was conducted from 24th to 29th November 2025, during the winter vacation for undergraduate students in Goa. Motivated undergraduate students from mathematics and physics were invited to apply through a brochure, video announcement, and Google registration form circulated via WhatsApp, email, Facebook, and Instagram. A total of 50 applications were received, including few faculty members. Based on interest and motivation, 26 students were selected.

The programme began with student registration and distribution of a registration kit containing essential stationery. The inaugural talk was delivered by Prof. Ramesh Pai, who introduced students to the evolution of computers, computation, and modern quantum technologies. This was followed by a lecture on Introduction to Differential Equations by Dr. Mridini Gawas, and a hands-on Fortran programming session by Dr. Bhargav K. Alavani and Dr. Pallavi Gaude. Each day consisted of theory sessions in the morning and practical sessions in the afternoon. Students learned to model real-world systems such as projectile motion with resistance, heat flow in metals, predator-prey dynamics, radioactive decay, and LCR circuits—using differential equations. Analytical solutions under limiting conditions, numerical errors, and Runge-Kutta methods were discussed.

In the practical sessions, participants were trained in Fortran programming, including basic

	commands, input/output, conditionals, and loops. Daily coding tasks were given, and students who completed them with minimal errors were awarded books. On the final day, Mr. Navanath Samant received a book prize for completing all coding tasks accurately and interpreting results effectively. On fourth day evening, participants were given a short tour of SPAS research facilities, including the SQUID system, X-Ray Diffractometer, and Computer Cluster. On the last day, students were assigned a real-world problem involving a large-amplitude pendulum suspended by a thin rod—an example that cannot be solved analytically. Students modeled the system using differential equations and simulated the motion using numerical methods and their newly acquired programming skills. The Winter School successfully introduced students to applied mathematics, computational physics, and numerical problem-solving, giving them both conceptual grounding and practical experience.
12. Benefit/Key outcomes of the Program/activity/event	The Winter School helped students learn how to turn real-life physical situations into mathematical models using differential equations. It also gave them practical experience in Fortran programming and numerical simulations, helping them build confidence and interest in applied mathematics and computational physics.
13. Enclosures with report	(Same has been pasted down in this document)
	Brochure, link
	Geo-tag photos link
	Group photo and general photos link
	Attendance of external participants, link

Coordinators: for GSRF winter school 2025.

Dr. Bhargav K. Alavani

Assistant Professor

SPAS, Goa University

Assistant Professor

SPAS, Goa University

Prof. Ramesh V. Pai Dean SPAREAN

Date:10/12/2025





SOLVING REALITY

A Hands-On Workshop on Applied Differential Equations and Computational Methods

School of Physical and Applied Sciences
Goa University

About the Winter School

Explore how mathematics the physical world from swinging pendulums to vibrating strings. Over six days, participants will learn to model natural phenomena and translate mathematical theory into computer simulations.

Who Can Apply?

Curious Physics and Maths undergraduate students who can think logically. No coding background needed.

What You'll Learn?

- •How to make math describe the real world?
- •Fortran: Language which computers understand.
- •Turning messy problems into neat computer simulations.
- •Plotting, visualizing, and interpreting results.

Event Details

- Dates: 24 29 November 2025
- Time: 9:30 AM 5:00 PM
- Venue: Computer Lab, School of Physical and Applied Sciences (SPAS), Goa University, Taleigao, Goa

How to Apply?

Fill the Google form https://forms.gle/2JeAwAosk7fHCsmK7
Or scan the QR-code.
Limited Seats.



Expected Outcomes

- •Modeling Skills: Learn to model real-world phenomena.
- •Computational Confidence: Build, run, and debug codes.
- •Interdisciplinary Insight: Combine physics, equations and codes.

GSRF

•Inspiration : To solve real life probles.

Speakers

- •Prof. Ramesh V. Pai ,Professor, Physics, SPAS
- •Dr. Mridini M. Gawas, Assistant Professor, Mathematics, SPAS
- •Dr. Pallavi P. Gaude, Assistant Professor, Physics, SPAS
- •Dr. Bhargav K. Alavani, Assistant Professor, Physics, SPAS

Coordinators:

Dr. Bhargav K. Alavani bhargav.alavani@unigoa.ac.in | +91 7517069718 Dr. Mridini M. Gawas mridinigawas@unigoa.ac.in | +91 8668858583

Funded by Goa State Research Foundation Winter School Scheme 2025

Geo-tagged photos



Figure 1 : Dr. Mridini M Gawas taking lecture



Figure 2: Dr. Bhargav K Alavani taking lecture



Figure 3 Group Photo



Figure 4 Miss Uma receiving Participation Certificate from Dr. V. Harthwar

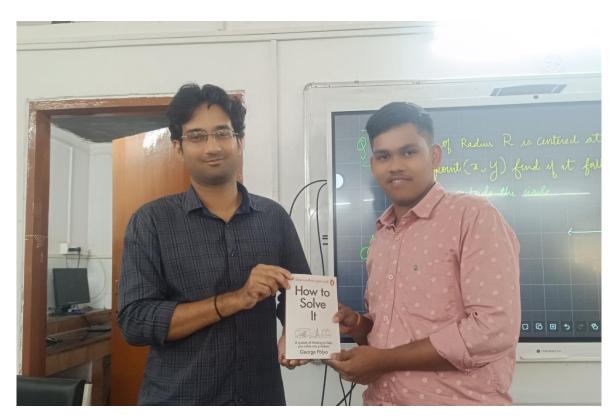


Figure 5 Mr.Navanath receiving the book from Dr. B. Alavani

Attendance sheets for 6 days workshop.

GSRF Winter School 2025

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

			Session	
Sr.no	Name	College	Morning	Afternoor
1	Agnelia Fernandes	DCT'S Dhempe College of Arts and Science	Morroungh	Merraude
_2	Amanpreet Kaur	St.Xaviers College , Mapusa	Jane	Laur
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	togar (Junga
4	Athary Gaonker	PES RSN COLLEGE OF ARTS AN ∑ SCIENCE	Colos	Calab
5	Bhumi Redkar	Dhyanprasarak mandals college and Research Centre	Junie	Thumit
6	Bindav Kerkar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Huran	Furlan
7	Brijali Dergunkar	Ganpat Parsekar College of Education	Bugulcar -	Berginka
8	Dipesh Ghadi	St.Xaviers College , Mapusa	Pheedi	Phaeli
9	Kavita Sahani	DCT'S Dhempe College of Arts and Science	Mahari	Habar
10	Lorellei Travasso	St.Xaviers College , Mapusa	Pravage	(Barasso
11	Navnath Samant	Dhyanprasarak mandals college and Research Centre	4	A
12	Piyusha Tari	DCT'S Dhempe College of Arts and Science	de la companya della companya della companya de la companya della	B.
13	Pushpak [*] Des ai	PES RSN COLLEGE OF ARTS AN S SCIENCE	Lishpakexi	Cushpark
14	Raja Pandit	DCT'S Dhempe College of Arts and Science	D	-
.5	Da Silva Ronan Dasilva	Parvatibai Chowgule College of Arts and Science (Autonomous)	Rdas	1 fail
.6	Saloni Gupta	DCT'S Dhempe College of Arts and Science	De la company de	God
7	Saloni Raut	DCT'S Dhempe College of Arts and Science	brant	Staul
8	Sara Korgaonkar	St.Xaviers College , Mapusa	Sy.	Suft.

19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science	Mair	Mar
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	Sim	Daw
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	glodi	Shedh
_22	Soham Kalsekar	Government college of arts science and commerce, Quepem	Bredse	Bredze
× 23	Uma Madhav Naik	DCT'S Dhempe College of Arts and Science	me	unes
_24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Variable A. March	Man Janual A. Man
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	NidhiTaura	Widhiland
26	Jonathan Sovio	St. Xarles Collige,	Jan	Jour

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Speakers & Pain V. Pain

2) Dr. Huidini M. Gawas Groon
2) Dr. Pallavi. P. Gande
4) Dr. Bhargav. k. Afavami Ahalav
Coordinators:
Dr. Bhargav K. Afavami Ahalav
Rr. Mridini M. Gawas Gawas

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

Date 25/11/2025

Sr.no	Name	C-11	Sess	sion
		College	Morning	Afternoon
1	Agnelia Fernandes	DCT'S Dhempe College of Arts and Science	Minomori	Herraudi
2	Amanpreet Kaur	St.Xaviers College , Mapusa	2 15	Royus
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Julyan	Jugan
4	Atharv Gaonker	PES RSN COLLEGE OF ARTS ANS SCIENCE	ako	ado
5	Bhumi Redkar	Dhyanprasarak mandals college and Research Centre	Shumil.	Bhumi P.
6	Bindav Kerkar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Kither	Burhar
7	Brijali Dergunkar	Ganpat Parsekar College of Education	#Bonker	Degler
8	Dipesh Ghadi	St.Xaviers College , Mapusa	Cheroli	Phadi
9	Kavita Sahani	DCT'S Dhempe College of Arts and Science	Mahair	John
0	Lorellei Travasso	St.Xaviers College , Mapusa	Danase.	Davass
1	Navnath Samant	Dhyanprasarak mandals college and Research Centre	42	A
2	Piyusha Tari	DCT'S Dhempe College of Arts and Science	8=	P3
1	Pushpak Des ai	PES RSN COLLEGE OF ARTS ANS SCIENCE	- troper	Thompat
	Raja Pandit	DCT'S Dhempe College of Arts and Science	1	PI
	Ronan Dasilva	Parvatibai Chowgule College of Arts and Science (Autonomous)	Rdans	Rdona
	Saloni Gupta	DCT'S Dhempe College of Arts and Science	A-	De
	Saloni Raut	DCT'S Dhempe College of Arts and Science	Frank	mant
	Sara Korgaonkar	St.Xaviers College , Mapusa	Sul.	Sik.

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19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science	Atron	Mais
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	(B)AN	(Bry)
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	Gladi	Made
22	Soham Kalsekar	Government college of arts science and commerce, Quepem	Disules	Scale
23	Uma Madhav Naik	DCT'S Dhempe College of Arts and Science	me	mae
24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Yamal & Much	James & Mand
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	A	A
26	Jonathan Santo	St. Xaviers College, Mapor	A	4

Speakers
Dr. Muidini M. Gawas Dwar
Dr. Pallari P. Garde
Dr. Bhargar K. Alavami Andar
Coordinators:

Dr. Bhargar. K. Alavani Ahalar Dr. Hridini. M. Gawas Jawa

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

Date: 26/11/2025

	Name		Sess	ilon
0	Name	College	Morning	Afternoon
A	gnelia Fernandes	DCT'S Dhempe College of Arts and Science	Syrandy	Demand
	Amanpreet Kaur	St.Xaviers College , Mapusa	Roug	Dur
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	1 July an	town
4	Atharv Gaonker	PES RSN COLLEGE OF ARTS AND SCIENCE	Cabor	Colper
5	Bhumi Redkar	Dhyanprasarak mandals college and	The soil	0 12
6	Bindav Kerkar	Research Centre Parvatibai Chowgule College of Arts	Thurs.	Bring.
7	Brijali Dergunkar	and Science (Autonomous) Ganpat Parsekar College of	2Un perio	Broker
8	Dipesh Ghadi	Education St.Xaviers College , Mapusa	Bugker	Degikan
9	Kavita Sahani	DCT'S Dhempe College of Arts and	Bhadi	. Made
10	Lorellei Travasso	Science St. Xaviers College , Mapusa	Halm	Mahr
11	Navnath Samant	Dhyanprasarak mandals college and	(Cravas)	Fravas
12	Piyusha Tari	Research Centre DCT'S Dhempe College of Arts an		A
13	Pushpak . Des)ai	Science PES RSN COLLEGE OF ARTS ANS	a	
14	Raja Pandit	SCIENCE DCT'S Dhempe College of Arts ar		To Down b.
15	Ronan Dasilva	Parvatibai Choward	nd 💮	0
16	Saloni Gupta	and Science (Autonomous)	Arts Rowe	21.8
17	Saloni Raut	College of Arts a	ind	0.1000
18	^{Sara} Korgaonkar	DCT'S Dhempe College of Arts a Science St.Xaviers College , Mapusa		brant

19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science	Milan	Marie
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	Jan	Dan
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	glodi	Spell
22	Soham Kalsekar	Government college of arts science and commerce, Quepem	(b) kuls	Doube.
23	Uma Madhav Naik	DCT'S Dhempe College of Arts and Science	Ma	My
24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Jamah A. Marcha	V runale & Hands
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	A	A
26	Jonathan Savio	St. Xavieus College	A	A

Dr. Pallavi P. Gaude gas Dr. Bhangar. K. Afavani Haland

Coordinators: D. Bhangar. K. Alavani Halavai

Dr. Mridini M. Gawas Quo

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

Date: 7/11/2025

Sr.no	Name	Callera	Sess	ion
	Name	College	Morning	Afternoon
1	Agnelia Fernandes	DCT'S Dhempe College of Arts and Science	Herrandin	Harrandis
2	Amanpreet Kaur	St.Xaviers College , Mapusa	Paus	Roya
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Layan	Kayan
4	Atharv Gaonker	PES RSN COLLEGE OF ARTS AND SCIENCE	Color	alex
5	Bhumi Redkar	Dhyanprasarak mandals college and Research Centre		
6	Bindav Kerkar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Bushan	Thouse
7	Brijali Dergunkar	Ganpat Parsekar College of Education	Bughlan	Bunkon
8	Dipesh Ghadi	St.Xaviers College , Mapusa	Bhadi	Tode
9	Kavita Sahani	DCT'S Dhempe College of Arts and Science		
10	Lorellei Travasso	St.Xaviers College , Mapusa	Danase,	Pravasso
1	Navnath Samant	Dhyanprasarak mandals college and Research Centre	¥	A
2	Piyusha Tari	DCT'S Dhempe College of Arts and Science	R	Ros.
3	Pushpak Des∈ai	PES RSN COLLEGE OF ARTS AND SCIENCE	Perol put	Achai
4	Raja Pandit	DCT'S Dhempe College of Arts and Science	0	P
5	Ronan Dasilva	Parvatibai Chowgule College of Arts and Science (Autonomous)	& darte	R lai
6	Saloni Gupta	DCT'S Dhempe College of Arts and Science	7	L
7	Saloni Raut	DCT'S Dhempe College of Arts and	Maut	braut
8	Sara Korgaonkar	Science St.Xaviers College , Mapusa	2 M	J.A.

19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science	Havi	a Alexander
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	man	gar.
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	Spladi	Sladi
22	Soham Kalsekar	Government college of arts science and commerce, Quepem	Esta	But
23	Uma Madhav Naik	DCT'S Dhempe College of Arts and Science	mes	mus
24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Varual A. Mari	Yourshit Mark
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	A	A
26	Jonathan Savio	St. Xavier's College, Mapusa	Son	gor

Speakers

Dr. Muidini M. Gawas Jawas

Dr. Bhangar K. Alavam Ahalam

Dr. Pallavi P. Gandl. Gull

Coordinators:
D1. Bhangan .K. Afavari thalar.
D1. Midini M. Gawas Gawas.

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

Date: 25/11/2025

Sr.ne) Name	College	Ses	ssion
21111	Nume	College	Morning	Afternoon
1	Agnelia Fernandes	DCT'S Dhempe College of Arts and Science	Murandes	Alemande
2	Amanpreet Kaur	St.Xaviers College , Mapusa	Rue	James
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Jones	
4	Atharv Gaonker	PES RSN COLLEGE OF ARTS ANS SCIENCE	der.	(0)
5	Bhumi Redkar	Dhyanprasarak mandals college and Research Centre	Thurik.	Juni P.
6	Bindav Kerkar	Parvatibai Chowgule College of Arts and Science (Autonomous)	Bur has	
7	Brijali Dergunkar	Ganpat Parsekar College of Education	Degular	Bughan
8	Dipesh Ghadi	St.Xaviers College , Mapusa	Pradi	Badi
9 K	cvita A. Sahani Kavita Sahani	DCT'S Dhempe College of Arts and Science	Jahan.	Johan
10	Lorellei Travasso	St.Xaviers College , Mapusa	Pravase	Bravasse
11	Navnath Samant	Dhyanprasarak mandals college and Research Centre	丸	AL.
12	Piyusha Tari	DCT'S Dhempe College of Arts and Science	R.	Q-
13	Pushpak Destai	PES RSN COLLEGE OF ARTS AND SCIENCE	- Lionpeller	*
.4	Raja Pandit	DCT'S Dhempe College of Arts and Science	1	P
5	Ronan Dasilva	Parvatibai Chowgule College of Arts and Science (Autonomous)	Below	21
6	Saloni Gupta	DCT'S Dhempe College of Arts and Science	Tol	P
7	Saloni Raut	DCT'S Dhempe College of Arts and Science	brant	a aul
3	Sara Korgaonkar	St Xaviers College , Mapusa	CIL	0.10

19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science		
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	SIN	310
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	a sol	Shedra 1
22	Soham Kalsekar	Government college of arts science and commerce, Quepem	Style	OB WE
23	Uma Madhav Naik	DCT'S Dhempe College of Arts and Science	Mary I	- INDE
24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Yamah. A. Worden	T
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	A	+
26	Jonathan Savio	St. Xavier's College, Magnea	190	San San

De Bhargar. K. Alavarni thalar Dr. Pallari P. Gaude gas

Coordinators:

Dr. Bhayav K. Alavan Ahalav Dr. Muidini M. Gawas www.

Solving Reality

A hands on workshop on Applied Differential Equations and Computational Methods

Attendance sheet

Date: 29/11/2025

Sr.no	o Name	College	Session	
			Morning	Afternoon
1	Agnelia Fernandes	DCT'S Dhempe College of Arts and Science	Hurnande	P
2	Amanpreet Kaur	St.Xaviers College , Mapusa	Roya	Round
3	Aryan Shekhar Magundnawar	Parvatibai Chowgule College of Arts and Science (Autonomous)	P	P
4	Atharv Gaonker	PES RSN COLLEGE OF ARTS AND SCIENCE	alex	dus
5	Bhumi Redkar	Dhyanprasarak mandals college and Research Centre	Anni P.	Kurnig
6	Bindav Kerkar	Parvatibai Chowgule College of Arts and Science (Autonomous)	P	P
7	Brijali Dergunkar	Ganpat Parsekar College of Education	Dignkom	P
8	Dipesh Ghadi	St.Xaviers College , Mapusa	phadi	Bhaoll
9	Kavita Sahani	DCT'S Dhempe College of Arts and Science	Adam	P
10	Lorellei Travasso	St.Xaviers College , Mapusa	Bavasso	Prairies
11	Navnath Samant	Dhyanprasarak mandals college and Research Centre	42	A)
12	Piyusha Tari	DCT'S Dhempe College of Arts and Science	2	P
13	Pushpak Des ai	PES RSN COLLEGE OF ARTS AND SCIENCE	turing)	Violinto
4	Raja Pandit	DCT'S Dhempe College of Arts and Science	2	P
5	Ronan Dasilva	Parvatibal Chowgule College of Arts and Science (Autonomous)	P	P
6	Saloni Gupta	DCT'S Dhempe College of Arts and Science	to	P
7	Saloni Raut	DCT'S Dhempe College of Arts and Science	brant	P
3	Sara Korgaonkar	St.Xaviers College , Mapusa	(V	Sila

19	Shreya Pednekar	DCT'S Dhempe College of Arts and Science	Mai	
20	Shyam Vernekar	Dhyanprasarak mandals college and Research Centre	Oh	840
21	Simran Ghadi	Dhyanprasarak mandals college and Research Centre	Jode	gl-sd-
22	Soham Kalsekar	Government college of arts science and commerce, Quepem	Besale	Belle
23	Uma Madhav Naik	DCT'S Dhempe College of Arts and	lime	P
24	Yannah Angelica Marchon	DCT'S Dhempe College of Arts and Science	Yamed A Manuar	P
25	Nidhi Tamse	Parvatibai Chowgule College of Arts and Science (Autonomous)	A	A
26	Jonathan Savio	St. Xavier's College, Magusa	for	145

Speakers

Dr. Bhangar. K. Alavari thalavai Dr. Pallavi P. Gande get

Coordinators:

D. Bhargar K. Alavarin thodai Dr. Mridini M. Gawais Jawas