Indian Space Research Organisation

Government of India

Project Proposal Title

RES-SAC-2023-015: Design and development of AI/ ML enabled algorithm for a static code analysis tool and its implementation as a software product

Project Proposal Submitted On

05-02-2024

Submitted to

ISRO Center: Space Applications Centre (SAC), Ahmedabad

Submitted by

Mr Murali N

E.G.S. Pillay Engineering College Nagapattinam Tamil Nadu

General Information

Title of the Project	:	RES-SAC-2023-015: Design and development of AI/ ML enabled algorithm for a static code analysis tool and its implementation as a software product
Name of the Institute	:	E.G.S. Pillay Engineering College, Nagapattinam, Tamil Nadu
Institue	:	Government Organisation
Bank Details	:	-
Affiliated College/Institutions	:	
Programme	:	RESPOND
Programme Associated College	:	
Area	:	Software Quality Assurance
ISRO/DOS Centre	:	Space Applications Centre (SAC), Ahmedabad
ISRO Co-PI	:	

Principal Investigator

Name	:	Mr . Murali N
Gender	:	Male
Date of Birth	:	1975-06-17
Designation	:	Professor
Department	:	CSE
Institute/University	:	E.G.S. Pillay Engineering College,Nagapattinam, Tamil Nadu
Email	:	murali@egspec.org
Alternate Email	:	
Mobile	:	7010105272

Educational Qualifications (from Graduation onwards)

Degree	Institution	Department	Completed year
B.E	EGS Pillay Engineering College	CSE	2002

Degree	Institution	Department	Completed year
M.E	Jayaram Engineering College	CSE	2008
Ph.D	Anna University	ICE	2017

Research experience

From year	To year	Institution	Details of work done
2010	2017	Anna University	Ph.D

Publications

Instituition Co PI Details

Name
Dr. MANIVANNAN R

Gender
Male

Mobile
9789442994

Email
maniramanatha@egspec.org

Date of birth
24/06/85- 12:00

Designation
Associate Professor

Department
CSE

Institution
E.G.S. Pillay Engineering College

Educational qualifications (from Graduation onwards)

Degree	Institution	Department	Completed year
B.E	P. R. ENGINEERING COLLEGE, THANJAVUR. 2002-2006	ECE	2004
M.TECH	SASTRA UNIVERSITY, THANJAVUR	CSE	2007
Ph.D	ANNA UNIVERSITY, CHENNAI	ICE	2017

Research experience

From year	To year	Institution	Details of work done
2014	2017	ANNA UNIVERSITY, CHENNAI	Ph.D

List of Publications/references
Biodata-Dr. R. M, 28.2.23_0.doc

Proposal Details

Respond Project Title

RES-SAC-2023-015: Design and development of AI/ ML enabled algorithm for a static code analysis tool and its implementation as a software product

Introduction of the proposal

Static code analysis is an activity to analyze source code in order to detect defects, vulnerabilities, non-conformances with standards and other shortcomings of source code without executing computer program/ package/ software. The proposed tool should have capability to perform static code analysis of a software program consisting one or more programming languages. The support for C, C++, python and Java programming languages is mandatory. The tool should be confi gurable and extensible. The algorithm of tool, while analyzing source code should fi nd defect, inter alia, based on

coding conventions/ standards/ rules, software quality attributes, software performance, security, comment density etc. The algorithm of tool should have AI/ ML enabled self-learning capabilities. The algorithm of tool should categorize issues/ defects reported into various categories along with severity score. The algorithm should support addition of new programming language(s) in future. The tool should be evolvable and open for future development by ISRO team/ ISRO authorized team to add new programming language(s)/ new feature(s). The tool should have a user-friendly user interface with capability to perform activities of software quality assurance (SQA) and software development team members. The tool should be deployable in server client mode with support for multiple users with multiple active analysis sessions. The developed tool should support standard features such as user management, role-based dashboard, reporting module, SQA module, software developer module etc. The tool should be integrated with a suitable open sourcebased database. The tool should have capability to provide its analysis report in user friendly manner, preferably over web

Project Objective

Design and development of AI/ ML enabled algorithm for a static code analysis tool and its implementation as a software product.

The developed tool should provide detailed explanation of each defect detected and provide its recommendations for solutions.

The support for C, C++, python and Java programming languages is mandatory

Deliverables

Algorithm and source code of developed tool, supporting libraries/ tools/ APIs developed or used, all project documents and artifacts including SRS, SDD, test plan document, test cases, test results, simulated/ actual data for testing user/ operational manual, installation guide etc. Installation and demonstration at Space Applications Centre Ahmedabad.

Methodology

The tool should have a user-friendly user interface with capability to perform activities of software quality assurance (SQA) and software development team members. The tool should be deployable in server client mode with support for multiple users with multiple active analysis sessions. The developed tool should support standard features such as user management, role-based dashboard,

reporting module, SQA module, software developer module etc. The tool should be integrated with a suitable open sourcebased database. The tool should have capability to provide its analysis report in user friendly manner, preferably over web.

Approach

Static code analysis is an essential activity in order to certify a software for operational usage. The proposed research will cater to the need of software quality assurance activities for various software products such as DPGS/ DQE of various satellite projects, web applications, scientifi c applications and other software applications.

Major scientific field of Interest

Software Quality Assurance, Software Development

Available Institution Facilities for proposed project

Software Development Lab Mobile App Development Lab IoT Lab Data Centre, Blade Server and ERP Server

Project duration (months)	:	36 Months
Any funding from other institutions for the same research project	:	No

Milestones

Year	From	To	Targets to be Achieved
1 Year	1 Month	12 Month	Data Collection and Preprocessing

Year	From	To	Targets to be Achieved
2 Year	1 Month	12 Month	Design, Development and Implementation
3 Year	1 Month	12 Month	Testing and Execusion

Proposal Budget Break Up

Category	Year 1(₹)	Year 2(₹)	Year 3(₹)	Justification
Manpower	5,94,720	5,94,720	5,94,720	Year - 1;Nos - 1;Month(s) - 12;Manpower Category - SRF;Per month - 42000.0;HRA - Type Y (18%) Year - 2;Nos - 1;Month(s) - 12;Manpower Category - SRF;Per month - 42000.0;HRA - Type Y (18%) Year - 3;Nos - 1;Month(s) - 12;Manpower Category - SRF;Per month - 42000.0;HRA - Type Y (18%) Additional comment by User: SRF;SRF;SRF
Equipment	3,50,000			GPU Computers (High end computing systems) Server Data Centre
		1,50,000		GPU Computers (High end computing systems) Server Data Centre
Consumables	50,000	50,000	1,00,000	Consumable Consumable Consumable
Travel	50,000	50,000	1,00,000	Travel Travel Travel

Category	Year 1(₹)	Year 2(₹)	Year 3(₹)	Justification
Miscellaneous	50,000	50,000	50,000	Software and Licensing (MATLAB, Oracle and Cyber Security) ML Lab Setup with Server Connection service charges
Institution Overhead	1,00,000	1,00,000	1,00,000	Overhead Overhead Overhead
Any others	50,000	50,000	50,000	Other items based on need Other items based on need Other items based on need
Total	**12,44,720**	**10,44,720**	**9,94,720**	

Ongoing Projects

Title	Total Budget	Project Duration	Project Starting Year	Project Completion Year	ISRO/DOS Center

Completed Projects

Title	Total Budget	Project Duration	Project Starting Year	Project Completion Year	ISRO/DOS Center

Declaration Form
Murali_ISRO_Declarion.pdf

I hereby declare that I have read the terms and conditions of ISRO Research Grants and also the above mentioned information in the application form is true and best of my knowledge