A

PROJECT REPORT

ON

"LANDLSIDE DETECTION AND MONITORING SYSTEM"

SUBMITTED TO THE

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION (MSBTE), MUMBAI

BY

Ms. Vaishnavi N. Patil

Ms. Siddhi H. Bagul

Ms. Sakshi R. Gurkha

Ms. Aarti R. Pawra

Under the guidance of

Prof.P.B.Kudal

DEPARTMENT OF COMPUTER ENGINEERING

GURU GOBIND SINGH POLYTECHNIC, NASHIK-422009

Academic Year 2021-22

CERTIFICATE

This is to certify that,

Ms. Vaishnavi Nitin Patil

Ms. Siddhi Hitesh Bagul

Ms. Sakshi Ramdas Gurkha

Ms. Aarti Rajendra Pawra

[Third year Diploma in Computer Engineering]

Have successfully completed project of final year having title

"IOT Based Landslide Detection and Monitoring System"

Under the guidance, towards the fulfillment of

Diploma in Computer Engineering

MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION (MSBTE), MUMBAI

During the Academic year 2021-22

Date:___/___/2022

Place: Nashik

Prof.P.B.Kudal	**Prof.G.R.Jagtap**	**Prof.S.R.Upasani**
Project Guide	**H.O.D.**	**Principle**

(Prof._____)

External Examiner

DEPARTMENT VISION AND MISSION

Guru Gobind Singh Foundation

GURU GOBIND SINGH POLYTECHNIC NASHIK

Program: Computer Engineering

Vision

Computer Engineering Program is striving for excellence in providing transformative Education and enhancing multidisciplinary skills for developing Intellectual, Innovative and Quality Technician, Engineer, Entrepreneur which will benefit the Society and the Industrial challenges.

Mission

1. To enhance the knowledge of Computer Engineering students through rigorous coursework and Technical skills, by understanding and providing the needs of Society and Industry.

2. To benchmark with the best standards of Quality Education in the field of Computer Engineering.

3. To enhance the commitment of Computer Engineering faculty, staff and Students by inculcating the spirit of inquisitiveness, teamwork, innovation and professionalism.

4. Establish a center of excellence to enhance Academia-Industry partnership work on collaborative projects and encourage Computer Engineering students to develop micro projects and patents.

5. To develop students by enhancing emerging technologies in the field of Computer Engineering and inculcating entrepreneurship quality in them.

PEO(s), PSO(s) AND PO(s)

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GURU GOBIND SINGH POLYTECHNIC NASHIK

Program: Computer Engineering

Programme Educational Objectives (PEO)

PEO 1. Provide socially responsible, environment friendly solutions to Computer engineering related broad-based problems adapting professional ethics.

PEO 2. Adapt state-of-the-art Computer engineering broad-based technologies to work in multi-disciplinary work environments.

PEO 3. Solve broad-based problems individually and as a team member communicating effectively in the world of work.

Program Specific Outcomes (PSO)

PSO 1. Computer Software and Hardware Usage: Use state-of-the-art technologies for operation and application of computer software and hardware.

PSO 2. Computer Engineering Maintenance: Maintain computer engineering related software and hardware systems.

Program Outcomes (PO)

PO 1. Basic knowledge: Apply knowledge of basic mathematics, sciences and basic engineering to solve the broad-based Computer engineering problem.

PO 2. Discipline knowledge: Apply Computer engineering discipline - specific knowledge to solve core computer engineering related problems.

PO 3. Experiments and practice: Plan to perform experiments and practices to use the results to solve broad-based Computer engineering problems.

PO 4. Engineering tools: Apply relevant Computer technologies and tools with an understanding of the limitations.

PO 5. The engineer and society: Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to practice in field of Computer engineering.

PO 6. Environment and sustainability: Apply Computer engineering solutions also for sustainable development practices in societal and environmental contexts and demonstrate the knowledge and need for sustainable development.

PO 7. Ethics: Apply ethical principles for commitment to professional ethics, responsibilities and norms of the practice also in the field of Computer engineering.

PO 8. Individual and team work: Function effectively as a leader and team member in diverse/ multidisciplinary teams.

PO 9. Communication: Communicate effectively in oral and written form.

PO 10. Life-long learning: Engage in independent and life-long learning activities in the context of technological changes in the Computer engineering field and allied industry.

CO(s)

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Program: Computer Engineering

COURSE OUTCOME CO (Scheme I)

First Semester			
Sr. No	**Course Code**	**Course Name**	**Course Outome**
1	22101	English	a. Formulate grammatically correct sentences. b.Summarise comprehension passages. c.Compose dialogues and paragraphs for different situations. d.Use relevant words as per context. e.Deliver prepared speeches to express ideas, thoughts and emotions.
2	22102	Basic Science (Physics and Chemistry)	a. Estimate errors in the measurement of physics quantities. b.Apply the principles of electricity and magnetism to solve engineering problems. c.Use the basic principles of heat and optics in related engineering applications. d.Apply catalysis process in industries. e.Use corrosion preventive measures in industries. f. Use relevant engineering materials in industry.
3	22103	Basic Mathematics	a. Apply concepts of algebra to solve engineering problems. b.Utilize basic trignometric concepts to solve problems. c.Solve basic engineering problems under given conditions of straight lines. d.Solve problems based on regular closed figures and solids. e.Use basic concepts of statistics to solve engineering related problems.
4	22001	Fundamentals of ICT	a.Use computer system and its peripherals. b.Prepare business document using word processing tool. c.Interpret data and represent it graphically using spreadsheet. d.Prepare professional presentations. e.Use different types of web browsers.
5	22003	Engineering Graphics	a. Draw regular geometric figures. b.Use drawing codes, conventions and symbols as per IS-46 in engineering drawing. c.Draw the views of given oject using principles of orthographic projection d. Draw isometric views of given component or from orthographic projections. e.Draw free hand sketches of given engineering elements. f. Use computer aided drafting approach to create enginering drawings.
6	22005	Workshop Practice	a.Use electrical tools, instruments, devices and equipment for basic level maintenance of computers and peripherals. b.Identify active and passive electronic components. c.Undertake basic level maintenance of a PC. d.Use different kinds of printers and scanners. e.Identify the layout of wired and wireless LAN environment.

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Program: Computer Engineering

COURSE OUTCOME CO (Scheme I)

Second Semester			
7	22215	Elements of electrical engineering	a.Use principles of magnetic circuits. b.Use single phase AC supply for electrical and electronics equipment. c. Use three phase AC supply for industrial equipment and machines. d. Connect transformers and DC motors for requirements. e. Use FHP motors for diversified applications. f. Use relevant protective devices for different requirement.
8	22224	Applied Mathematics	a. Calculate equation of tangent, maxima, minima,radius of curvature by differentiation. b.Solve given problems of integration using suitable methods. c.Apply the concept of integration to find area and volume. d.Solve the different equation of first order and first degree using suitable methods. e.Apply concepts of numerical methods in computer programming languages.
9	22225	Basic Electronics	a. Identify electronics components in electronic circuits. b. Use diodes in different applications. c. Interpret the working of junction transistor in the electronic circuits. d. interpret the working of unipolar devices in the electronic circuits. e. Use sensors and transducers.
10	22226	Programming in C	a.Develop flowchart and algorithm to solve problems logically. b. Write simple C programs using arithmetic expressions. c.Develop Cprograms using control structure. d.Develop C program using arrays and structures e.Develop functions in C programs for modular programming approach. f. Develop C programs using pointers.
11	22009	Business Communication using Computers	a. Communicate effectively by avoiding barriers in various formal and informal situations. b. Communicate skillfully usiing non-verbal methods of communication. c. Give presentations by using audio-visual aids. d. Write reports using correct guidelines. e. Compose e-mail and formal business letters.
12	22013	Computer peripherals and hardware maintenance	a. Identify different types of computer systems b.Troubleshoot common motherboard problems. c.Select processors required for relevant systems d. Partition/format hard drives. e. Troubleshoot peripherals and networks. f. Test power supplies.
13	22014	Web Page Designing with HTML	a.Use block level formatting tags to present content on web page. b.Use text level formatting tags to present content on web page. c. Apply hyper linking on web page. d. Organize the content using table and frames. e. Apply presentation schemes on content using CSS. f. Publish websites on Internet or Intranet.

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COURSE OUTCOME CO (Scheme I)

Third Semester			
14	22316	Object Oriented Programming using C++	a. Develop C++ programs to solve problems using Procedure Oriented Approach. b. Develop C++ programs using classes and objects. c. Implement inheritance in C++ program d. Use Polymorphism in C++ program e. Develop C++ programs to perform file operations.
15	22317	Data Structure Using C	a.Perform Basic Operations on array b.Apply different searching and sorting techniques c.Implement Basic operations on stack and queue using array representation d.Implement basic oprations on Linked list e.Implement program to create and traverse tree to solve problem
16	22318	Copmputer Graphics	a. Manipulate visual and geometric information of images. b.Imlement standard algorithms to drae various graphics objects using C program. c.Develop programs for 2-D and 3- D transformations. d. Use projections to visualize objects on view plane. e. Implement various clipping algorithms. f. Develop programs to create curves using algorithms.
17	22319	Database Management System	a. Design normalized database on given data. b. Create and manage database using SQL command. c. Write PL\SOL code for given database. d. Apply triggers on database also create procedure and function according to condition. e. Apply security and confidentiality on given database
18	22320	Digital Techniques	a. Use number system and codes for interpreting working of digital system. b. Use boolean expression to realize logic circuits. c. Build simple combinational logic circuits. d. Build simple sequential logic circuits. e. Test data converters and PLDs in digital electronic system
Fourth Semester			
19	22412	Java Programming	a. Develop programs using Object Oriented methodology in Java. b. Apply concept of inheritance for code reusability. c. Develop programs using multithreading. d.Implement Exception Handling. e. Develop programs using graphics and applet f. Develop programs for handling I/O and file streams.
20	22413	Software Engineering	a. Select suitable Software Process model for software development. b. Prepare software requirement specification. c. Use Software modeling to create data designs. d. Estimate size and cost of software product. e. Apply project management and quality assurance principles in software development.
21	22414	Data Communication and Computer Network	a. Analyse the functioning of data communication and computer network. b. Select relevant transmission media and switching techniques as per need. c. Analyse the transmission errors with respect to IEEE standards. d.Configure various networking devices e. Configure different TCP/IP services
22	22415	Microprocessors	a.Analyze the finctional block of 8086 microprocessor b.Write assembly language program for given problem. c.Use instructions for different addressing modes. d.Develop an assembly language program using assembler. e.Develop assembly language programs using procedure,macros,modular programming approach.
23	22034	GUI Application Development using VB.Net	a. Use Visual Studio IDE to design application. b.Develop GUI Application using Form Controls and its events. c.Apply Object Oriented concepts in GUI Application. d.Use Data access controls to store data in Database and retrieve it. e. Use data Binding in GUI Application.

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COURSE OUTCOME CO (Scheme I)

Fifth Semester			
24	22447	Environmental Studies	a. Develop Public awareness about environment. b. Select alternative energy resources for Engineering Practice. c. Conserve Ecosystem and Biodiversity. d. Apply techniques to reduce Environmental Pollution. e. Manage social issues and Environmental This is as lifelong learning.
25	22516	Operating system	a.Install Operating System and configure it. b.Use Operating system tools to perform various functions. c.Execute process commands for performing process management operations d.Apply scheduling algorithms to calculate turnaround timeand average waiting time e.Calculate efficiency of different memory management techniques. f.Apply file management techniques.
26	22517	Advanced Java Programming	a. Develop programs using GUI Framework(AWT and Swing) b. Handle events of AWT and Swings components. c. Develop programs to handle events in Java Programming. d. Develop Java programs using networking concepts. e. Develop programs using database. f. Develop programs using Servlets.
27	22518	Software Testing	a. Apply various software testing methods. b. Prepare test cases for different types and levels of testing. c.Prepare test plan for an application d. Identify bugs to create defect report of given application. e.Test software for performance measures using automaated testing tools
28	22520	Advance Computer Network	a. Implement Network layer protocols. b. Configure IPv6 network. c. Choose routing protocol in given network situation. d. Implement different Transport layer protocols. e. Configure various Application layer protocols
29	22050	Capstone Project-Planning	a. Write the problem/task specification in existing systems related to occupation. b. Select collect and use required information/knowledge to solve the problem/ complete the task. c.Logically choose relevant possible solutions. d. Consider the ethical issues related to the project. e.Assess the impact of the project on society. f.Prepare 'project proposals' with action plan and time duration scientifically before beginning of project. g. Communicate effectively and confidently as a member and leader of team.
30	22049	Industrial Training	a.Communicate effectively the work carried out
			b.Prepared and present the report of work carried out
			c.Exercise time management and safety in work environment
			d.Working in a team
			e.Demonstrate various quality assurance
			f.Exhibit the work carried out.

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GURU GOBIND SINGH POLYTECHNIC NASHIK

Program: Computer Engineering

COURSE OUTCOME CO (Scheme I)

Sixth Semester			
31	22509	Management	a. Use basic management principles to ececute daily activities
			b. Use principles of planning and organising for accomplishment of tasks
			c. Use principles of directing and controlling for implemanting the plans
			d. Apply principles of safety management in all activities
			e.Understand various provisions of industrial acts.
32	22616	Programming with Python	a. Display message on screen using Python script on IDE
			b. Develop python program to demonstrate use of Operations
			c. Perform operations on data structures in Python
			d. Develop functions for given problem
			e. Design classes for given problem
			f. Handle exceptions.
33	22617	Mobile Application Development	a. Interprete features of Android operating system
			b. Configure Android environment and development tools
			c. Develop rich user interfaces by using layouts and controls
			d. Use user interface components for android application development
			e. Create Android application using database
			f. Publish Android application
34	22618	Emerging trends in Computer and Information Technology	a. Describe Artificial Intelligence, Machine learning and deep learning
			b. Interpret IoT concepts
			c.Compare Models of Digital Forensic Investigation.
			d. Describe Evidence Handling procedures
			e.Describe Ethical hacking process
			f. Detect Network, Operating System and applications vulnerabilities
35	22619	Web based Application development with PHP	a. Develop program using control statement
			b. Perform operations based on array and graphics
			c. Develop programs by applying various object oriented concepts
			d.Use form controls with validation to collect user's input
			e. Perform database operations in PHP
36	22060	Capstone Project-Execution and Report Writing	a. Implement the planned activity individually and/or as team
			b. Select, collect and use required iformation/knowledge to solve the identified problem.
			c. Take appropriate decisions based on collected and analysed information.
			d. Ensure quality in product
			e. Incorporate energy and environment conservation principles
			f. Consider the ethical issues related to the project(if there are any)
			g. Assess the impact of the project on society(if there is any)
			h. Communicate effectively and confidently as a member and leader of team

SPONSORSHIP LETTER

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Cognifront
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Ref: 210916/1

Date : 16 Sep 2021

Sponsorship Letter

To Whomsoever it May Concern

This is to certify that the Cognifront has sponsored the following project.

"IOT based Landslide detection and Monitoring System"

The students of Computer Department, Guru Gobind Singh Polytechnic, Nashik are working on the project. The names of the students are listed below.

- Patil Vaishnavi Nitin
- Bagul Siddhi Hitesh
- Gurkha Sakshi Ramdas
- Pawara Aarti Rajendra

The necessary hardware and tools will be provided by the Cognifront.

The students shall abide by the rules and regulations of the Cognifront.

Dr R S Tiwari
Technical Director
Cognifront, Nashik

Email : tiwari.nashik@gmail.com
Ph: 9422245764

ACKNOWLEDGEMENT

It is our privilege to declare the completion of our project "**IOT based landslide detection and monitoring system"** under the valuable guidance of our **Guide Prof. P. B. Kudal,** whose constant support and motivation has encouraged us to come up with this successful project. We also extend our sincere gratitude towards our respected **HOD Prof. G. R. Jagtap** who also played a key role in successful completion of this project.

Also, our sincere thanks to the whole staff of the Computer Department without whose help, it would have been different for us to complete this project. This work is virtually the result of inspiration showered by them.

Sincere thanks to our respected **Principal Mr. S. R. Upasani** sir and **CEO Mr. Perminder Singh** Sir, for providing us with all the required facilities and essentials.

We would also like to thank all the library and non-teaching staff for their help. Last but not least, congratulations to our team members for successful completion of this project and for keeping the momentum going with enthusiasm.

Yours sincerely,

Ms. Vaishnavi Nitin Patil

Ms. Siddhi Hitesh Bagul

Ms. Sakshi Ramdas Gurkha

Ms. Aarti Rajendra Pawara

Final year diploma

Department of Computer Engineering

ABSRACT

Landslide is a natural disaster and it occurs due to natural or manmade activities. A landslide is defined as the movement of a mass of rock, debris, or wide range of ground movement. Landslides are a type of "mass wasting," which denotes any down-slope movement of soil and rock under the direct influence of gravity and it damaging the social life every year. India also faced the loss of humans due to landslides which occurred last few years during monsoon in Kerala. The aim of the proposed system is to detect that condition which leads to the occurrence of landslide and notify it well before time. And necessary steps can be taken to reduce or save the human loss. The system uses soil moisture and accelerometer sensors. Soil Moisture sensor measures the moisture content in the soil whereas accelerometer monitors the movement of land. The readings crossing the defined thresholds give an alarm to local citizens in the form of message through GSM. The sensed data are also transmitted via MQTT protocol to the Raspberry Pi (Rpi) used in the monitoring station. Raspberry pi is interfaced with a laptop to display the SAFE, MIDDLE and DANGER zones. All the readings from Rpi are also uploaded to IoT cloud for future analysis. The system takes only less time to collect data from sensors and transmit it to Rpi and also to upload data from raspberry pi to IoT cloud.

In this project Landslide is a rare and sudden event. At the same time, it is a critical hazard which causes damage to both infrastructure and human life. Slopes in the vicinity of infrastructure and human need to be monitored by a vigilant and accurate system to avoid such damage. As landslide is affected by several factors from both internal and external environments, the monitoring and prediction systems need to cover all those possible factors that can influence slope stability and trigger a landslide.

Keywords: Soil moisture sensor, Accelerometer, GSM, Raspberry Pi, IoT cloud, MQTT protocol.