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EYE-CONTROLLED MOUSE CURSOR

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ABSTRACT
The system described here presents hand-free interface between human and computer. It uses various image processing methods such as face detection, eye extraction, interpretation of sequence of eye blinks in real time for controlling a non- intrusive, human-computer interface. It uses a typical webcam to capture an input image. Mousecursor control can be done by facial movement by moving the face towards left and right, up and down, mouse events are controlled through eye blinks. A high number of people, affected with neuron locomotor disabilities can use this technology in computers for basic tasks such as sending or receiving messages, browsing the internet, watch their favorite TV shows or movies. This algorithm is used to give the best possible outcomes of the eye position using the decision tree algorithm so that the eye movement is detected and the mouse moves accordingly. It also enables the user to open and close the applications by blinking the eye.
KEYWORDS: IMouse; eyes gesture control system; eye tracking systems; mouse cursor; eye mouse; webcam; eyemovement.

INTRODUCTION PROBLEM STATEMENT

Aimed at making a comfortable environment for disabled people that cannot move anything except their eyes. For these people, eye movement and blinks are the sole thanks for communicating with the outside world through the computer. This analysis aims in developing a system that will aid the physically challenged by permitting them to act with a computing system mistreatment solely by their eyes. Human-Computer interaction has become an associated progressively vital part of our daily lives. There is no universal method to trace the attention movement.

Scope of the Project: The eye gesture system directly interacts with the vision of the human eyes and then controls the system. Eye Gesture is a real-time gesture assurance program that controls a mouse cursor by using the users eye gestures. Our technique principally focuses on the employment of an online camera to develop a virtual human laptop interaction device in a very cost-effective manner presents hands free interface between computer and human especially for physically disabled persons. For using this system,users must have to go through the authentication process in which users' faces will be matched with the authenticated users. If the user is authenticated then only, he/she can log into the system.

Objective of the Project:

- To create a interactive device cost-effectively.
- To present a hands free interface between computer and human especially for physically disabled person.
- To reduce human intervention.
- To give 100% comfortable environment for disable people.

LITERATURE SURVEY

A literature review establishes familiarity with and understanding of current research in a particular field before carrying outa new investigation. Conducting a literature review should enable you to find out what research has already been done and identify what is unknown within your topic. The literature was studied to address the aims, understanding of the research area, focus on the research questions, planning of the data collection approach, clarification of the meaning of the terms and

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proper identification of the framework. The most important task was to understand the research domain in which eye detection and cursor movement of a mouse is involved Eye tracking technology has played an increasingly important role in psychology, marketing, and user interfaces, centered on an eye sensor that tracks the orientation and locations of the eye. Eye trackers have existed for several years, but early in the history of the field of eye tracking, the use of eye trackers was primarily limited to laboratory experiments to analyze the existence of human eyemovements, instead of using such movements as an actual control mechanism within a human(HCI). Because the cost of eye trackers a decade ago was around 30,000, it was too costly to consider using actual user. In recent years, many high- companies have developed low- eye trackers with the production of better and cheaper components for gaze interaction, such as Tobii's Eye X tracker ,Gaze Point's GP3 tracker and the Eye Tribe Tracker.

Batch mode is employed for human eye (Iris) detection. The technique for tracking the iris is applied to static images. This technique works clearly whether the iris orientation is left, right, or centre. If the iris location is up or down, this won't work. The machine doesn't work in real-time. Handling blinks and closing eyes isn't professional.This paper aims to develop and introduce a network of human computer interfaces that monitors the orientation of the human eye. The specific motion as well as direction of the iris is used to control the device by subsequently positioning the mouse cursor. Some progress on image recognition and eye tracking has been made. Has software implementation in both systems. Imageprocessing, a sub division of the signal processor,can consist of an image or video-like visual objectas an input and output as an image or specific parameters thereof. Eye monitoring is also more of a method in image processing. Generally, eye tracking refers to eye movements, image processing, or image processing through the software input and the data collected. This project was created for people who are inefficient when itcomes to using hand-held mice. With the aid of colors, a real-time view can be obtained in this thesis analysis.

A significant number of people with neuro-disorders or those who are disabled by injury cannot use computers for simple activities such as sending or receiving messages, surfing the internet, watching their favorite TV show or movies. A previous research study concluded that eyes are an excellent candidate for ubiquitous computing because they move during contact with computer machinery anyway. Use this underlying information from eye movements may allow these patients to be brought back to using computers. We propose an I-mouse gesture control device for this function which is controlled entirely only by human eyes. This work aims to develop a generic open- sourceeye-gesture control system that can effectively track eye movements and allow the user to perform actions mapped to specific eye movements/gestures using webcam computers. It senses the pupil from the face of the user, and then monitors their motions. It needs to be accurate in real-time, so that the user can use it easily like other everyday apps.

EXISTING SYSTEM

Some researchers have been attempting to establish techniques that help the elderly communicate with devices. Signals such as brain electro encephalography(EEG),facial muscle signals(EMG) and electrooculogram (EOG) have been used. Other techniques include monitoring of the limbus, pupil and eye/eyelid, contact lens system, corneal relationship, reflective pupil relationship and measurement of head motion.These approaches include the application of attachments and electrodes to the ear, making them impractical. Many high-end techniques focused on eye movement monitoring to monitor computers were extremely costly and not available to those who wanted them.

PROPOSED SYSTEM

The input of eye movement is taken from theindividual's pupil. If a person looks at a center mouse pointer, that point would be taken as the input point and it sets that location as the basis for gaze tracking and it begins moving in the direction of the person's eye movement and the cursor stops moving when the person'seye hits its initial place.And it increases…

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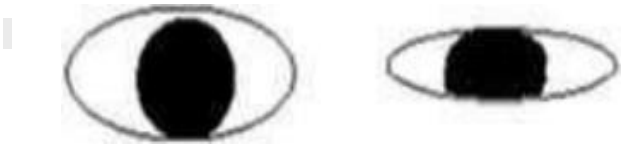
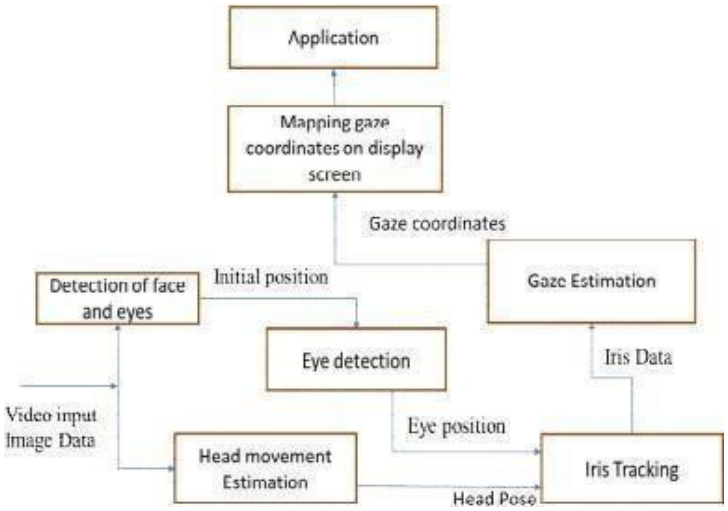
- Accuracy
- Productivity
- Reliability
- Consistency
- Compliance

Left and right movement of the pupil: Horizontal eye pupil movement can be achieved using circular artifacts.If the pupil moves in the left direction, the mouse pointer moves in the left direction and right.

Up and down movement of the pupil: Vertical eye pupil movement can be achieved by using pupil scale. The eyes are in slightly half-closed state when gazing downwards. This phenomenon can be used to guide the step from top to bottom of the mouse pointer.



SYSTEM ARCHITECTURE



The system is divided into three components: 1) Face detection and tracking component 2) Eye tracking component 3) Gaze to screen coordinates mapping component .The proposed system uses a camera with 20 mega pixels(480pixels- interpolated 20M pixels still image resolution, interpolated 2.1M pixels video resolution) to capture the images of the user for iris tracking and gaze estimation. The flow chart of the proposed system is depicted in above figure. The first image is used for initial face location and eye detection. If any one of these detection procedures fails, then go to the next frame and restart the above using values are stored in database. Then, the gazeposition is computed by using calibration points on the screen after that using the eye ball model comparison is done between the input images with the stored database image. The accuracy and precision are measured by looking at the calibration points on the screen.

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Process flow of proposed method:

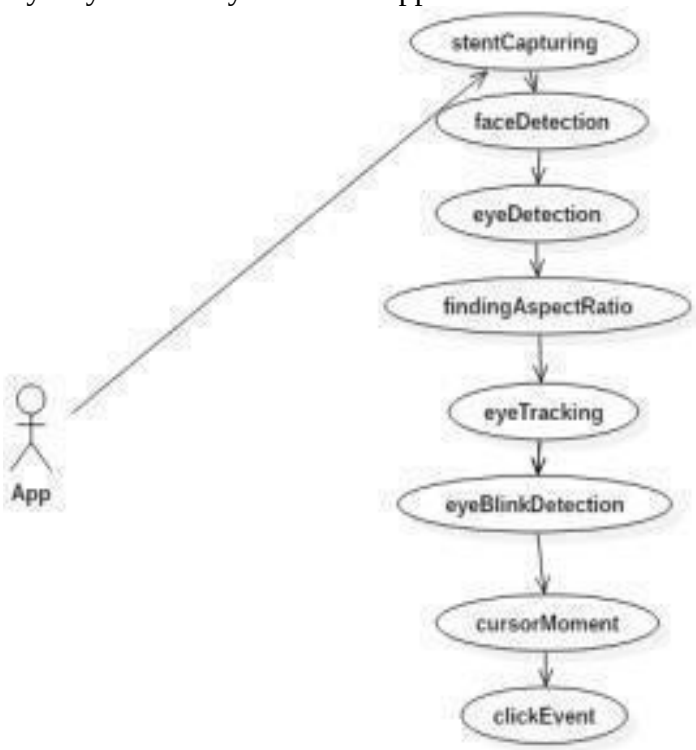
The process flow of the proposed method that consists of three processes: facial-feature detection/tracking, eye model estimation, iris tracking, and gaze estimation using calibration points. The facial-feature detection/tracking process detects facial features that are used in both face/eye model estimation and gaze estimation processes. First, we detect the face position in the image using a face detection method based on the Viola- Jones algorithm which uses a complex combination of Haar features for object detection. In the eye model estimation and iris tracking process, first we capture N images for face/eye then using Haar cascade object detect or extract the necessary features.

Eyes Detection method:

The first step of detection of the gaze is to locate the eye regions, to extract the necessary features. The fundamental requirement of an iris tracking and gaze detection system is to accurately detect the eyesockets, which can easily be achieved by Haar-like object detectors. It allows a classifier trained with sample views of a particular object to be detected in a whole image. An eye image is captured with a zoom-in camera of high resolution. This provides iris images with more number of pixels.

METHODOLOGY USE CASE DIAGRAM

A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorporating usecases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application.



The use diagram depicts the high-level functionality of a system and also tell show the user handles asystem.

CLASS DIAGRAM

Class diagrams are the blueprints of eye mouse systemare used to model the objects that make up the system,to display the relationships between the objects, and to describe what those objects do and the services that they provide.

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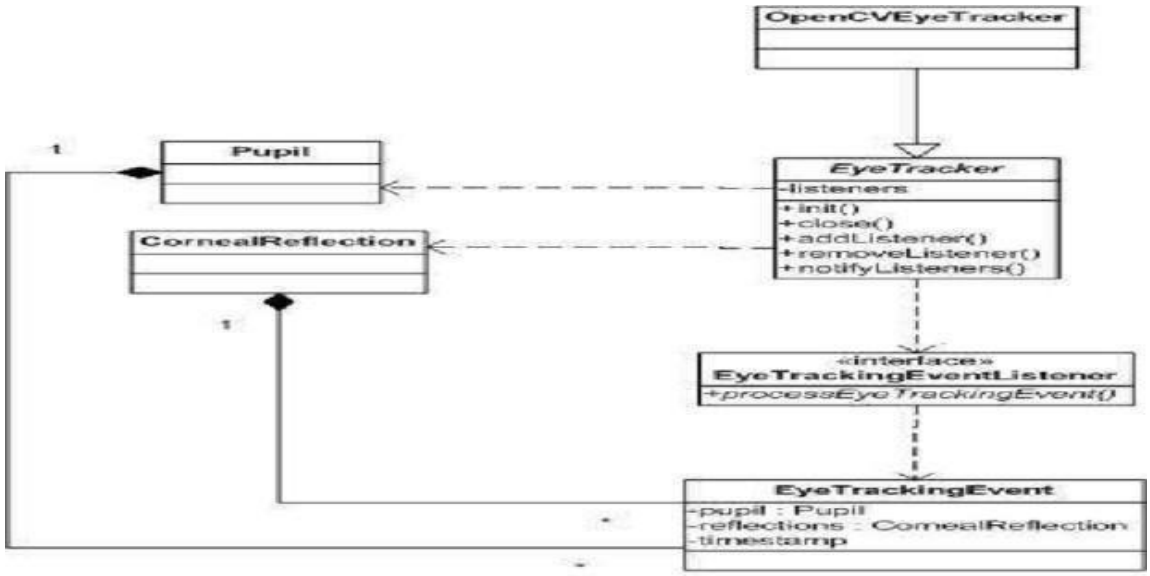

HARDWARE INTERFACE

Once the system is ready to execute the task, the project can be uploaded on pycharm. With the help of pycharm, the projectsare run of various PCs. The pycharm monitors.

SOFTWARE INTERFACE

Pyautogui:mainly used to operate mouse event simutils.
Python provides useful and advanced libraries that make a programmer's life easier. The pyautogui library is one of theextensive collections of the useful methods.
It is a series of OpenCV + convenience functions for translation, rotation, resizing.
OpenCV2 :OpenCV is a cross-platform library.That shall be used to develop the real-time computer vision applications.

FUTURE ENCHANCEMENT

Controlling the proposed system using eye movements mainly concentrates on the development of hands-free computing.The study of various movement–based human computer interaction techniques are implemented. The mouse cursor is operated by the eye movement. The paper presented above has a very wide future scope as the human-computer interaction- based software can be very useful in the field of modern technology. Various different scope of this project could be driving cars with the eye movements and operating other digital appliances with the body movements.
The use of eye tracking in the simulated setting can help improve our understanding of what sources of information users are and are not using as they deliver routine processes. In particular, data derived from eye tracking can be used to evaluate common, error-prone processes. Information on the eye behavior of experts can lead to the development of training protocolsto guide the education of the students.

RESULTS & CONCLUSION

The main goal of developing this project is to provide hands-free cursor control which reduces the dependency onmouse we mainly focused on physically disabled persons who cannot use their hands to operate the system. It don't perform well in poor lightening environment. In this paper a computer vision algorithm primarily based on the answer is enforced an endeavour has been created towards development of low value, the period answer for eye gaze trailing. There are several applications of eye gaze trailing, for example in HCI, appliances management, usability studies and in advertising

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effectiveness. Accuracy for options extraction algorithms depends upon image quality and lighting conditions algorithmic rule performance drops down in poor lighting settings. Higher image quality would improve accuracy of laptop vision algorithms. Refined Pre-Processing algorithms ought to be introduced to compensate for lighting variations and web-cam resolution ought to even be multiplied to decrease the pointer size. A feature describing head-posture should even be introduced, it'll enable the user to maneuver freely whereas interacting with the system. Introducing the construct of gaze estimation in conjunction with gaze projection is going to be useful as a result it'll improve gaze projections drastically. the thought of gaze estimation guarantees to be told from usage statistics and infer gaze projections. Particle Filters will be accustomed implement gaze estimation as a result of they're quite straight forward and has likeness with drawback of gaze estimation.

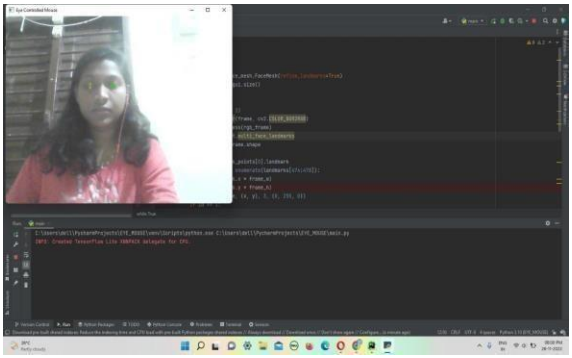

FIGURE1:ExecutionPage

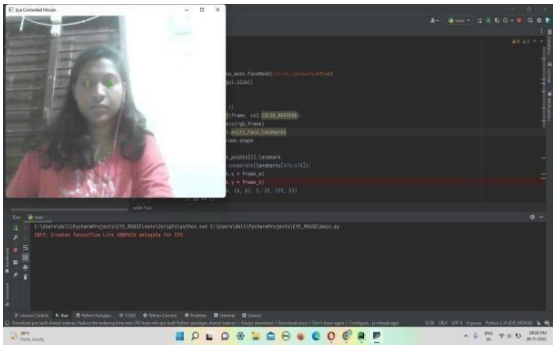

FIGURE2:ExecutionPage

References

1. Vo Ngoc Mai Anh; Hoang Kim Ngoc Anh; Vo Nhat Huy; Huynh Gia Huy; Minh Ly. "Improve Productivity and Quality Using Lean Six Sigma: A Case Study". International Research Journal on Advanced Science Hub,5, 03, 2023, 71-83. doi: 10.47392/irjash.2023.016
2. Somu C, Karthi A, Sanjay S, Karthikeyan R, Dinesh S and Ganesh N 2017 Synthesis of various forms of carbon nanotubes by arc-discharge methods—comprehensive review Int. J. Res. Eng. Technol. 4 IRJET- V4I164
3. R. Devi Priya, R. Sivaraj, Ajith Abraham, T. Pravin, P. Sivasankar and N. Anitha. "MultiObjective Particle Swarm Optimization Based Preprocessing of Multi-Class Extremely Imbalanced Datasets". International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems Vol. 30, No. 05, pp. 735-755 (2022). Doi: 10.1142/S0218488522500209
4. Swathi Buragadda; Siva Kalyani Pendum V P; Dulla Krishna Kavya; Shaik Shaheda Khanam. "Multi Disease Classification System Based on Symptoms using The Blended Approach". International Research Journal on Advanced Science Hub, 5, 03, 2023, 84-90. doi:

10.47392/irjash.2023.017
5. Susanta Saha; Sohini Mondal. "An in-depth analysis of the Entertainment Preferences before and after Covid- 19 among Engineering Students of West Bengal". International Research Journal on Advanced Science Hub,5, 03, 2023, 91-102. doi: 10.47392/irjash.2023.018
6. Ayush Kumar Bar; Avijit Kumar Chaudhuri. "Emotica.AI - A Customer feedback system using AI". International Research Journal on Advanced Science Hub, 5, 03, 2023, 103-110. doi: 10.47392/irjash.2023.019
7. Rajarshi Samaddar; Aikyam Ghosh; Sounak Dey Sarkar; Mainak Das; Avijit Chakrabarty. "IoT & Cloud- based Smart Attendance Management System using RFID". International Research Journal on Advanced Science Hub, 5, 03, 2023, 111-118. doi: 10.47392/irjash.2023.020
8. Minh Ly Duc; Que Nguyen Kieu Viet. "Analysis Affect Factors of Smart Meter A PLS-SEM Neural Network". International Research Journal on Advanced Science Hub, 4, 12, 2022, 288-301. doi:10.47392/irjash.2022.071
9. Lely Novia; Muhammad Basri Wello. "Analysis of Interpersonal Skill Learning Outcomes in Business EnglishStudents Class". International Research Journal on Advanced Science Hub, 4, 12, 2022, 302-305. doi: 10.47392/irjash.2022.072
10.Ms. Nikita; Sandeep Kumar; Prabhakar Agarwal; Manisha Bharti. "Comparison of multi-class motor imagery classification methods for EEG signals". International Research Journal on Advanced Science Hub, 4, 12, 2022, 306-311. doi: 10.47392/irjash.2022.073
11.Aniket Manash; Ratan Kumar; Rakesh Kumar; Pandey S C; Saurabh Kumar. "Elastic properties of ferrite nanomaterials: A compilation and a review". International Research Journal on Advanced Science Hub, 4, 12, 2022, 312-317. doi: 10.47392/irjash.2022.074
12.Prabin Kumar; Rahul Kumar; Ragul Kumar; Vivek Rai; Aniket Manash. "A Review on coating of steel with nanocomposite for industrial applications". International Research Journal on Advanced Science Hub, 4, 12, 2022, 318-323. doi: 10.47392/irjash.2022.075
13.Twinkle Beniwal; Vidhu K. Mathur. "Cloud Kitchens and its impact on the restaurant industry". International Research Journal on Advanced Science Hub, 4, 12, 2022, 324-335. doi: 10.47392/irjash.2022.076
14.V.S. Rajashekhar; T. Pravin; K. Thiruppathi , ―Control of a snake robot with 3R joint mechanism‖, International Journal of Mechanisms and Robotic Systems (IJMRS), Vol. 4, No. 3, 2018. Doi: 10.1504/IJMRS.2018.10017186
15.T. Pravin, C. Somu, R. Rajavel, M. Subramanian, P. Prince Reynold, Integrated Taguchi cum grey relational experimental analysis technique (GREAT) for optimization and material characterization of FSP surface composites on AA6061 aluminium alloys, Materials Today: Proceedings, Volume 33, Part 8, 2020, Pages 5156-5161, ISSN 2214-7853, https://doi.org/10.1016/j.matpr.2020.02.863.
16.Pravin T, M. Subramanian, R. Ranjith,Clarifying the phenomenon of Ultrasonic Assisted Electric discharge machining, -Journal of the Indian Chemical Society‖, Volume 99, Issue 10, 2022, 100705, ISSN 0019-4522, Doi: 10.1016/j.jics.2022.100705
17.M. S. N. K. Nijamudeen, G. Muthuarasu, G. Gokulkumar, A. Nagarjunan, and T. Pravin, ―Investigation on mechanical properties of aluminium with copper and silicon carbide using powder metallurgy technique,‖ Advances in Natural and Applied Sciences, vol. 11, no. 4, pp. 277–280, 2017.
18.T. Pravin, M. Sadhasivam, and S. Raghuraman, ―Optimization of process parameters of Al10% Cu compacts through powder metallurgy,‖ Applied Mechanics and Materials, vol. 813-814, pp. 603–607, 2010.
19.Rajashekhar, V., Pravin, T., Thiruppathi, K.: A review on droplet deposition manufacturing a rapid prototyping technique. Int. J. Manuf. Technol. Manage. 33(5), 362–383 (2019) https://doi.org/10.1504/IJMTM.2019.103277
20.Rajashekhar V S, Pravin T, Thirupathi K, Raghuraman S.Modeling and Simulation of Gravity based Zig-zag Material Handling System for Transferring Materials in Multi Floor Industries. Indian Journal of Science and Technology.2015 Sep, 8(22), pp.1-6.

DOI:10.46647/ijetms.2023.v07i03.051 ISSN: 2581-4621

21.Shoeb Ahmed Syed; Steve Ales; Rajesh Kumar Behera; Kamalakanta Muduli. "Challenges, Opportunities and Analysis of the Machining Characteristics in hybrid Aluminium Composites (Al6061-SiC-Al2O3) Produced by Stir Casting Method". International Research Journal on Advanced Science Hub, 4, 08, 2022, 205-216. doi:10.47392/irjash.2022.051
22.Nirsandh Ganesan; Nithya Sri Chandrasekar; Ms. Gokila; Ms. Varsha. "Decision Model Based Reliability Prediction Framework". International Research Journal on Advanced Science Hub, 4, 10, 2022, 236-242. doi: 10.47392/irjash.2022.061
23.Vishnupriya S; Nithya Sri Chandrasekar; Nirsandh Ganesan; Ms. Mithilaa; Ms. Jeyashree. "Comprehensive Analysis of Power and Handloom Market Failures and Potential Regrowth Options". International Research Journal on Advanced Science Hub, 4, 10, 2022, 243-250. doi: 10.47392/irjash.2022.062
24.Ashima Saxena; Preeti Chawla. "A Study on the Role of Demographic Variables on Online Payment in Delhi NCR". International Research Journal on Advanced Science Hub, 4, 08, 2022, 217-221. doi: 10.47392/irjash.2022.052
25.Vishnupriya S; Nirsandh Ganesan; Ms. Piriyanga; Kiruthiga Devi. "Introducing Fuzzy Logic for Software Reliability Admeasurement". International Research Journal on Advanced Science Hub, 4, 09, 2022, 222-226. doi: 10.47392/irjash.2022.056
26.GANESAN M; Mahesh G; Baskar N. "An user friendly Scheme of Numerical Representation for Music Chords". International Research Journal on Advanced Science Hub, 4, 09, 2022, 227-236. doi: 10.47392/irjash.2022.057
27.Kakali Sarkar; Abhishek Kumar; Sharad Chandra Pandey; Saurabh Kumar; Vivek Kumar. "Tailoring the structural, optical, and dielectric properties of nanocrystalline niobate ceramics for possible electronic application". International Research Journal on Advanced Science Hub, 5, 01, 2023, 1-7. doi: 10.47392/irjash.2023.001
28.Pavan A C; Somashekara M T. "An Overview on Research Trends, Challenges, Applications and Future Direction in Digital Image Watermarking". International Research Journal on Advanced Science Hub, 5, 01, 2023, 8-14. doi: 10.47392/irjash.2023.002
29.Pavan A C; Lakshmi S; M.T. Somashekara. "An Improved Method for Reconstruction and Enhancing Dark Images based on CLAHE". International Research Journal on Advanced Science Hub, 5, 02, 2023, 40-46. doi: 10.47392/irjash.2023.011
30.Subha S; Sathiaseelan J G R. "The Enhanced Anomaly Deduction Techniques for Detecting Redundant Datain IoT". International Research Journal on Advanced Science Hub, 5, 02, 2023, 47-54. doi: 10.47392/irjash.2023.012
31.Nguyen Kieu Viet Que; Nguyen Thi Mai Huong; Huynh Tam Hai; Vo Dang Nhat Huy; Le Dang Quynh Nhu; Minh Duc Ly. "Implement Industrial 4.0 into process improvement: A Case Study in Zero Defect Manufacturing". International Research Journal on Advanced Science Hub, 5, 02, 2023, 55-70. doi: 10.47392/irjash.2023.013
32.Gyanendra Kumar Pal; Sanjeev Gangwar. "Discovery of Approaches by Various Machine learning Ensemble Model and Features Selection Method in Critical Heart Disease Diagnosis". International Research Journal on Advanced Science Hub, 5, 01, 2022, 15-21. doi: 10.47392/irjash.2023.003
33.Nirsandh Ganesan; Nithya Sri Chandrasekar; Ms. Piriyanga; Keerthana P; Mithilaa S; Ms. Jeyashree. "Effect of Nano Reinforcements Tio2 And Y2O3 on Aluminium Metal Matrix Nanocomposite". International Research Journal on Advanced Science Hub, 5, 01, 2023, 22-32. doi: 10.47392/irjash.2023.004
34.Nur Aeni; Lely Novia; Mr. Muhalim; Nur Fitri. "Incorporating Secret Door in Teaching Vocabulary for EFL
Vocational Secondary School Students in Indonesia". International Research Journal on Advanced ScienceHub, 5, 01, 2023, 33-39. doi: 10.47392/irjash.2023.005