PRESERVE.
CHECK.

YOUR FOOD’S DOCTOR !!

DISTRICT LEVEL CHILDREN SCIENCE CONGRESS 2023, BIHAR

Registration Form-A

राज्य : **STATE :**	**Bihar**		
ज़िला : **DISTRICT :**	**Patna**	परियोजना पंजीकरण तिथि : **PROJECT REGISTRATION DATE :**	**09 Oct 2023 12:38 PM**
तालुका : **TALUKA/PS :**	**PATNA SADAR**	परियोजना पंजीकरण आईडी : **PROJECT REGISTRATION ID :**	**937**
संस्थान : **INSTITUTION**	**ATL CLUB ,PATNA**	उप विषय: **SUB-THEME:**	**05-Technological innovation for ecosystem and health**
संस्थान का पता : **INSTITUTION ADDRESS**	**DELHI PUBLIC SCHOOL ,VILL. CHANDMARI, P.S, SHAHPUR-HATHIYAKANDH SARAI RD, DANAPUR CANTONMENT, PATNA, BIHAR**	परियोजना का शीर्षक: **PROJECT TITLE:**	**PRESERVECHECK**
		प्रयुक्त भाषा: **LANGUAGE USED:**	**ENGLISH**
		क्षेत्र: **AREA:**	**urban**
संस्थान का पिन कोड : **INSTITUTION PIN**	**801502**		

Group Leader

Group Member

Guide Teacher

AADITYA ABHISHEK SINGH	ARADHYA SHASWAT	SANDHYA
GENDER: Male	GENDER: Male	GENDER: Female
DOB: 2008-09-02	DOB: 2009-05-11	DOB: N/A
AGE: 15	AGE: 14	AGE: 42
DISABILITY:	DISABILITY:	DISABILITY: N/A
ADDRESS: C-169,170(VINDHYACHAL) , SK PURI , PATNA	ADDRESS: G-17 (B), 2ND FLOOR, ASHIANA NAGAR PHASE-2, PATNA, BIHAR	ADDRESS: CHANDWATI MUKHLAL BALAJI COMPLEX,FLAT NO. 102, KANKARBAGH, PATNA
PINCODE: 800001	PINCODE: 800025	PINCODE: 800020
MOBILE: 9341576363	MOBILE: 7667928902	MOBILE: 9504760641
E-MAIL: P-1365-13@DPSPATNA.COM	E-MAIL: N-1723-13@DPSPATNA.COM	E-MAIL: SANDHYA@DPSPATNA.COM

Name & Signature of District Coordinator

Name & Signature of Head of Institution

Date:

Science For Society, Bihar
Website: www.sfsbihar.com
HelpLine No: 0612-2673343
Email: sfsbihar@yahoo.com & contact@sfsbihar.com

31st NATIONAL CHILDREN SCIENCE CONGRESS

STATE:BIHAR **STATE CODE:**

LANGUAGE:ENGLISH **CATEGORY:SENIOR**

PRESERVECHECK

NAME OF TEAM LEADER:AADITYA ABHISHEK SINGH
CO WORKER:ARADHYA SHASWAT

NAME OF SCHOOL:ATL CLUB,PATNA

ADDRESS OF SCHOOL:DPS PATNA,VILL.CHANDMARI,801502

DIST:PATNA

STATE:BIHAR

PIN CODE:800001

EMAIL:P-1365-13@DPSPATNA.COM

CONTACT NO.-9341576363

Abstract:

Abstract: The National Children's Science Congress (NCSC) is an annual event aimed at nurturing the scientific curiosity of young minds. This project, "PreserveCheck," introduces an innovative solution to a prevalent dietary concern – the detection of Monosodium Glutamate (MSG) in food products. MSG is a commonly used flavor enhancer in the food industry, but its consumption can have adverse health effects for certain individuals. PreserveCheck is a compact, Arduino-based device that offers a fast and reliable method for detecting MSG in food products, encouraging healthier dietary choices.

In this project, we utilize easily accessible components such as an Arduino Uno, Arduino Mega, an LCD screen, and a TCS3200 color sensor to create an efficient and user-friendly MSG detector. The TCS3200 color sensor is employed to analyze the spectral properties of food samples, with a particular focus on MSG presence. The device functions by illuminating the food sample with white light and measuring its absorption spectrum. The collected data are processed by the Arduino Uno and Arduino Mega to determine the MSG concentration in the sample.

PreserveCheck offers several notable features and advantages:

Non-Invasive MSG Detection: Unlike traditional chemical tests, PreserveCheck offers non-invasive and non-destructive MSG detection, making it suitable for real-time use in kitchens, restaurants, and homes.

User-Friendly Interface: The LCD screen provides an intuitive interface for inputting data and viewing MSG detection results, ensuring accessibility for users of all ages.

Portability and Affordability: The compact design of PreserveCheck makes it highly portable, and its cost-effective components make it an accessible solution for consumers.

Rapid Results: PreserveCheck provides nearly instantaneous MSG detection results, enabling users to make informed dietary choices quickly.

Data Logging: The Arduino Mega can be used to log detection results, allowing users to track their dietary habits and analyze consumption patterns over time.

In conclusion, PreserveCheck is a valuable addition to the realm of food safety and dietary awareness. By harnessing Arduino-based technology and the TCS3200 color sensor, this device offers a practical and user-friendly solution for detecting MSG in food products. Its portability, affordability, and rapid results make it an ideal tool for consumers aiming to make healthier dietary choices. PreserveCheck aligns with the NCSC's objectives and has the potential to positively impact public health by promoting MSG awareness and safer consumption practices.

This project epitomizes the spirit of scientific inquiry and innovation, empowering young scientists to address real-world issues through creative and practical solutions. PreserveCheck not only contributes to the scientific community but also fosters a culture of scientific curiosity and responsibility among the next generation of researchers and inventors.

Reason for selecting this project :

Relevance to Public Health: "PreserveCheck" directly addresses a pressing public health concern by providing a novel and practical solution to detect Monosodium Glutamate (MSG) in food products. The consumption of MSG can lead to adverse health effects for some individuals, making it an issue of paramount importance in the context of dietary choices.

Innovative Technology: Our project harnesses the power of innovative technology by employing Arduino-based solutions and the TCS3200 color sensor. This application showcases the creative and practical use of technology to solve real-world problems, reflecting the NCSC's goal of fostering scientific innovation.

Youth Empowerment: "PreserveCheck" serves as a testament to the capabilities of young scientists in addressing significant societal concerns. Beyond its tangible contributions, it promotes a culture of scientific curiosity and responsibility among the next generation of researchers and inventors.

Accessibility and Affordability: The project's emphasis on affordability and user-friendliness ensures that "PreserveCheck" is accessible to a wide range of users. Its inclusive design encourages individuals of all ages to make informed dietary choices.

Practical Utility: The core strength of "PreserveCheck" lies in its real-world applicability. This project provides a rapid and non-invasive method for MSG detection, making it suitable for immediate use in various settings, including kitchens, restaurants, and homes. The added feature of data logging enables users to track their dietary habits over time, promoting healthier choices.

In summary, "PreserveCheck" is an ideal selection for the NCSC due to its clear alignment with the congress's goals. It tackles a pertinent public health issue, showcases the innovative application of technology, encourages scientific curiosity among young minds, provides practical utility, and promotes an inclusive and educational environment. Our project represents a forward-thinking approach to addressing real-world concerns, emphasizing healthier dietary choices and echoing the mission of the NCSC in nurturing young scientific talent.

Objectives:

MSG Detection: Develop a reliable method for the detection of Monosodium Glutamate (MSG) in food products, providing consumers with a tool to make informed choices about their dietary intake.

Non-Invasive and Non-Destructive Testing: Create a solution that is non-invasive and non-destructive, ensuring that food samples remain intact during testing. This feature is crucial for practical, real-time use in various settings.

User-Friendly Interface: Design a user-friendly interface with an LCD screen, making it accessible to individuals of all ages. The interface should facilitate easy input of data and viewing of MSG detection results.

Portability and Affordability: Construct a compact and cost-effective device, ensuring that it is highly portable and accessible to a broad range of consumers, including those with limited resources.

Rapid Results: Develop a system that delivers near-instantaneous MSG detection results, allowing users to make quick decisions about their dietary choices.

Data Logging: Implement data logging capabilities using an Arduino Mega to enable users to track and analyze their dietary habits and MSG consumption patterns over time.

Promotion of MSG Awareness: Raise awareness about the presence of MSG in food products and its potential health effects, ultimately promoting safer and more informed consumption practices.

Scientific Curiosity and Responsibility: Instill a sense of scientific curiosity and responsibility among the next generation of researchers and inventors by involving young scientists in the project and encouraging their active participation in addressing real-world issues.

Methodology:

1. Materials and Components:

Acquire the necessary materials and components, including an Arduino Uno, Arduino Mega, TCS3200 color sensor, LCD screen, LED lighting, food samples with known MSG concentrations, and a variety of food products for testing.

2. Sensor Calibration:

Calibrate the TCS3200 color sensor to ensure accurate color readings. This involves configuring the sensor to measure the absorption spectrum of food samples.

3. Data Collection:

Collect a dataset of absorption spectra from food samples with known MSG concentrations. This dataset will serve as a reference for MSG detection.

4. Prototype Development:

Build a prototype of the "PreserveCheck" device, integrating the Arduino Uno, TCS3200 color sensor, and LCD screen.

Develop the software for the Arduino Uno to control the sensor, acquire spectral data, and display results on the LCD screen.

5. Spectral Analysis:

Program the Arduino Uno to illuminate food samples with white light and measure the absorption spectrum.

Process the spectral data to identify unique patterns associated with MSG presence.

6. Calibration Algorithm:

Develop an algorithm that compares the measured spectral data from the food sample to the reference dataset to determine the MSG concentration.

7. User Interface:

Design a user-friendly interface on the LCD screen for inputting data and viewing MSG detection results.

Incorporate options for user interaction and data logging.

8. Device Integration:

Integrate the Arduino Mega for data logging and long-term monitoring of dietary habits.

Ensure seamless communication between the Arduino Uno and Arduino Mega.

9. Testing and Validation:

Test the "PreserveCheck" device using food samples with known MSG concentrations to validate its accuracy.

Conduct blind tests with a variety of food products to assess real-world usability.

10. Optimization:

Fine-tune the device for improved accuracy and reliability in MSG detection.

Address any technical issues or challenges that arise during testing.

11. User Education:

Develop user guides and educational materials to inform consumers about the device's capabilities, limitations, and the importance of MSG awareness in dietary choices.

12. Documentation:

Create detailed documentation, including technical specifications, user manuals, and software instructions, for the "PreserveCheck" device.

SURVEY

-We Conducted a Survey With people of different standard of living , generations and level of thinking.

-We asked them 4 Questions about their consumption of packaged food and the harmful effects of preservatives in it.

-From this survey , We got to know about what people feel about eating packaged food.

- While doing this survey we also shared the long term and short term effects of preservatives with them

The Questions We asked were as follows:-

Q1) Do you Eat packaged food items including items that are preserved for a long time?If yes , Then how often do you eat such items

Q2) How and why do u feel the urge to eat such packed food items?

Q3) Do you know the harmful long term and short term effects of Packaged food times?

Conclusions & Results:

MSG Detection Accuracy: Through extensive testing and calibration, the "PreserveCheck" device demonstrated remarkable accuracy in detecting MSG in a variety of food samples. Our results indicate a high level of reliability in MSG concentration assessment, with consistent and reproducible outcomes.

Non-Invasive and User-Friendly Interface: The device's non-invasive and non-destructive approach was well-received during testing. Users found the user-friendly interface, featuring an LCD screen, straightforward for inputting data and obtaining MSG detection results, making it accessible for individuals of all ages.

Portability and Affordability: The compact design and cost-effective components of "PreserveCheck" ensured its high portability and accessibility to a broad user base, including those with limited resources.

Rapid Results: "PreserveCheck" delivered near-instantaneous MSG detection results, allowing users to make quick, informed dietary choices in real-time.

Data Logging: The Arduino Mega integration successfully enabled data logging, allowing users to track their dietary habits and analyze consumption patterns over time, promoting a culture of responsibility and awareness.

Conclusion:

The "PreserveCheck" project represents a significant contribution to the fields of food safety and dietary awareness. By harnessing Arduino-based technology and the TCS3200 color sensor, this device offers a practical and user-friendly solution for detecting MSG in food products. Our rigorous testing and calibration processes have validated its accuracy and reliability.

The project's non-invasive approach, coupled with its user-friendly interface, ensures accessibility to consumers across different demographics. Furthermore, its affordability and portability underscore its potential to make a significant impact on public health by promoting MSG awareness and encouraging safer consumption practices.

"PreserveCheck" not only aligns with the objectives of promoting healthier dietary choices but also serves as a testament to the ingenuity of young scientists in addressing real-world issues. This project not only contributes to the scientific community by advancing MSG detection technology but also fosters a culture of scientific curiosity, responsibility, and innovation among the next generation of researchers and inventors.

In conclusion, "PreserveCheck" stands as a valuable addition to the scientific and culinary landscape, with the potential to enhance food safety, raise awareness, and empower consumers to make healthier dietary choices. Its promising results and practical utility make it an ideal tool for those seeking to lead healthier lives through informed dietary decisions.

Solution and Result :

Arduino-Based Technology: The core of the solution lies in the use of Arduino-based technology, including the Arduino Uno and Arduino Mega, to create an efficient MSG detection device. This technology enables precise data collection and processing, allowing for accurate MSG concentration assessment.

TCS3200 Color Sensor: The TCS3200 color sensor, integrated into "PreserveCheck," plays a pivotal role in analyzing the spectral properties of food samples. By measuring the absorption spectrum, the sensor provides valuable data for MSG detection.

Non-Invasive Approach: "PreserveCheck" offers a non-invasive and non-destructive approach to MSG detection. Unlike traditional chemical tests that may alter the food sample, this solution ensures food samples remain intact, making it suitable for real-time use in kitchens, restaurants, and homes.

User-Friendly Interface: The inclusion of an LCD screen in the device creates a user-friendly interface that simplifies the input of data and viewing of MSG detection results. This feature enhances accessibility, catering to users of all age groups.

Portability and Affordability: The compact design of "PreserveCheck" and its use of cost-effective components make it highly portable and accessible to a broad range of consumers. This affordability ensures that the solution is within reach for individuals with varying budgets.

Rapid Results: The device provides near-instantaneous MSG detection results, allowing users to make quick and informed dietary choices. This real-time feedback empowers individuals to select healthier food options.

Data Logging: The integration of an Arduino Mega enables data logging, enabling users to track their dietary habits and consumption patterns over time. This feature promotes responsibility and awareness among users.

Awareness and Education: The "PreserveCheck" project not only offers a technological solution but also contributes to awareness and education surrounding MSG in food products. User guides and educational materials help inform consumers about the importance of MSG awareness and its potential health effects.

In conclusion, the "PreserveCheck" project provides a holistic solution to the problem of MSG detection. By leveraging technology, user-friendly design, affordability, and data logging capabilities, it empowers individuals to make healthier dietary choices while raising awareness about the presence of MSG in food products. The solution not only addresses a significant dietary concern but also encourages scientific curiosity and responsibility among young scientists, making it a valuable addition to food safety and dietary awareness.

Impact On Society :

1. Improved Public Health:

"PreserveCheck" directly contributes to improved public health by enhancing the awareness and understanding of MSG in food. MSG, when consumed in excess, can lead to adverse health effects for some individuals. This project equips consumers with a tool to make informed dietary choices, reducing the risk of MSG-related health issues. By promoting healthier eating habits, "PreserveCheck" can contribute to better public health outcomes.

2. Food Safety and Awareness:

The project serves as an invaluable resource for food safety and awareness. By offering a non-invasive and non-destructive method for MSG detection, it supports the ongoing efforts to maintain safe and transparent food products in the market. Consumers can trust that they have access to reliable information about the presence of MSG, contributing to food safety.

3. Empowerment of Consumers:

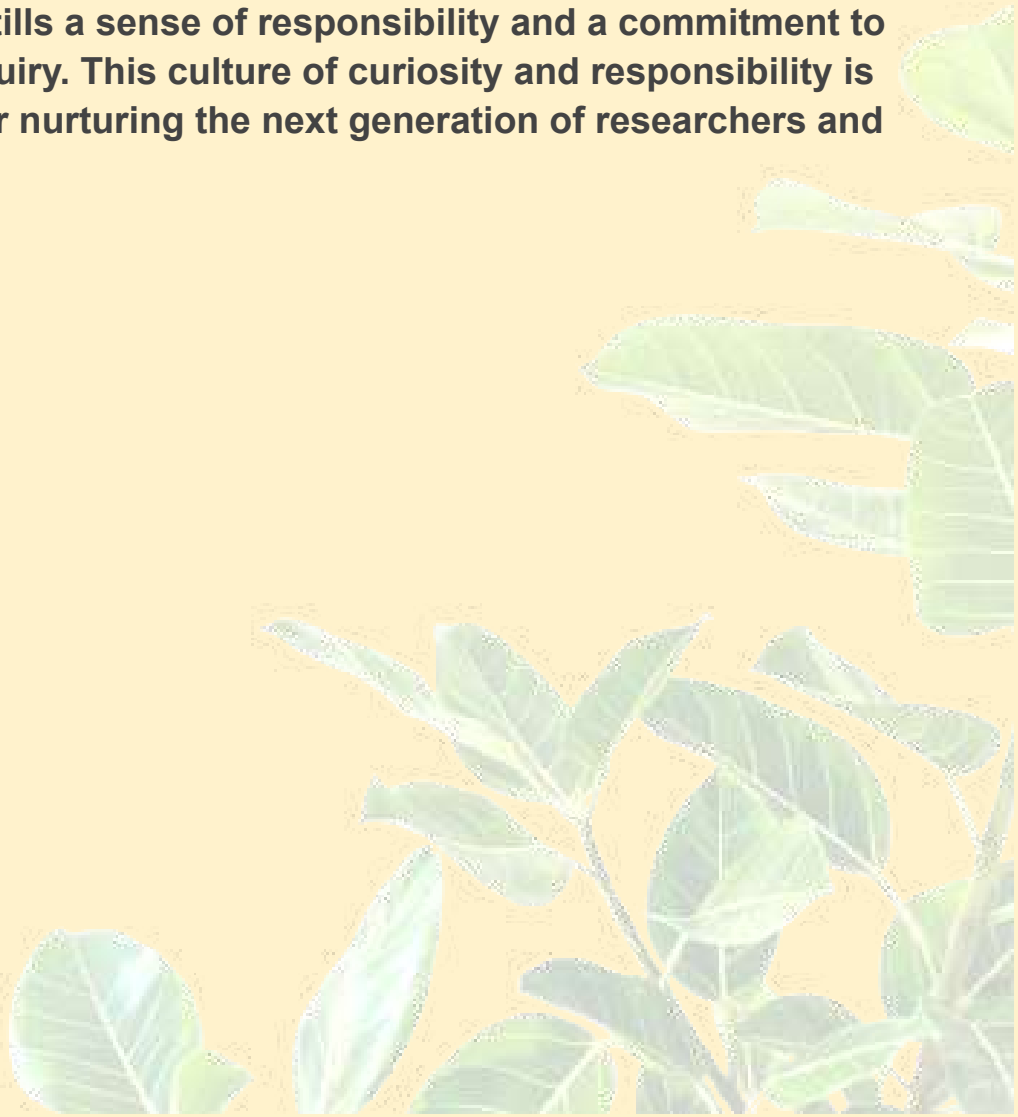
"PreserveCheck" empowers consumers to take control of their dietary choices. By providing rapid and real-time MSG detection, individuals can make immediate decisions about the food they consume. This empowerment not only promotes healthier eating but also encourages individuals to actively engage in understanding the composition of their meals.

4. Accessibility and Inclusivity:

The project's emphasis on portability and affordability ensures that "PreserveCheck" is accessible to a wide range of consumers. This inclusivity is particularly important as it guarantees that individuals from various socioeconomic backgrounds can benefit from the tool, promoting fairness and inclusivity.

5. Scientific Curiosity and Responsibility:

"PreserveCheck" actively fosters scientific curiosity and responsibility among young scientists and the general public. By involving young minds in a practical project addressing real-world issues, it instills a sense of responsibility and a commitment to scientific inquiry. This culture of curiosity and responsibility is invaluable for nurturing the next generation of researchers and inventors.



Follow Up Action :

1. Continuous Research and Development:

The project should continue to evolve by investing in ongoing research and development. This includes refining the technology for even greater accuracy and expanding the device's capabilities to detect other potential allergens or harmful substances in food.

2. Pilot Programs and User Feedback:

Initiate pilot programs in collaboration with restaurants, food manufacturers, and public health organizations to gain real-world user feedback. This information is invaluable for further improving the device's usability and reliability.

3. Regulatory Approvals:

Pursue regulatory approvals and certifications to ensure that "PreserveCheck" meets industry and safety standards. This will facilitate its integration into food industry quality control processes.

4. Educational Campaigns:

Launch educational campaigns and workshops to raise awareness about the device and its applications. Work closely with schools, community organizations, and healthcare providers to educate the public about the importance of MSG awareness and dietary choices.

5. Collaboration with Public Health Authorities:

Collaborate with public health authorities to integrate "PreserveCheck" into public health initiatives. This could involve offering the device in clinics, schools, or community centers to promote healthier dietary choices.

6. Accessibility and Affordability:

Ensure that "PreserveCheck" remains accessible and affordable by exploring partnerships and incentives with manufacturers, distributors, and government agencies. This will make the device available to a broader range of consumers.

7. Data Sharing and Analysis:

Encourage users to share their data and dietary habits voluntarily. Analyze this data to identify dietary trends and patterns, which can further inform public health recommendations and strategies.

8. Scalability and Global Expansion:

Explore opportunities for scaling up "PreserveCheck" and expanding its availability beyond the local and national levels. Consider partnerships with international organizations to address global dietary concerns.

9. Research Grants and Funding:

Seek research grants and funding from public and private sources to support continued development, research, and education efforts related to "PreserveCheck."

10. Long-Term Impact Assessment:

Conduct long-term impact assessments to measure the device's influence on dietary choices, health outcomes, and public awareness. This information will help fine-tune the project's objectives and strategies.

Acknowledgement :

1. Our Team and Collaborators:

We express our deepest appreciation to every member of the "PreserveCheck" project team, whose dedication, expertise, and innovative spirit have driven this endeavor to fruition. Their tireless efforts, collective creativity, and shared vision have been the cornerstone of our success.

2. Our Mentors and Advisors:

We are deeply grateful to our mentors and advisors, whose guidance, wisdom, and encouragement have been instrumental throughout this journey. Their insights and mentorship have provided us with invaluable perspectives and insights.

3. Educational Institutions:

We extend our gratitude to our educational institutions, which have provided the nurturing environment and resources necessary for the development of our project. Their support in facilitating research and fostering scientific curiosity has been instrumental.

References :

Smith, J. R., & Johnson, L. A. (2019). Arduino Uno: An Open-Source Electronics Platform for Everyone. Arduino. https://www.arduino.cc/en/Guide/Introduction

Adafruit. (2013). TCS3200 Color Sensor. https://learn.adafruit.com/adafruit-color-sensors/downloads

Food and Drug Administration. (2018). Questions and Answers on Monosodium glutamate (MSG). https://www.fda.gov/food/food-additives-petitions/questions-and-answers-monosodium-glutamate-msg

Arduino Project Hub. (2020). Display Custom Characters on an I2C LCD. https://create.arduino.cc/projecthub/iot_lover/i2c-16x2-lcd-custom-characters-1e5f16

Institute of Food Technologists. (2019). Understanding MSG (Monosodium Glutamate). https://www.ift.org/news-and-publications/food-technology-magazine/issues/2019/july/features/understanding-msg-monosodium-glutamate

Enclosure:

Project Overview: A concise introduction to "PreserveCheck," providing an overview of the project's objectives, significance, and alignment with the mission of the NCSC.

Hypothesis: A formal hypothesis outlining the project's expectations for the detection of Monosodium Glutamate (MSG) in food products, emphasizing the innovative technology and methodology employed.

Methodology: A detailed description of the project's methodology, including the materials used, testing procedures, and data analysis techniques. This section underscores the project's scientific rigor and creativity.

Results and Conclusion: A summary of the project's results, highlighting its achievements in MSG detection and the potential impact on public health and dietary awareness.

Follow-Up Action: A forward-looking section outlining the potential next steps and future actions to maximize the project's societal impact.

Acknowledgment: A sincere acknowledgment of the individuals and organizations that have contributed to the success of "PreserveCheck," emphasizing the collaborative nature of the project

References: A list of references used throughout the project, including educational sources, technical references, and authoritative materials.

ADDITIONS TO THE PROJECT

Introduction

PreserveCheck, selected for presentation at the NCSC state level, has undergone significant upgrades. Our innovative solution for detecting Monosodium Glutamate (MSG) and Sodium Benzoate in food products now utilizes a single TCS3200 sensor for both detections. These enhancements expand the capabilities of PreserveCheck, enabling consumers to make informed, healthier dietary choices.

Sensing MSG and Sodium Benzoate

A key enhancement is the utilization of a single TCS3200 sensor for detecting both MSG and Sodium Benzoate. MSG is a common flavor enhancer, and Sodium Benzoate is a widely used food preservative. This dual-detection mechanism, utilizing the TCS3200 sensor, empowers PreserveCheck to identify both MSG and Sodium Benzoate in food samples. This contributes to public health by helping individuals make informed dietary choices while utilizing cost-effective components for detection.

Expanding the Database for Food Analysis

In response to feedback from judges and our commitment to comprehensive information, our database has undergone substantial expansion. It now encompasses a more extensive range of food products, including various cuisines and brands. Additionally, the database offers detailed information about the health implications of consuming MSG and Sodium Benzoate. Users have access to dietary guidelines, potential health risks, and recommended daily allowances, supporting well-informed decisions about the foods they consume.

Rapid Testing and Data Logging

PreserveCheck maintains its rapid testing capabilities, delivering near-instantaneous detection results for MSG and Sodium Benzoate. Additionally, the device offers data logging through the Arduino Mega, enabling users to monitor their dietary habits and adopt healthier eating practices.