i-SPiKE 2023

INTERNATIONAL EXHIBITION & SYMPOSIUM ON PRODUCTIVITY, INNOVATION, KNOWLEDGE & EDUCATION

"Optimizing Innovation in Knowledge, Education and Design"

EXTENDED ABSTRACT

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7.	Sad Nature Bag *Nurul Hazirah Amani binti Hafizal, Khursiah Nur binti Mohamad Amin & Nurulhuda Insyirah binti Khairol Maizi*	702-705
8.	Mehlcate Gift *Noor Ruzzuwana binti Rahlan, Darshanaa A/P Gunasingam, Dania Balqis binti Rezaman, Aniq Hakimi bin Rozishahlan & Nur Zahirah Aqilah binti Johori*	706-709

CATEGORY: CSP YOUNG INVENTOR

1.	Gyroscopic Contactless Head Mouse *Nannabhad Thammultri, Bhandhisa Pongsak, Pakin Teerachotmongkol & Athicha Siriboonlamom*	710-713
2.	"Imagine Spacing Ruler, Your Writing Buddy" *Saadiah Juliana Saadun, Putri Qisha Nur Iman, Damia Humaira Syuhaimi, Nurul Aina Amilia Mokhtar, Khayra Zarith Khuzairi, Siti Maslinda Syed Musa & Farah Ilyana Azlan*	714-718
3.	SOAP4LYFE: Soap Used Cooking Oil with Sandal Wood and Black Seed *Irdina Iwani Abd Jalil, Fatin Nur Amira A.Rosman & Fatin Nursabrina Lokman*	719-723

CATEGORY: CST YOUNG INVENTOR

1.	Smart Exposure to Artificial Intelligence (AI) Among the Primary School Students *Muhammad Adam bin Helmi, Mohammad Qayyim bin Mohammad Rizal, Muhammad Anas bin Helmi & Adlin Elieza binti Nik Awang*	724-726
2.	Go Beyond *Raidahwati binti Jalalin, Madni bin Siadi, Maimunah binti Tajuddin, Mohd Hafiz bin Abdul Karim & Myzan Luqman bin Mohd Yazid*	727-729
3.	Sustainable Sap Hydrogels Enhance Controlled Urea Release in Agriculture *Maizatul Husna Nasuha Mazlan, Alyasofea Nazrul Hisham, Hatika Kaco & Mohd Shaiful Sajab*	730-736
4.	Coco M Board (Coconut Multipurpose Board) *Norzalina binti Jenal, Badreyanaliss binti Ignicious Nizam, Farishah Najwa binti Roslan, Nurin Qistina Basyirah binti Rusli, Nur Hidayatul Munirah binti Mohd Zaiton, Nadhirah binti Abdul Halim & Fateha Syahera binti Khairul Anuar*	737-740

Assalamualaikum warahmatullahi wabarakatuh,

First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality . I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH

WELCOME MESSAGE (i-SPiKE 2023 CHAIR)

We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPiKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPiKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail
Chair
3rdInternational Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPiKE 2023)

GYROSCOPIC CONTACTLESS HEAD MOUSE

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ABSTRACT:

The 'Contactless Mouse' is an innovation that allows individuals with physical disabilities, injuries or limited mobility to control their computer without physical contact via sensors to detect head motions which transform them into cursor movements. The device includes built-in accelerometers and gyroscopes for accurate control of cursor movements, shortcut buttons and other controls which can be activated by blowing into the microphone. Some objectives of this invention include: making computer access easier and creating an input device that can be used in a range of settings conveniently. The Contactless Mouse contributes to the society as a whole by promoting a normal life for the disabled, for example patients with C-spine injury, paraplegia or carpal tunnel syndrome, and at the same time improving safety measures for individuals who use computers regularly - the mouse can provide improved ergonomics, reducing strain on the wrists. Additionally, the contactless mouse has a significant potential for commercialisation in a range of markets.

INTRODUCTION:

The world of technological advancements is progressing at a rapid pace where devices have become a major part in our daily life. However, the disabled are often excluded from these changes, especially those with little function in the upper body. Nevertheless, despite their challenges of holding and operating a phone or tablet, there is a chance when it comes to functioning desktop computers: leading to the invention of the *'Contactless Mouse'*. In the process of developing this project, we have interviewed a potential client, a former financial officer who used computers on a regular basis. However, after losing her upper limbs in an accident, she has been restricted from being of service at the workplace. Therefore, we have constructed our design surrounding her struggles, in the hopes of allowing her to once again operate a computer.

WHAT IS A CONTACTLESS MOUSE

A contactless mouse is a type of computer input device that does not require physical contact with a surface. Instead, it uses sensors to detect hand movements and translate them into cursor movements on the computer screen. The main benefit of a contactless mouse is that it allows users to control their computer without having to physically move a traditional mouse across a

surface. This can be especially beneficial for individuals with limited mobility, physical disabilities, or injuries that make it difficult or uncomfortable to use a traditional mouse. Our Contactless mouse comes with built-in accelerometers and gyroscopes, allowing for precise control of cursor movement, as well as buttons and other controls that can be activated through mouth blowing. Moreover, users can also control their computer with spoken commands by our voice recognition technology.

DESIGN PROCESS:

Firstly, we identified our target group as the disabled and looked at their needs. An area we decidedto work on is how to make the internet use more convenient for them. We looked at their daily activities and it is found that many of them lack jobs and occupations due to their special needs. With the use of Program Language C, we were able to explore different functions of coding and finally developed an embedded system which allows our product to function.

FEATURES OF OUR DESIGN INCLUDE:

1. An intuitive head movement sensors able to translate to on-screen cursor activity
2. Connection of components via Bluetooth
3. Rechargeable battery
4. Personalized settings
5. Relative accuracy controlled by minimal head movements
6. Small and compact design
7. Users allowed maneuverability whilst operating the device
8. Compatibility across many operating systems (Windows, iOS, etc.)

COMPONENTS OF THE MOUSE INCLUDES:

1. A motion processor IMU MPU6886 (gyro and accelerometer)
2. A microphone(MAX4466), connected to an analog-to-digital converter (ADC) to convert real world signals (wind motion from mouth blowing) into a digital representation, which will act as a left click button.
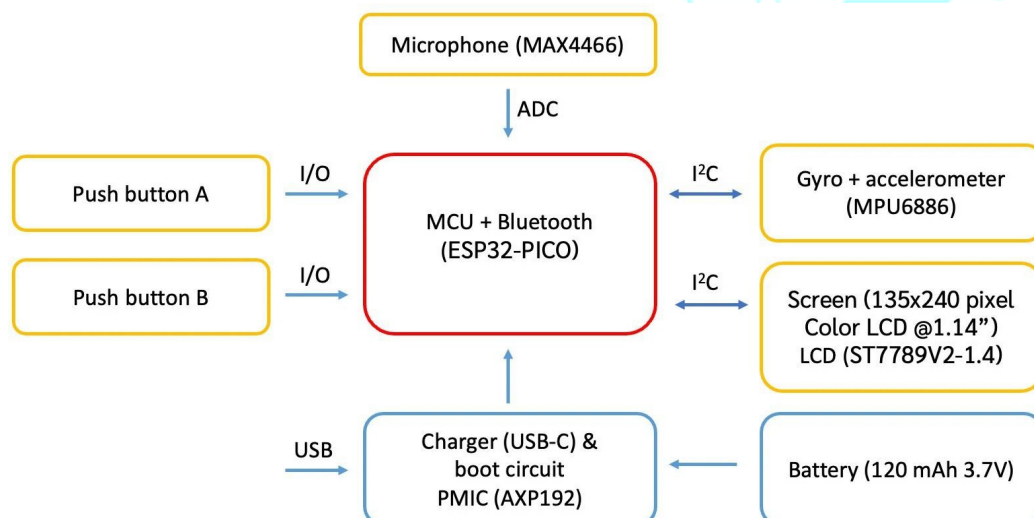3. LCD screen to display parameters of device

Diagram 1: Block Diagram

HOW DOES IT WORK?

1. Since the ESP32-PICO microcontroller contains a bluetooth built in, when we program the firmware, we can utilize the hardware as a wireless mouse via a bluetooth connection.
2. Input signals received from the microphone (MAX4466) through the Analog to Digital Converter (ADC) are classified into two types. If the sound detected by the microphone is higher than the amplitude threshold we input, the microphone will act as an enter button; if lower, the sound will be ignored.
3. Users can control the direction of the mouse through head movement (input) in which the gyro and accelerometer connected via the I^{2}C port will read the tilting angle of the user's head according to x, y and z axis and convert these inputs to a change in the direction and distance that the mouse moves on the computer screen.
4. The LCD screen displays the current status of the module which corresponds with the directionof the mouse. This is categorized into: Normal, Up, Down, Left, and Right.
5. If push button A or B is being pressed, the module will read the signal sent through the input port and translate them to an electrical signal.
6. The Power Management Integrated Circuits (PMIC) AXP192 manages the power of various components of the device, including IC module and LCD module.

Diagram 2: Prototype

USING THE CONTACTLESS MOUSE

1. **Powering on:** To start using the mouse, the user will have to hold Button C for 5 seconds until a white screen appears.
2. **Connect the mouse:** If you are using your Contactless Mouse for the first time, make sure to connect it to your computer via Bluetooth first.
3. **Press Button B:** By pressing Button B, a signal is sent from the device to the computer in order to prevent signal interference from the touchpad. This allows you to choose between using the touchpad and the contactless mouse.
4. **Defining Normal:** By pressing button A, the device will remember the starting position resembled as "normal" on the screen.
5. **Pressing Enter:** In order to press enter, the user will have to simply blow or speak into the microphone in front of them.

Diagram 3: Label of different parts

ADVANTAGES OF THE CONTACTLESS MOUSE:

1. **Improved Accessibility:** For those with physical disabilities or limited mobility, a mouse can provide an accessible method of interacting with a computer. Using a mouse can reduce the need for complicated keyboard shortcuts, allowing individuals to navigate and control their computer more easily.
2. **Versatility:** Mice can be used for a wide variety of computer tasks, from basic web browsing to complex software applications. This versatility makes them an ideal tool for individuals whorely on their computer for work, education, or communication.
3. **Improved Ergonomics:** For individuals who spend extended periods using a computer, a mouse can provide improved ergonomics, reducing strain on the hands, wrists, and arms. This can help prevent conditions such as carpal tunnel syndrome or Quervain's tenosynovitis.
4. **Adjustable:** Our contactless mouse can be personalised through an adjustable headband, ensuring that it can accommodate different head sizes and provide a snug fit for each user and an adjustable microphone. This adaptability guarantees a comfortable and secure experience, tailored to individual preferences.

SAFETY PRECAUTIONS:

As the device is powered by batteries, it should not be kept in humid places or close to any liquid. Avoid placing the device in a hot environment with temperature above 40 degree celsius.

OTHER HIGHLIGHTS:

1. Portable - can be conveniently stored in pockets
2. Produced in Thailand - easier for maintenance and repair as materials are widely available
3. Can be mass produced - reducing the price of the product
4. Durable and has high resistance - especially against fall damage
5. Comfortable to wear - adjustable features and light in weight
6. Easy to charge - Type-C charging port