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College: ITE College Central

Lose that Fire

Unlike commercial buildings, HDB homes are not fitted with fire protection devices such as fire sprinkler systems and fire extinguishers. Most HDB home owners also do not own any fire protection device. Many believe it is unnecessary or does not fit their home interior.

The solution? A simple and easy to use device called the **AAA** (**Autonomous Active Fire Protection Apparatus**), which has a neutral form to fit the ceiling of any home interior.

It will be activated upon fire contact, igniting a fuse which will break the foam cover apart and disperse a chemical agent to extinguish the fire.

Innovators' Inspiration

"We were motivated to do this project after coming across news reports of fire accidents. One that left a strong impact on us was the devastating fire that broke out at the Grenfell Tower block of public housing flats in London. It was shocking, because many lives were lost. Subsequently, we came across more reports of fire accidents in HDB flats here.

It made us realise that such accidents are very common, and more could be done to keep homes safe from fire. That is when we thought of creating a fire protection device that could be well accepted by home owners – one that is simple, easy to use, and aesthetically pleasing."

What's So Special

- The chemical agent used is ABC Dry Chemical, the same agent used in fire extinguishers.
- The design resembles ceiling light, for a better fit with the home environment!
- The casing of the device is made of high density foam. This allows the casing to break apart safely and easily for dispersion of the extinguishing agent after the fuse is ignited.

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An Aid for Arm Rehabilitation

For people suffering from loss of muscle strength due to ageing or recovering from strokes and forearm injuries, properly guided forearm exercises help to promote recovery. Such exercises involve rotation of the palm upwards (supination) and downwards (pronation).

With the **Automatic Forearm Prono-Supinator**, patients can perform forearm therapy by themselves after the set-up by their occupational therapist. It comes with automatic forearm turning, adjustable angular motion, and an indicator showing motion counts.

By supporting self-therapy, it frees up time for occupational therapists to assist other patients amidst their busy schedule.

Innovators' Inspiration

"We have grandparents who are unable to carry out normal routines such as eating food with a spoon or brushing their teeth, due to weakness in the arm. Through this project, we hope to help other people facing daily struggles like our grandparents.

One thing we learned was that providing therapy support for the elderly requires careful consideration of their unique conditions. When we tested the device at AWWA, we discovered that many elderly patients have sensitive skin that tears easily. Therefore, we had to identify material that will not hurt their skin.

As Singapore faces an ageing population, supporting the healthcare needs of elderly patients has become more important."

What's So Special

- The device is fully automated, powered by a servomotor that turns at a customisable angle and pre-set count.
- The turning angle is kept within 180 degrees, which is the maximum angle for pronation and supination movements.

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Space for Comfort

Have you ever been uncomfortable when someone stands too close? For most of us, respecting the personal space of others comes naturally. However, children with Autism Spectrum Disorder (ASD) are less aware of this. Often, they may unconsciously cause discomfort to others by standing too close.

To help them overcome this issue, the team created **SPACE Home and SPACE Mobile**. These wearable devices would alert the ASD children through blinking light, verbal cues, and vibrations if they get too close to others.

Innovators' Inspiration

"We were inspired to do this project based on personal experiences with ASD individuals.

We had a senior with ASD who often stood very close to people when talking to them, causing others discomfort without realising it. Initially, we thought it was a trait unique to him. When we met an ASD child on a bus who stood very close to talk to us, we realised that this is a real problem for people with ASD.

We wanted to do something that can help ASD children integrate normally into society as they grow up, and build a more inclusive society."

What's So Special

- SPACE Home can be worn by parents at home or teachers in school – alerting the child to move back through blinking light and voice instructions if they come too close.
- The voice instructions can be pre-recorded and customised, as ASD children would be more receptive to their parents' or teachers' voices.
- SPACE Mobile is sewn into the ID card holder worn by ASD children for convenience – vibrating when the child gets too close to someone.
- The design of SPACE Mobile was made to appeal to ASD children – the sensors are fitted as "eyes" of cartoon figures!

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Helping Hands

Did you know that the number of dementia patients in Singapore has been rising?

Determined to help dementia patients, five students developed a device that provides brain training exercise for patients.

The device has a stress ball with a sensor and a tracing route to follow. Patients have to squeeze the ball with one hand for a specified number of counts, to "unlock" obstacles in the tracing route that they have to follow using their other hand. This helps to stimulate their brain, and improve their hand-eye coordination and multi-tasking abilities.

Innovators' Inspiration

"One common thing between the five of us? We all do community service as a co-curricular activity. We wanted to do a project with our skills and heart, to make a difference to those in need. We had several challenges while developing the product such as getting equipment and programming the product. However, through research and the support of our lecturers, we are glad we managed to create a unique product that is functional and beneficial for dementia patients."

What's So Special

- The tracing route is designed to be simple, fun and intuitive – based on a loop-the-loop movement.
- There are three levels of "difficulty" in the exercise – more counts of ball squeezing are required to "unlock" obstacles as patients progress up the levels.
- A scoreboard attached to the device shows the level and score of the patients.
- As the device collects data, it allows medical staff to assess the condition and performance of patients over time.

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A Head-Turning Marketing Machine

The Autonomous Ice-cream Man is not any ordinary ice-cream man. It is a head-turning promotional machine!

Equipped with the capability to move around spaces on its own, the machine is made up of a three-dimensional (3D) model that appears to be riding it, and a compartment to dispense flyers or promotional items, such as canned drinks. Sound and light effects can be added too.

Innovators' Inspiration

"Once, Silvanus distributed flyers at an IT Show. He saw that people were more attracted to louder, bigger and more colourful displays, rather than him when he tried to hand them a flyer. That experience inspired us to create a machine that can attract people's attention in an unconventional way.

Instead of having people distribute flyers, companies can have a more cost-effective option of using the Autonomous Ice-cream Man to attract customers' attention and promote their products."

What's So Special

- The 3D model can be a mannequin, a mascot or any other idea companies may have.
- Using ultrasound sensors that can calculate distance and avoid obstacles, the machine can move around automatically or customised to follow a fixed pathway.
- The compartment for dispensing flyers can easily be replaced with other components, like a vending machine for snacks.
- The device is cost effective and likely to be within most SMEs' budget.
- Incorporating light, sound and motion, the unconventional machine will attract attention and add colour to events.

Members: Ong Yi Kai
              Lim Jing Chuan Jonathan
              Peh Bing Zhou
              Chia Ming Yang Bryan
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College: ITE College West

Game to Learn

Going to class will no longer be a boring affair with the help of games! Using Internet of Things (IoT) nodes, the team created five interactive games for classroom teaching and learning.

With a console or wireless keyboard on hand, students may navigate options in the games and learn from the in-game content. Lecturers can also use the system to check the participation level of students.

Innovators' Inspiration

"To capture the attention of digital natives, we infused competitive elements and time limits into the games, making them more challenging and intense.

The prototypes were tested on our classmates up to five times. The honest feedback we received helped us to fine-tune the user-friendliness of the games. We are glad that the games created a positive impact on class attendance – my classmates came to class earlier just to play them! My lecturer has used the games in some lessons too!"

What's So Special

- The games allow students to learn and have fun at the same time!
- The team built the whole system from scratch, from programming, designing, to the actual application of each game!
- The games encourage teamwork as students may form teams (four persons in a group) to compete with other teams in class.
- Teachers may edit the options in the game to include learning content that supplement the existing curriculum.
- Easily scalable, multiple IoT nodes can be connected such that up to 40 persons can play   at   the   same   time.

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Lobsters in the City

Singaporeans love seafood. Lobsters, in particular, are popular but considered an expensive delicacy. The high cost is driven by the difficulty of lobster farming, as lobsters tend to grow slowly but eat a lot. This makes lobster farming less commercially viable.

To create a more sustainable lobster supply, the team developed a vertical farming system for high density lobster farming. It is made up of a tank with stackable PVC pipes that house one lobster each, as well as feeding and mating areas.

Innovators' Inspiration

"We discovered hawker stalls that sell lobster prawn noodles. The dish seems to be getting more popular, but at $18 to $30 a bowl, it is expensive. We felt more can be done to meet the demand for this delicacy.

We read up on vertical crab breeding and decided to use a similar approach to breed lobsters. Initially, our prototype was a massive tank that can house about 200 lobsters. However, we soon realised that lobsters were more aggressive than crabs. We decided to restrict the space for free roaming to prevent fights, by housing each lobster within one pipe."

What's So Special

- The division of the tank into different "zones" replicates the natural habitat of the lobsters.
- Wi-Fi temperature readings, remote food feeding devices and IP cameras are used to control the living conditions and feeding of the lobsters through mobile phone apps.
- The team developed a successful prototype in two months – retrieving 12 pregnant lobsters that eventually bred close to 200 baby lobsters!