Abstract: Science and Engineering Fair of Houston

1357

AI system to diagnose COVID-19 from radiology images

Category:

Robotics and Intelligent Machines

Ria Duseja

Fort Bend ISD /Fort Settlement Middle School

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, began in late 2019 and spread rapidly worldwide, infecting millions of people and causing severe health and economic impacts. Detecting the virus accurately was a major challenge because the most reliable test, RT-PCR, could miss up to 20% of positive cases. This project explores how Artificial Intelligence (AI) can improve COVID-19 detection using chest X-ray images. The goal is to build an AI model using Convolutional Neural Networks (CNNs) that can identify COVID-19 with high accuracy. The model will be trained on publicly available, anonymized X-ray images of healthy individuals, COVID-19 patients, and patients with other lung diseases. After training, the model will be tested for accuracy and fine-tuned if needed. Finally, the AI system will be converted into an app that can predict COVID-19 from new X-ray images. This project demonstrates how AI can assist in medical diagnosis and reduce human error. If successful, this technology could help doctors make faster decisions, improve patient care, and even be adapted to detect other diseases in the future. By combining computer science and healthcare, this project shows how innovation can help prevent future pandemics and save lives.

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Abstract: Science and Engineering Fair of Houston

1358

Only You Can Go Through

Juliet Ramsey

Clear Creek ISD /Seabrook Intermediate School

Category:

Robotics and Intelligent Machines

The main research question for this experiment was to determine the effect of magnet's different pull strengths on the response of the auto pet door. It was expected that the strongest magnet would open the door from the farthest distance. The experiment was conducted by measuring each magnet, (each with a different pull strength), the farthest they could be from the door, but still causing it to open. The results showed that the magnet that was strongest, the 60lb one, opened the door from 6cm, the farthest distance. Overall, the stronger the magnet, the farther it will open the door from. (But be sure not to use a magnet stronger than the weight of your pet, or he/she will get stuck to the fridge.

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Abstract: Science and Engineering Fair of Houston

1359

Automated Classification of Recyclables using Google Teachable Machine

Nick Zhu

Conroe ISD /McCullough Junior High

Category:

Robotics and Intelligent Machines

Efficient recycling depends heavily on accurately sorted materials. When these materials are mixed together, it causes contamination, which ruins the recycling process. The current method of sorting recyclables is often mistake-prone and highly inefficient. This is why, to address this problem, my project investigated whether an AI model could accurately and automatically classify recyclables. Using Google Teachable Machine, I first gathered image samples of paper, plastic, metal, and glass objects to train my model. I started off with 2 categories (paper and plastic), and added a category (metal and glass) only after my model passed the accuracy test. After the model was trained, it was given around 30 unseen items to classify. I then recorded the results in my journal to analyze. The final model achieved an 85.7% accuracy classifying recyclables into four categories, exceeding the engineering goal of 80% accuracy. These results show that an easy to access, reliable AI model could potentially replace the current recycling method in the future, reducing contamination and increasing efficiency.

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Abstract: Science and Engineering Fair of Houston

1360

Evaluation of Whether Artificial Intelligence Can be Indistinguishable From Humans

Alyssa Huang

Conroe ISD /McCullough Junior High

Category:

Robotics and Intelligent Machines

My project is focused on the topic of whether AI can mimic human emotion. To test this out, I passed out surveys to students at my school and told AI (Chat GPT, Perplexity, Google Gemini, Deep Seek, and Dola AI) to fill it out too but using the perspective of a middle school student. The surveys contain questions that are opinion and emotion-based so we can compare to testify whether AI is capable of understanding human emotion. For example: "What is something that makes you mad?" and "What color best represents your favorite activity?" I came up with these questions based on some examples of Turing Tests I found online. After the survey was published for a week, I added 2 more questions on there asking for students to identify if a response is done by AI or humans. The results are interesting, because more people tend to believe that the AI response is done by a human and the human response was done by an AI. However, it is proven that AI doesn't actually understand human emotions and can't mimic human emotions flawlessly as in the futuristic movies. It is obvious that AI doesn't really have a personality of their own, because they all went with similar answers on most of the questions and many answers are vague. For example, all AI chose blue as their favorite color, which could be reflected in many polls online, where blue is the most popular color among humans. After all, AI is only studying human behavior with data online, and have never actually experienced any. Even so, humans can't really tell humans and AI apart anymore, unless you analyze them carefully.

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Abstract: Science and Engineering Fair of Houston

1361

From Data to Diagnosis: Predicting the Risk of Diabetes Using Machine Learning

Prisha Gupta

Tomball ISD/Northpointe Int

Category:

Robotics and Intelligent Machines

Diabetes poses a major global health challenge, affecting approximately 537 million adults worldwide, with nearly 90% of cases being Type 2 diabetes, a largely preventable condition. It is a leading cause of serious complications, including blindness, kidney failure, and cardiovascular disease, while a substantial proportion of cases remain undiagnosed. Early detection is critical to reducing the consequences of diabetes, and emerging machine learning–based screening approaches offer a cost-effective means of identifying at-risk individuals. By enabling personalized risk assessment and supporting timely preventive care, such approaches have the potential to significantly reduce the individual and societal burden of diabetes.

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Abstract: Science and Engineering Fair of Houston

1362

Vision in Orchard: How to Identify Fruits using AI

ERIC GAO

Conroe ISD /McCullough Junior High

Category:

Robotics and Intelligent Machines

This project is about fruit recognition using machine learning with AI. The goal for this project is for AI to identify 10 common fruits with at least 90% accuracy. To achieve this goal, the model will train with datasets containing high-quality images of fruits, allowing it to learn and distinguish their unique features. During testing, the results showed how fruits with unique patterns or colors (Ex: Banana) scored higher than fruits with similar colors or patterns (Ex: Orange and Lemon). This project also showed how lighting and background can effect results, likely causing bias and unbalanced result. A successful model could be used in agriculture and/or in an automated fruit-sorting machine, improving efficiency and accuracy.

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Abstract: Science and Engineering Fair of Houston

1363

Scribey: Whiteboard Drawing Robot

Category:

Robotics and Intelligent Machines

Anne Raphael, Sonia Di, Jocelyn Li

Houston ISD/T. H. Rogers MS

As many students know, managing homework on many different digital platforms is a challenge. Double checking all the different sites are not only time consuming but also increases the risk of missing critical deadlines. To solve this, we have developed an autonomous task-management robot designed to combine assignment data into a single, physical interface, in this case a whiteboard. It uses various pulleys and motors, utilizing the V-plotter system. With this robot, students with lots of homework and assignments will find it easier to find whatever they need to do so they can do it on time, therefore leading to many positive results, including more assignments submitted on time and more downtime to relax.

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Abstract: Science and Engineering Fair of Houston

1364

School Pi-ckup Ai

Steven Truong

Stafford SMSD/Stafford STEM Magnet Academy

Category:

Robotics and Intelligent Machines

Using a low-cost, AI-powered system on a Raspberry Pi, we can solve the long-standing problems of inefficient traffic flow and safety issues in school pickup lines. This technology is trained to perform real-time license plate recognition. It cross-references the license numbers with student data and, upon a match, displays the student's name on a monitor. This automated system ensures that students are quickly and accurately matched with their ride, creating a much smoother and more secure pickup process. I will compare my license plate recognition model's results to the ground truth in the detection and the character recognition.

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Abstract: Science and Engineering Fair of Houston

1365

For Eyes Forever

Adi Sanghavi

Houston ISD/Lanier - MS

Category:

Robotics and Intelligent Machines

This project, For Eyes Forever, explores whether adjusting an iPhone screen using blur, zoom, and sharpening techniques can reduce the need for glasses or contact lenses for individuals with vision prescriptions. The purpose of this research was to determine if software-based visual adjustments can improve readability and screen comfort for users with nearsightedness or farsightedness. The project involved testing customized screen display settings designed to simulate prescription correction through digital image processing. Human participants with known vision prescriptions were asked to view text and images under normal screen conditions and then under adjusted conditions using blur reduction, sharpening, and zoom calibration. Participants provided feedback through surveys measuring clarity, eye strain, and overall comfort. No personal identifying information was collected. Results showed that a majority of participants experienced improved screen clarity and reduced eye strain when using the adjusted display compared to the standard screen. Participants with mild to moderate prescriptions benefited the most from the adjustments, reporting increased readability without corrective lenses. In conclusion, the findings suggest that screen-based visual adjustment technology has the potential to supplement traditional vision correction for digital device use. Eyes Forever demonstrates how software solutions could improve accessibility and reduce dependency on glasses or contact lenses for everyday smartphone interaction

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Abstract: Science and Engineering Fair of Houston

1366

Coding a Voice

Aydin wyatt

Charter/SST - Champions College Prep - MS

Category:

Robotics and Intelligent Machines

This project investigates whether a robotic arm can be successfully controlled using voice commands through a coordinated coding system. A voice recognition module was programmed first to recognize specific commands, which were then translated into movements of the robotic arm. The system was designed to prevent conflicting commands while the arm was already in motion. The hypothesis was that by properly connecting the voice module to the robotic arm's motherboard and coding the system in the correct sequence, the arm would be able to lift and move at least five objects of different weights. The results demonstrate that voice-controlled systems can be effectively integrated with mechanical components through structured programming.

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Abstract: Science and Engineering Fair of Houston

1367

Wearable Glasses

Jesus Ramon

Conroe ISD /McCullough Junior High

Category:

Robotics and Intelligent Machines

This project is about testing if a small device attached to glasses can help someone notice objects in front of them. I built a light prototype using a Raspberry Pi Zero 2 W, a camera, and Time-of-Flight sensors. The device measures how close objects are and warns the user with a sound or a voice message. I tested how accurate the distance readings were and how fast the device reacted when objects were at different distances. The results showed that the sensors worked well within a few feet and reacted fast enough to be useful. The device was also light and comfortable to wear, which is important if someone is going to use it every day. This project shows that a simple and low-cost wearable device could help people with low vision or anyone who wants extra awareness of what's around them.

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Abstract: Science and Engineering Fair of Houston

1368

Water Sensor: Saving lives and water

Aashi Rajasekar

Fort Bend ISD /Fort Settlement Middle School

Category:

Robotics and Intelligent Machines

Flooding is one of the most common causes of home damage. Early detection can save thousands of dollars in repairs. Water leaks can lead to electrical hazards, mold growth, and unsafe living conditions. A buzzer and visual alert give homeowners time to act quickly—turning off water supply, moving valuables, or calling for help. This water sensor can change lives and help people make a quick getaway to places where there is no flooding. You can set the water sensor wherever you want and decide at which height you want to get notified. You can also stop the flooding early with this sensor. My test is to make a carboard model of a house and sprinkle water, coffee, tea, and gatorade to see if the sensor can pick up other substances.

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Abstract: Science and Engineering Fair of Houston

1369

ROV Efficiency

Victoria Sifuentes

Clear Creek ISD /Brookside Intermediate School

Category:

Robotics and Intelligent Machines

In this project, there were 2 ROVS created, 1 remotely operated, and 1 autonomously controlled. The testing was trash collection, and pH sample collection. To begin with, the remotely operated ROV had 5 trials to collect as much trash as it could in time of increments. The times were 10 seconds, 30 seconds, 50 seconds, 1 minute, 10 seconds, and 1 minute and 30 seconds. Overall, the remotely operated collection average for each time was 6, 16, 26, 34, and 45. Now looking at the autonomous ROV still having 5 trials using the same time of increments of 10 seconds, 30 seconds, 50 seconds, 1 minute, 10 seconds, and 1 minute and 30 seconds, but the average results of the autonomous ROV are 5, 14, 19, 24, and 26. Using the data above, the remotely operated ROV is more efficient in trash collection when it comes to time. Now looking at types of trash collected, first up was the remotely operated ROV; there were 3 categories and 5 trials. The three categories were large pieces collected, rocks collected, and small pieces collected. In each of these 3 categories, the ROV averaged 7 large pieces, 15 rocks, and 21 small pieces. Now for the autonomous ROV there were still 5 trials and 3 categories that were large pieces collected, rocks collected, and small pieces collected. The autonomous ROV in each of the 3 categories averaged 11 large pieces, 9 rocks, and 9 small pieces. Based on the data collected, the remotely operated ROV was better at collecting smaller pieces and rocks, while the autonomous ROV is better at collecting larger pieces of trash. Overall, the remotely operated ROV was more efficient in the water.

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Abstract: Science and Engineering Fair of Houston

1370

Cosmic Cruiser: Cross Planetary Navigation: When the Shortest Route Isn't the Best

Guangqi Yue

Conroe ISD /McCullough Junior High

Category:

Robotics and Intelligent Machines

Most modern navigation systems, like GPS, calculate routes based on the shortest distance or the fastest time. However, for battery-powered machines like electric vehicles (EVs) and Mars rovers, saving energy is often more important than saving time. The purpose of this project was to determine if a robot consumes less battery power by taking a longer, flatter route compared to a shorter, steeper one. The hypothesis was that a path planner minimizing "estimated energy consumption" (avoiding hills) would preserve more battery life than a path planner that simply minimizes distance. To test this, I engineered a robotic platform using an Elegoo Smart Car kit and an Arduino microcontroller. I modified the robot's power circuit by adding an INA219 current sensor, which allowed me to measure real-time power consumption. I wrote code to calculate the total Energy (Joules) used during each mission. I designed two test paths: Path A was a short, straight route over a 15-degree ramp (simulating a hill), and Path B was a curved flat route that was three times longer (simulating a detour). I ran 5 trials on each path. The data supported my hypothesis. On average, the robot consumed 14.97 Joules on the steep hill, while it only consumed 11.24 Joules on the long flat path. The results showed that overcoming the force of gravity required significantly more energy than overcoming the friction of the longer distance. This suggests that future navigation algorithms for EVs and space rovers should prioritize "flatness" over "shortness" to extend their operating range.

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Abstract: Science and Engineering Fair of Houston

1371

Implementing a Hybrid CNN-Transformer Model for ASL Fingerspelling Translation

Reyansh Gupta

Tomball ISD/Willow Wood - JH

Category:

Robotics and Intelligent Machines

The goal of this project was to create a machine learning model that could get an average Normalized Levenshtein Distance (NLD) of 0.7 when translating American Sign Language (ASL) fingerspelling into text. This project has a big impact to society because it reduces the communication barrier with people who rely on sign language by making ASL fingerspelling easier to understand. A publicly available ASL fingerspelling dataset was used to train a CNN - Transformer model to learn fingerspelling sign recognition. The model was created using Python and TensorFlow, and got an average NLD of 0.81, demonstrating the model's translation abilities. Next, the model was embedded into a user interface along with the MediaPipe library to extract hand coordinates from a video. The UI could display predictions unseen data, showing that the model would be real world successful.

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