Construction and Evaluation of Deep Neural Network-based Predictive Controller for Drug Preparation

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* (Excluding Mailing and Handling)

The evaporator used in the pharmaceutical industry is for drug preparation. The purpose of the evaporator in drug manufacturing is to extract the water content in the material through the heating process. In this research, the SISO evaporator is taken, which contains temperature as input and dry matter content as output. The mathematical modelling of the drug preparation evaporator is done with the help of the system identification method. Controlling and maintaining the temperature inside an evaporator is a tedious process. In this regard, the Neural Network predictive controller (NNPC) is designed and implemented for drug preparation. It helps to predict the future performance of the evaporator and tune the control signal based on that. The setpoint tracking challenge is given to the designed controller. For analysing the performance of the controller, the error metrics, such as integral square error (ISE), integral absolute error (IAE), integral time square error (ITSE), and integral time, absolute error (ITAE), are employed. The time-domain specification, such as rise time, settling time, and overshoot, is also used to better understand controllers performance. From the above two analyses, the conclusion is made that the predictive controller is performing well in comparison with the conventional PID controller in the drug preparation pharmaceutical industry.

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Smart Child Rescue System

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Abstract - A water well or borewell is an excavation or building made in the ground by digging, boring, or drilling to access groundwater in underground aquifers. Nowadays, it is rather common to observe abandoned borewells that have been left open after usage. These walls turn into a deadly trap for young children who play close to the wells without realizing their depth. The task of rescuing children who have become trapped inside the borewell is not only challenging but also dangerous. The rescue teams attempt to save these young children for hours, sometimes days, and it costs a lot of money. Consequently, technology must be used to improve the rescue effort.

Key Words: underground aquifers, abandoned , excavation .

1.INTRODUCTION

One of the prevalent problems in several regions of India nowadays is kids slipping into bore wells. Children falling into borewells most frequently occur in rural India. This reveals something about the bore hole sizes. Bore wells are drilled in cities for domestic consumption. They have a smaller diameter. Large-diameter bore wells are also dug by some manufacturing businesses. These would often be found in the villages. This, however, cannot be regarded as the main cause since in the villages, people look for groundwater for household, agricultural, and other uses. People need water, but it is not always readily available, so they dig a borewell. Consequently, groundwater is the source. And thus, work on drilling a deep borewell to reach a decent source level of ground water begins. For a number of reasons, including the summer, excessive extraction, inadequate recharge, etc., groundwater is vital. However, a large number of bore wells don't supply water and are frequently left open.

When there is no longer any water, the driller will partially plug the hole and pack up and leave. One day a wandering youngster unknowingly plunges into the borewell. considering a toddler may easily fall into a borewell due to its diameter. If the youngster is not located elsewhere, it takes a long time to realize that they have fallen into a borewell. Since there won't be any use for the borewell owing to a shortage of water, it may potentially collapse. Since some borewells may reach depths of more than 300 feet, a youngster can stay caught in the muck instead of always falling to the bottom. Finding the depth of an open borewell is a difficult undertaking since the interior is quite deep and dark. However, if the youngster has fallen into a deep borewell, a web camera is sent down there to capture images of the child.

2. LITERATURE SURVEY

V. Saritha *et al.* [1] The purpose of this study is to prevent children from falling into bore-wells, which necessitates a novel design with a sensor placed above the borehole to detect children who fall within. The automated horizontal closure, which is kept at a depth of around 3 feet, closes if the device detects a child, shielding the kids from falling below. It has the capability to keep an eye on the confined youngster and to offer a platform on which the child can be raised using motors. The three blocks, which are set at an angle of 120 degrees from one another, are pushed toward the side of the bore hole by the motor, which is mounted on top of a gear mechanism. The clipper will then be used to rescue the youngster who is trapped within the hole by picking him or her up and placing them with the aid of a remote control. The rope fastened at its hands is used to manually insert the clipper. This scenario states that

A REVIEW ON VOICE CONTROLLED WHEELCHAIR WITH OBSTACLE SENSOR AND THERAPY UNIT

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Abstract: *This paper presents the design of an automated wheelchair with voice control. The main objective of this campaign is to promote voice control of wheelchairs for individuals who need it. The system's safe mobility is enhanced by additional features including obstacle identification that reduce the likelihood of accidents while travelling. This gadget also features a component for therapy that helps the user's limbs avoid becoming numb after extended rest.*

Keywords-wheelchair, voice, obstacle, disability, therapy

I. INTRODUCTION

Inspiring and admirable effort has been done by many researchers to make patients' life as simple and independent as possible. The fact that physically challenged patients can hardly move and must use a wheelchair is one of their major limitations. A controller is now built into certain wheelchairs, making them more modern. This type of wheelchair can be useful for patients who have functional upper limbs but little control over their bottom limbs. In today's world, speech recognition is a hot topic. Speech recognition has a wide range of uses that improve the quality of our lives. However, for wheelchair remained a notable barrier. As a result, an intelligent wheelchair system based on voice recognition is suggested. The voice-activated wheelchair is built with safety features to prevent collisions with obstacles and can be operated via voice commands. The primary goal of this system is to be able to recognise speech as accurately as possible. Speech recognition is the process of turning spoken words into forms that computers can understand. This intelligent wheelchair incorporates speech recognition, so when a command is given verbally, the system will carry it out as instructed. It has a therapy machine to help the crippled person's limbs and prevent numbness from being brought on by prolonged rest. Through this approach, disabled people can receive some therapies alone. Through the use of their voice commands, those who are physically disabled or socially isolated will be able to move around freely and independently like other members of the community. This paper discusses the creation of a system that uses an infrared sensor, Raspberry Pi, Google Assistant, servo motor, and an Android handset as a microphone.

II. LITERATURE SURVEY

[1] Muhammad Azlan Alim, et al. In this proposed system, a voice-activated intelligent wheelchair device for those with physical disabilities who are unable to steer with their limbs. This innovation uses voice commands to control the wheelchair's mobility in various directions. The Android device serves as a microphone to connect to the Google Assistant before the Raspberry Pi processes the data. The servo motors will subsequently be given the appropriate instructions by the Raspberry Pi. Through the employment of an infrared sensor, this technology provides automated obstacle detection and assists the operator in applying the temporary stop button when the impediment is detected. The trial findings of more than 90% accuracy and a reaction time of less than 1.2 seconds confirm that it is a trustworthy system for usage by disabled individuals. The dual-controller mode further highlights its importance for users who have limited control over one or both of their lower limbs. This wheelchair also has a user-friendly mechanism since it doesn't require any special training or user restrictions to use.

[2] Ms. Cynthia Joseph, et al. In this proposed system, The device is built on a design that incorporates manual operation to let physically challenged persons use voice activation. Voice recognition software and an Arduino microcontroller have been utilised to facilitate wheelchair mobility. An improper spoken command does not cause the wheelchair to move. The Arduino controls the wheelchair directions in accordance with the instructions provided by voice and gesture. Obstacle detection is performed via ultrasonic sensors. The prototype's layout makes it possible to utilise it effectively and without much effort on your own. It helps consumers save time, money, and energy. Ultrasonic sensors are effective at detecting any obstruction. The prototype begins to move as soon as the user turns it on, and any impediment that is anticipated to be within a specific range will be picked up. Older because of their independence. [3]M.Senthil Sivakumar, et al. In this proposed system, They suggest a wheelchair, speech module, and navigation module for the Intelligent Home Navigation System (IHNS). An older person or someone with physical limitations can easily move around the house using their method. The wheelchair is controlled automatically or manually in the suggested system

Siddesh

Analysis of hybrid nano composite pva-pdms thin films for hydrophobic applications

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ABSTRACT

In the present study, electrical and physical properties of Polydimethylsiloxane (PDMS) and polyvinyl alcohol (PVA) polymer were combined with zinc oxide (ZnO) and silicon dioxide (SiO$_2$) nanoparticles to form the zinc silicate (ZnSiO$_3$) hybrid nanocomposites thin films using sol-gel process. The samples were prepared with a ratio of 50:48:02 and named as P$_0$, P$_1$, P$_2$, P$_3$ and P$_4$.The electrical properties such as ac conductivity (σ_{ac}) dielectric constant (ε_r) and dissipation factor (tan δ) of developed PDMS/PVA/ZnSiO$_3$ nanocomposites thin films were studied using high frequency LCR meter with a frequency range from 100Hz to 1MHz. From the physical properties, the surface hydrophobicity of the thin films was studied using contact angle meter measurement and it was inferred that the films are hydrophobic in nature with increase in the nanofiller content. The Scanning Electron Microscopy (SEM) was used to examine the surface morphology of the developed films. The X-ray diffraction (XRD) was used to investigate the structure and crystalline size of the nanoparticles within the nanocomposite films. These nanocomposites thin films are used in hydrophobic materials like waterproof covers and waterproof glass surfaces.

Keywords – Sol-gel, hybrid nanocomposites, hydrophobicity, electrical properties, crystalline size

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