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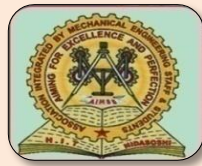
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PEO2: Design, demonstrate and analyze the mechanical systems which are useful to society.

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1. Smart Echo and Farmer Friendly Economic Sprayer

Introduction

Plant protection activities are most important practices during crop production. Application of maximum pesticide products with the sprayer. The application of fungicides, herbicides, and insecticides is one of the most recurrent and significant tasks in agriculture. Conventional agricultural spraying techniques have made the inconsistency between economic growth and environmental protection in agricultural production. Spraying techniques continuously developed in recent decades. For pesticide application, it is not the only sprayer that is essential, but all the parameters like the type and area of the plant canopy, area of a plant leaf, height of the crop, and volume of plants related to plant protection product applications are very important for obtaining better results. From this point of view, the advancement in agriculture sprayer has been started in last few decades.

In recent years variable spray technology has attract researchers as well as farmers and showed great advancement in the development and utilization of technology variable rate sprayers in terms of target detection technology, based on real-time sensors. Sensors are (Ultrasonic sensor, Infrared sensor, LiDAR sensor) used in variable sprayers for the feature detection of the target area. The process of spray device control unit adjusts the real-time application of spray rate and allows accurate sprays which are essential on canopy. To enhance the spraying efficiency and droplet deposition for tree crops, the measurement of the plant canopy is a critical consideration because the geometry of the plant canopies variable in height and width.

To avoid the health problems of humans with the manual spraying mechanism unmanned aerial vehicles (UAV) aircraft are used. The equipment and labors difficult to operate but UAVs can be used easily operated in the field. UAVs now widely applied in field for purpose of precision agriculture in the developed countries. Before that, a variety of UAV models are utilizing for civilian and military purposes. Addition of vision and sensor systems are also increase the potential of the UAVs and reduces the spray loss in form of spray drift by accurate spray application on the required field with perfect target detection sensors and a good handling system. Advancement in spray application technologies increase crop production and increase pesticide efficiency on weed and insects in the field. Spray loss in the form of spray drift, weather effects, target detection, and control flow nozzles problem solved by advanced pesticide application technologies.

LIDAR Sensor Technology

For the detection of plant geometry, many sensors are used like ultrasonic sensors, Infrared sensors, LiDAR sensors, and computer vision-based technology used. Ultrasonic sensor detects

the target distance from the sprayer however it is sensitive to environmental conditions such as humidity and temperature.

LIDAR sensor technology is an accurate remote sensing technique for distance measurements. It has good accuracy for the detection and quantification of biological and nonmetallic objects. LIDAR sensor measures the distance of the elapsed time between the transmission of a pulsed laser beam and the reception of its echo from a reflecting object. In computer vision-based technology, the cameras are inserted on sprayers which segregate the physical parameters of the plant-like area, height, density, and color of the plants as shown in Figure 1.1.

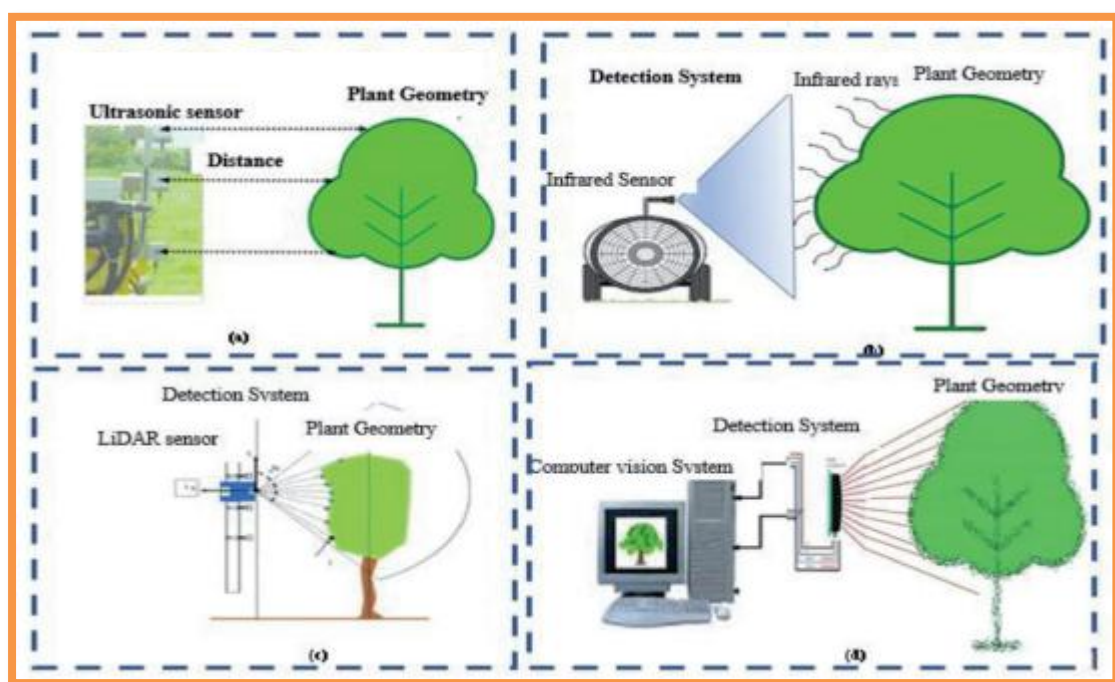


Figure 1.1 Sensor based VR sprayers. Ultrasonic sprayer (a) infrared sensor sprayer (b) LiDAR sensor sprayer (c) computer vision based spraying technology (d).

Conclusions

Plant protection practices are most important activities during crop production. Progress in spraying technology has been increase in recent past. Robotics and automatic spraying technologies like variable rate sprayers, UAV sprayers, and electrostatic sprayers has gained more attention to enhance. These advanced spraying technologies not only reduces the labor cost but also effective in environmental protection. Researchers are conducting experimental studies on the design, development and testing of precision spraying technologies for crops and orchards. Simulation modeling studies are also conducting by the researcher to increase the sprayer's efficiency and to improve the design for better utilization.

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2. Smart Seed Sowing and Fertilizer Dispenser with Automatic Anticlog System

Introduction

Agriculture is done in every country from ages. Agriculture is the science and art of cultivating plants. Agriculture was the key development in the rise of sedentary human civilization. Agriculture is done manually from ages. As the world is trending into new technologies and implementations it is a necessary goal to trend up with agriculture also. IOT plays a very important role in smart agriculture.

IOT sensors are capable of providing information about agriculture fields. This IOT based Agriculture monitoring system makes use of wireless sensor networks that collect data from different sensors deployed at various nodes and send it through the wireless protocol. Agriculture is the backbone of Indian economy. About half of the total population of our country has chosen agriculture as their chief occupation. The states like Maharashtra, Punjab, and Kerala, Assam are highly involved in agriculture.

This project consists of the better design of the machine which can be used specifically for sowing of soybean, maize, pigeon pea, Bengal gram, groundnut etc. For various agricultural implements and no availability of sufficient farm labor, various models of seed sowing implements becoming popular in dry land regions of India.

Objectives

1. This reduces the overall cycle time and cost of manufacturing of the product.
2. The robot carries out farming using ultrasonic sensors in order to change its position from one farming strip to another.
3. The robot aims to contribute greatly in developing the farming strategies and reduce farmers' cost.
4. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed.

Work Plan

Agriculture is a most important field in the life of human being. It is the backbone of our country's economic system. In this project we have focused on seed sowing processes and tried to solve the problem. In seed sowing machine system we have used battery-powered wheels, L298 motor drive built in these wheels and Arduino Uno is used to control the all system process. When

the seeds are empty it detects the level of storage seed and indicates with the help of LED and also send the message to operators mobile through GSM module. LCD displays the percentage of the seeds in a seed drum and also displays when any obstacle comes in-front of machine or divert path the seed sowing machine can detect the obstacle very easily with the help of Ultrasonic sensor. In each complete rotation of rotating wheel there is seeds falls from these seed drums and the seed plantation process can take place smoothly as well as without wastage of seeds. After completing the seed sowing process, ploughing will automatically takes place. We also used the solar panel to charge the battery. The overall control of this robot using a Bluetooth controller app.

Summary of Progress (Design, Experiments, Results)

By putting the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed in figure 2.1. The robot can cover large areas of the field in a short time, reducing the time and effort required for manual sowing and spraying.



Figure 2.1 Project model

Conclusions

The main focus of this system is its Automatic way of sowing the seeds. The seeds are been sowed in a proper sequence which results in proper germination of seeds. This automatic way of sowing seeds using a robot reduces the labor requirement. Here the wastage of seeds is also been reduced to a greater extent. This system has been developed for the sowing of seeds in an automatic way. Here with the help of a robot the seeds are been dispensed in the soil in a proper sequence hereby reducing the wastage of seeds The planting process of the onion crop only has been implemented by using this Seed Sowing V robot autonomously. This robot will help the farmers to do the farming process efficiently.

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3. IOT Based Solar Powered Smart Agriculture Monitoring System

Introduction

India is the speediest growing enormous economy on the planet, with a huge populace, helpful demographics, and excessive catch-up potential. In essential area of economy, exercises are attempted through on double utilizing common assets. Farming, fishing, dairy, and other normal items are alluded to as so in light of the fact that they shape the base of all particular item. Since limit of the characteristic time we get is from farming, dairy, fishing, it is likewise called agriculture and unified area. Agriculture plays a fundamental capacity inside the Indian monetary framework. More than 70% of the rustic families rely on farming. Agriculture is a significant area of Indian monetary framework since it makes commitments around 17% and large GDP and gives work to more than 60% of the populace. Agriculture is the technology & artwork of cultivation of plants & domestic animal. Farming was the evolution for development of mankind. For example,—Punjab, Haryana, Uttar Pradesh. Figure 3.1 as shown a smart solar system project model:



Fig. 3.1 Smart solar system

Proposed System Design and Working Principle

Present-day farming is another and rising idea utilized in developing the yield of a harvest with the aid of using advanced technology to help in conventional cultivating rehearses Ideas, for example, exactness in Agriculture (PA), Internet of Things (IoT), Wireless Sensor Networks (WSN), and many other techniques are utilized with conventional framing to help in the profit of harvests, growing efficiency, and controlling of expenses. The purpose of the execution is to exhibit the smart and brilliant abilities of the microprocessor to permit the choices to be taken

on irrigation of the vegetation, checking the temperature of fields, soil moisture, and many more based on the non-stop tracking of the ecological conditions in the field. There are many different types of sensors which are used in our system. These sensors are constantly observing the parameters & forward it to the Arduino board for additional handling which goes about as an IoT gateway. “This passage has been given the wireless service by putting in a GSM module which will be updating the records to the cloud”.

With the help of GSM module, we can also able to operate our device over 2G and 4G networks. The frameworks have been diverse in that the sensor hubs planned, utilized explicit detecting units for tracking surroundings. In sensor hubs comprised of soil wetness, temperature, air humidity, and laser sensors. In sensor hubs, the best effective is to acquire a soil wetness sensor. In most of the gadget planned, hubs didn't contain any energy gathering gadgets, and as such could best effective capacity for a specific time period earlier than the hub's energy flexibility could need to be supplanted. In this work, we expand on top of these recently published works, and furthermore exploit the segments that take lead of the element present in the blueprint of a remote IoT organization Sensors networks have been geared up with photovoltaic panels for power harvest to be able to rise the overall run-time of the network. When sensor information was estimated and conveyed to the objective, time stamps were set on the bundles and stock, which would then be able to be explored later to decide any potential activities that are expected to additional consideration of the yields.

Conclusions

Smart Agricultural Field observing framework can assume a significant function in Agricultural countries. Through this framework, soil condition can be monitored. This framework can assist with continuing cultivation and accurately. This framework forestalls the misuse of water. Some more sensors with more information investigation should be possible as future work of this chapter. IoT sensors have high efficiency and accuracy, so it is easy to obtain the direct data of ground wateriness and warmth in agriculture field. The water stages indicator is used, so prevents the waste of water and saves water; it helps the farmers to expand their production. By forcing this framework, farming, plant lands, parks, gardens, golf courses can be irrigated. Thus, this device is more affordable and proficient when contrasted with various types of mechanization gadget. In huge scope applications, high sensitivity sensors can be applied for huge regions of agricultural grounds.

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4. Injection Mould Tool Design

Introduction

Injection molding is a plastic-forming process used in the production of most (about 70%) of plastic parts. Injection molding is generally used in the high-speed manufacture of low-cost, high- volume products like videocassette cases, plastic cups, or children's toys, etc. The mold defines the shape of the part, as well as the path by which the molten plastic flows from the barrel of the Injection Molding Machine.

The process of injection molding begins with a barrel full of hot, liquid plastic. The plastic is rammed at high pressure into a mold. Once the plastic fills the mold, it is allowed to cool and solidify. The finished part is then extracted (usually automatically) from the mold. No chemical reaction occurs during the molding process. Any reaction that occurs would be a degradation reaction, which should be avoided.

Most of the tools fabricated involve standardized mold bases, for ease the construction and reduce the manufacturing cost. Only the inserts that give the internal and external shape of the component has to be fitted into the mold base. More care has to be taken while designing and manufacturing the inserts to obtain the required shape and size of the component. Overall tool design should lead to less cost, high productivity and ease of manufacturing.

Press Button is used in adjustment of seat belt in cars. It involves internal projection, which helps to hold seat belt for adjustment. It should posses good surface finish and meet the requirement so as to reduce post processing operation. Since the material chosen for this component is High Impact Polystyrene (HIPS), Injection molding machine is used for production.

Objectives

1. The main objective is to develop a protocol of the tool for the given component using scientific approaches.
2. The study is made to design the mold as simple as possible from the cost and manufacturing point of view, simultaneously maintaining the quality of the component within the specified limits.

Methodology

The basic concept involved in this method is to attain the objective of the systematic and correct tool design; a well-planned approach has been employed. The methodology consists of the following. The process component is shown in the figure 4.1.

- Component analysis.

- Solid modeling of the component
- Step by step approach to mould design.
- Selection of tooling materials
- Solid modeling of the tool.
- Tool fabrication, assembly and tryout
- Injection molding defects

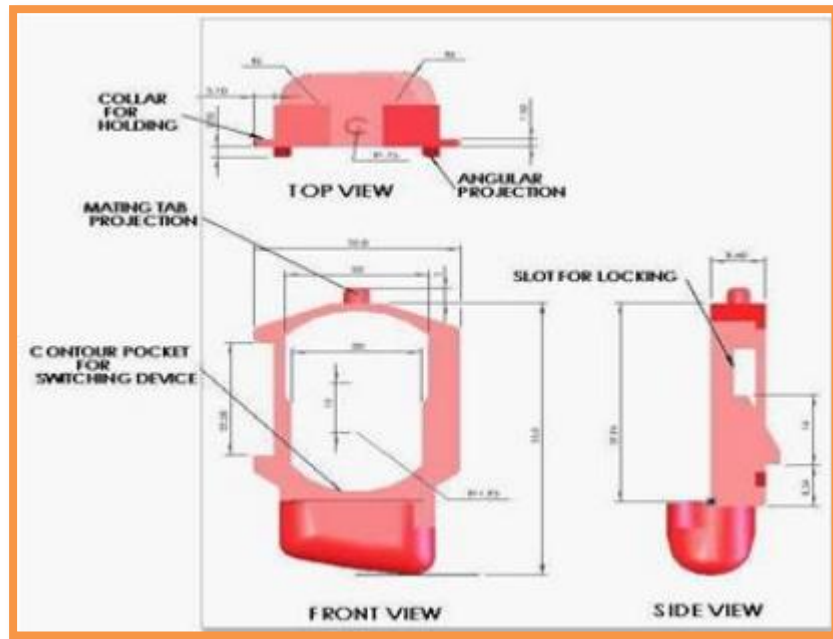


Figure 4. 1 Press button component

Conclusions

Design procedures developed in this work for the production of tool for the component Press Button to be produced through injection molding processes using HIPS material has been successfully validated by conducting tryout operation.

A number of new techniques have been studied. The expertise, experience and empiricisms are followed to greater extent that scientific analysis, logic and hierarchy of decision making developed for this specific task. A tool built which works on initial trial appear to be satisfactory.

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5. IoT Based Smart Mechanism of Transportation & Disposal of Industrial & Domestic Waste Material

Introduction

The rapid growth of population in our country makes the present waste management system inefficient. The highly populated metropolitan cities generate tons of waste every day and it is difficult to process the waste with our existing systems and techniques. Despite the changes in other sectors of the country, waste management systems remain unchanged. Solid waste management is defined as storage, collection, transport or transfer, processing and disposal of solid waste materials.

The stages of the waste management system involve: waste generation; onsite handling, storage, and processing; waste transfer and transport; waste processing and recovery and disposal. Due to many different reasons the waste that has been produced is not processed properly, initially the waste that has been accumulated at the bin has not been cleared properly and thus all the bins are overflowing. With internet being accessible to everyone, every application of internet of things is growing rapidly, getting more efficient in solving real life problems and making much easier. There are many factors for the growth of IoT such as cost effectiveness, less maintenance and moreover the efficiency of the whole process. This paper is focused on the timely transfer of garbage from the bins to the dumping yard and creating a system which helps in monitoring the whole process across the city and take required actions.

Proposed Technique

Figure 5.1 represents the block diagram of the proposed architecture. The proposed system is divided into two layers. The first layer is the garbage bin equipped with sensors and microcontroller and the second layer is the Web server which monitors all the bins across the city and takes required action. This smart waste management system works on the principle of hardware components and a programmed microcontroller.

In the first layer once the system is turned on, the Arduino sketch starts running and the Wi-Fi module checks for connections and gets connected. The ultrasonic sensor starts checking the amount of waste present in the bin. The Arduino then sends the data to the specified IP address in the code periodically.

In the second layer, the web server gets the data from all the bins. If the amount of waste in any bin is more than 70% then the server sends a message to assigned mobile number. To get the location details of the bin, instead of using GPRS module we hardcoded the coordinates of the bin. The message gives the directions to the bin that needs to be cleared.



Fig.5.1. Block diagram of proposed architecture

Conclusions

In this work, a feasible solution for solid waste management is proposed. Ultrasonic sensors (HC-SR04) and Wi-Fi module (ESP8266) are used to measure the amount of waste in the bin and transmit the data to server. A two layered architecture is developed using which the status of garbage bins in large urban cities can be monitored very well. By using the data received from the bins, the server takes actions accordingly. In this system, if the amount of waste in a bin exceeds 70%, then the servers intimates the assigned garbage pickup driver in the form of SMS. The main advantage of this system is that it is very independent and transparent. Instead of using GSM and GPRS module, the server directly send the messages and the coordinates are being hard coded. This not only reduces the cost but also reduces the maintenance of these embedded bins. Thus we conclude that by using our proposed architecture, a “smart waste management system using IoT” can be implemented in a metropolitan city.

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6. Pedal Operated Areca Nut Peeling & Coconut Dehusking Mechanism

Introduction

Farmers are the backbone of the country, out of 1.2 billion total population, the farmers in India is 600 million i.e. 50% of total population. In order to enhance their crop production it is necessary to implement the new technologies and new concepts to be applied. The main crop of the country is areca, soya, moong, tur, green gram etc. Farmer cultivates the crops and they investing more than 20% of their profit for the dehusking. The manual dehusking process shown in fig. 1 by this method the production rate is very low and labour cost is more. Farmers are struggling on manual method of dehusk, so in order to overcome the problem this project had initiated.

Objectives

1. Objective of the project is to develop a mechanism for dehusking of crop like areca nut, moong, tur, soya etc.
2. The machine should be able to accommodate various crops and it must also be easy to operate, eliminating the need of skilled labor.

Development of Mechanism

The mechanism consists of rotating shafts with blade, rough surface hollow tube, bearing, hopper and frame as shown in figure

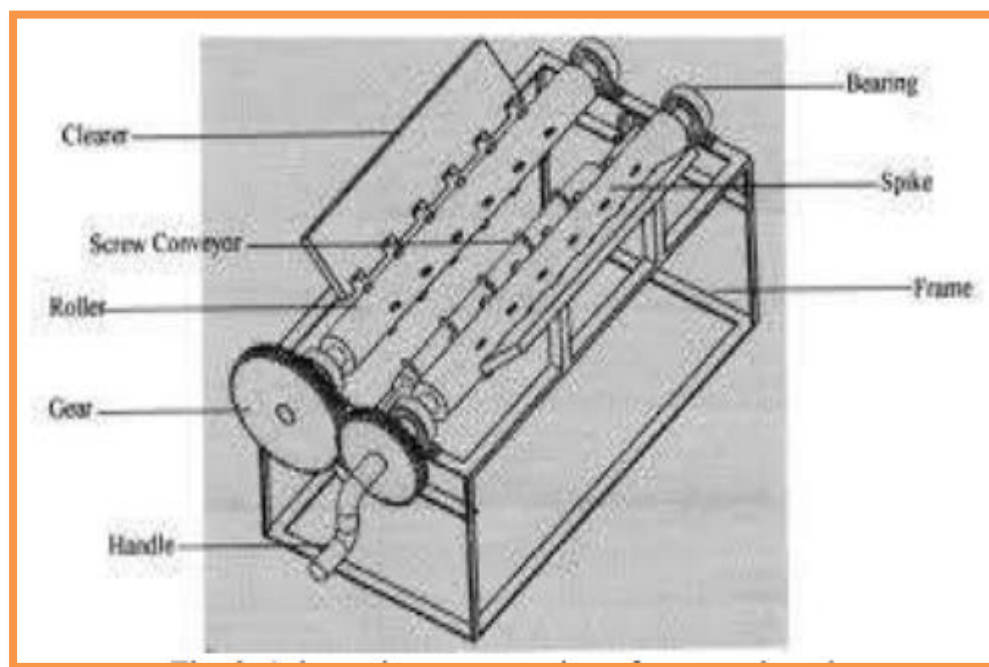


Figure 6.1 Schematic representation of proposed work

Construction of Working Model

As shown in the figure 6.2, blade is an important part of this mechanism with sharp edges to cut the crops. The material used is mild steel for withstanding different load condition. The blades are placed on the periphery of the 2 rotor shaft at an angle of 45°. Specifications of blade: Width: 30mm Length: 320mm Specifications of blade: Width: 30mm Length: 320mm Thick: 3mm Material: Mild steel.



Figure 6.2 Pedal operated crop dehusking mechanism

The mechanism consists of two rotating shafts with blades, and another additional supporting shaft is maintained. The principle is simple i.e. potential energy of human is converted into kinetic energy of the rotating shaft. The pedalling mechanism has a one sprocket with chain connected to the driving shaft consisting of spur gear which rotates the driven shaft and supporting shaft. When the crop undergoes the rotating elements it gets crushed up and segregated seeds and shells are collected at the bottom. Following types of crops can be dehusked by using this proposed method; • Areca nut • Soya bean • Green gram • White gram • Tur • Moong.

Conclusions

The Agriculture is in a developing stage, but in the equipment condition Indian Agriculture is far behind so this project may be little helpful to the farmers. Different types of crops can be cultivated from this proposed work, this is affordable to everyone and even this mechanism helps youngsters to keep their body very healthy, it works without electrical and even it is maintenance free.

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7. IoT Based Pipe Inspection Robot

Introduction

The pipeline inspection robots are highly useful to detect the pipelines or small tunnels internal cracks. It is more important for increasing performance and life of pipelines. There are many pipeline inspection robot systems have been developed, and this pipeline inspection robots which are classified into several elementary forms according to the movement mechanism. Thus, many kinds of mechanisms have been developed, such as wheel type, inchworm type, legged mobile type, screw type, crawler type, PIG type, caterpillar type and passive type. Among them, wheel type and caterpillar type pipeline inspection robots were mostly popular.

Robotics is one of the fastest growing engineering fields, presently they are used for wide variety of works especially in manufacturing industries.

Primarily robots are designed in such way that they reduce human intervention from labor intensive and hazardous work environment. Pipelines have the purposed for transferring liquids and gases from one point to another point such as water, oil, sewage and natural gas. With these daily activities, pipes are prone to defects such as corrosion, stress and aging which cause the pipes to leak, crack or break. When leaks occurs in pipelines, large volume of liquid or gas will lost, causing impact on the production industries and common people's routine. Since the pipes are invisible and unreachable, identification of cracks is not possible. Hence finding the leakages and replacing the defective pipe is very crucial during the distribution of liquid and gas. Therefore implementation of pipeline leakage detecting system has importance in domestic application and industries.

Objectives

1. To design and build a prototype robot to detect faults in pipelines like corrosion, dentmarks, and metal losses by providing ultrasonic and visual inspection.
2. The detected fault location (latitude and longitude) inside the pipeline will be sent to a registered mobile number by using GSM and GPS technologies.

Working Principle

The robot consisting of two DC motors which is driven by motor driver connected with power supply. For visualization purpose an ESP32 camera will be connected along with the sensors, to detect the crack inside the pipelines two ultrasonic sensors are used for both up and down position of the robot. This inspection robot shown in the figure 7.1 will be used to detect faults and get to know internal condition of the pipelines. To detect faults in the pipelines ultrasonic sensors are used and for visual inspection ESP32 IP camera will be used, robot movement and

IP camera will be controlled by connecting IP address through android mobile. The detected fault location SMS will be sent to a registered mobile number using GSM and GPS technologies.

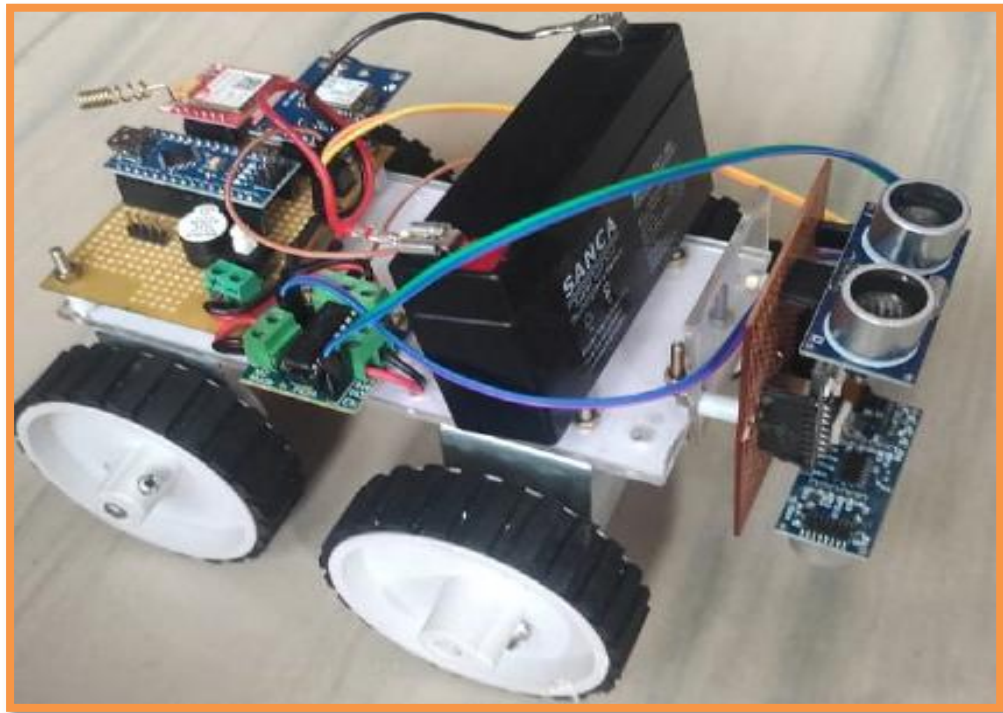


Figure 7.1 Schematic diagram of inspection robot

Conclusions

Robots play an important role in inside pipe-network maintenance and their repairing. Some of them are designed to realize specific tasks for pipe with constant diameters, and other may adapt the structure function of the variation of the inspected pipe. Here, inside pipe modular robotics system is proposed. An important design goal of this robotic system is the adaptability to the inner diameter of the pipes .the given prototype permits the usage of smart phone camera for visualization of the pipe inspection. This prototype is wirelessly controlled by a smart phone using GPS connectivity and sends the fault location inside the pipeline by GSM.

Pipelines are essential for transporting fluids and gases in various industries, such as oil & gas, water supply, chemical processing, etc. However, pipelines are subject to different types of defects that can compromise their safety and efficiency, such as corrosion, cracks, leaks, blockages, and surface irregularities. Traditional methods of inspection that rely on human intervention and specialized equipment are expensive, time-consuming, and risky.

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8. Automatic Rain Sensing Protection Cover

Introduction

In the rapidly advancing world of technology, the Internet of Things (IoT) has emerged as a powerful force, revolutionizing various sectors. Agriculture, one of the most critical industries for human sustenance, stands to benefit immensely from IoT's transformative capabilities. Among the many challenges faced by farmers, protecting crops from unpredictable weather patterns, especially heavy rainfall, remains a pressing issue. Excessive rain not only damages crops but also disrupts soil fertility, leading to substantial financial losses. This calls for innovative solutions that transcend traditional methods of crop protection. In conventional agriculture, manually constructed barriers and continuous onfield monitoring are both labor-intensive and inefficient. To address these limitations, we propose the IoT-Based Automatic Rain Shutter—an automated system designed to protect crops by deploying a controlled shed when rain is detected.

Automated Crop Protection Systems

Automated crop protection systems have gained traction as a solution to mitigate weather-induced damage. Jiang and Lu (2018) proposed an automated irrigation and shading system that integrates IoT technology with environmental sensors to optimize the water use and temperature control for crops. Their research demonstrates that sensor-based systems, when combined with IoT, can offer automated, real-time responses to environmental changes, making farming more resilient to adverse conditions. Similarly, Mehta et al. (2021) developed an automatic greenhouse control system using environmental sensors that manage light, temperature, and humidity. Although primarily focused on greenhouses, these studies underscore the viability of automated control systems for protecting crops against weather fluctuations.

Rain-Sensing Technology

Rain-sensing technology is an essential component of crop protection systems, enabling the automatic detection of rainfall to trigger responsive mechanisms. Research by Ali et al. (2020) demonstrates the effectiveness of rain sensors in automated irrigation systems, where water flow is controlled based on real-time weather data. This principle is also applied in crop protection systems, as sensors detect rain and immediately trigger protective mechanisms such as automated covers or barriers. These systems provide not only timely protection but also conserve water by reducing the reliance on human intervention. The study by Kumar et al. (2022) further explored the integration of rain sensors with IoT platforms for large-scale

agricultural operations, showcasing how rain sensors can efficiently protect crops during monsoon season.

Problem Statement

This project addresses these challenges by developing an "Automatically Controlled Shed for Crop Protection from Rains Using Rain Sensors." The system uses rain sensors to detect rainfall and automatically deploys a protective shed over the crops, providing timely protection without requiring manual intervention. This solution aims to minimize crop damage, improve water management, and contribute to more sustainable and efficient agricultural practices.



Figure 8.1 Schematic diagram of automatic rain sensing protection cover

Conclusions

The "Automatically Controlled Shed for Crop Protection from Rains Using Rain Sensors" project offers an innovative and practical solution to one of agriculture's most pressing challenges—unpredictable weather, particularly heavy rainfall. By integrating rainsensing technology with an automated shed deployment system, this project provides farmers with a real-time, efficient method to protect crops from water damage. The system's ability to operate autonomously without requiring manual intervention makes it highly scalable and accessible, especially for small and medium-sized farms. It also aligns with the broader goals of Precision Agriculture and Agriculture 4.0 by promoting resource optimization, improving crop yield, and contributing to sustainable farming practices. As agriculture continues to face the impacts of climate change, this technology represents a valuable tool for safeguarding crop health, enhancing productivity, and ensuring food security.

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9. Automatic Can Crusher

Introduction

The main purpose of the project is to get knowledge of design and fabrication. The design is an environment friendly and uses simple properties such as mechanical single slider and automation properties which use microcontroller and sensor. The design is done so that knowledge of designing, mechanism and forces analysis are increased. In order to reduce the waste, we planned to create a can crushing machine that will reduce the volume of aluminum cans by approximate eighty percent. This machine primarily usage is to save space and for recycling. It can be placed anywhere in park, restaurant, canteens, etc. in today's life most of the food items are packed in canned. Cold drinks and other beverages are also comes in cans. Commercial establishments like cafeteria and bars, have to deal with leftover cans. Storage is often a problem and cans consume lot of space, thereby increasing total volume of trash. The transportation cost is also high for moving such a huge number of cans. Thus this machine will help to recycle and maintain eco-friendly environment also. This project involves the process of designing the different parts of the crusher machine considering the forces and ergonomic factor for people to use.

This project mainly about generating a new concept of can crusher that would make easier to bring anywhere and easier to crush cans. After design has completed, it was transformed to its real product where the design is use for guidelines. Can is 100% renewable. This means that can you take to your local recycling centre today becomes a new aluminium can. There are no waste products n the process of making a 100% renewable resources and one of the best things can recycle. You might be surprised to know that within 60 days an aluminium can is able to go from your recycling centre and becomes a brand new can to be used by consumer.

Working

The engine is attached at compressor site .the compressor is made ON till the pressure in storage tank reaches 5 bar pressure. Here, the minimum operating pressure is 3bar to crush the can. The flexible hose coupled with the compressor tank and the air storage tank installed on the air engine .Here we use combination of electronic circuit, 5/2 solenoid valve for running cylinder compressor .the utility valve which supplies the air from the air tank to the direction control valve is gradually opened. The 5/2 direction control valve is operated as can placed in front of the opto sensor. A can crusher for environmental protection is generally composed of a pneumatic system to drive a piston forward or reverse backward. When the piston is move forward a plate which act as a bore of the piston moves along the piston crushes the can. A

separate pneumatic cylinder is used to push the can in crushing zone. A groove formed at an inner bottom portion to drain any residue left in a can to a collecting bin. The working of the project picture has been made and its image format is taken and uploaded here.

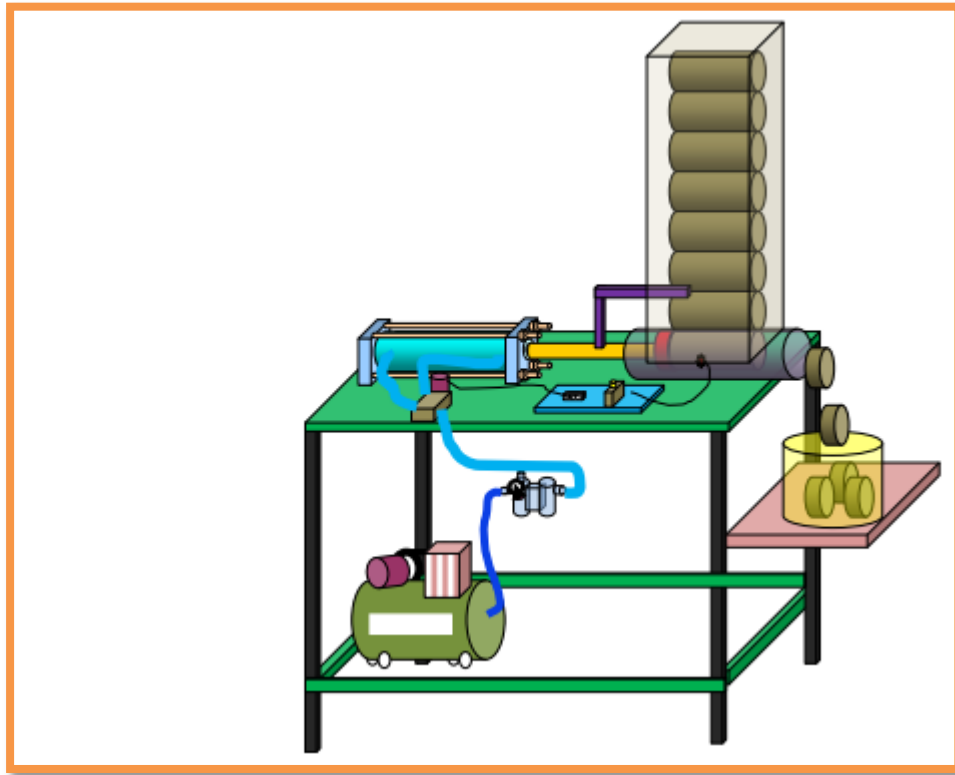


Figure 9.1 Schematic diagram of automatic can crusher

Future Scope

By placing the micro controller and sensor instead of manual operated gives more result and for future it can be handful for can crushing .this model can also be made with hydraulic.

Conclusions

The above design procedure is been adopted for the fabrication of fully automatic can crusher machine which will make the product durable for the long time as well as make it efficient and also helps to understand the concept of design. Thus with the help of this design we can fabricate an automatic can crusher machine to simply reduce the volume of cans as well as to reduce the human fatigue.

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10. Fabrication of Android Controlled Screw Jack

Introduction

Automatic Jack system is used to jack the car during road side emergency i.e. tire puncher. A device which is mechanical jack is used to lift heavy equipments, all the part of the vehicle which in order to facilitate vehicle maintenances or breakdown repairs. Experience of changing a flat tire is not pleasant. Variety of car jacks have been developed for lifting up the vehicles been produced nowadays. With the manual work of changing the flat tire has been difficult for the elderly and handicapped. It requires physical work such as squatting position or prolonged bent to operate the jack. During this work which is squatting position or bent where in it gives a back ache problem in due of time. A toggle Jack is operated by turning a lead screw.

With this case of jack, a little force is applied in the horizontal plane which uses to raise or lower large load. A thread which is more often used is acme, as this thread can resist the large loads and very strong imposed on the jackscrews and by wear it is not being weakened over many rotations . A normal jack purposed to hold up to 1000 kilograms, when test is conducted by consumer affairs has revealed that it stops to work after reaching 250 kilograms and physical damage takes place when it has a weight close to its 1000 kilograms capacity. The detailed block is shown in the figure 10.1.

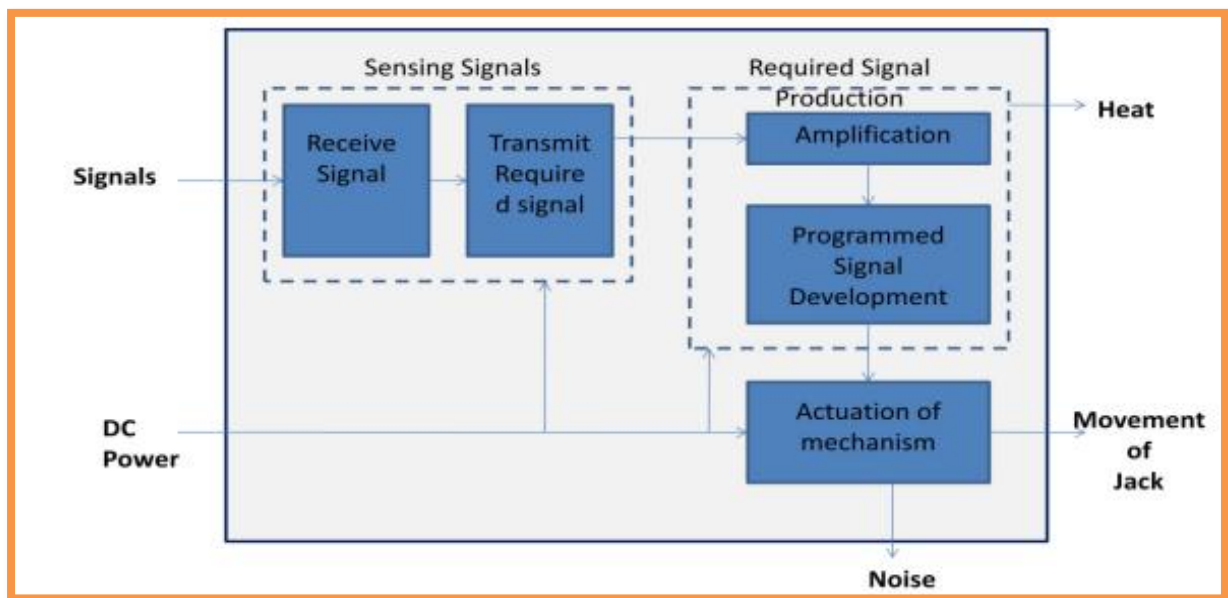


Figure 10.1 Schematic diagram of android controlled screw jack

Applications

- Small / mini cars
- Heavy vehicles like buses and trucks
- Heavy Utility vehicles (HUV) like crane and harvester

Advantages

- Easily operated
- Maintenance cost will be less
- Parts are easily available in the market
- This type of system is useful mainly for ladies and old peoples, during the time of puncher they can easily operate and change the wheel.

Vehicle Lift Using Android Controlled Screw Jack

Automatic Jack system for a motor vehicle will allows the individual to quickly and safely raise and lower the vehicle thereby facilitating the efficient process of changing a vehicle tire. It will be easy for elderly or handicapped individual to jack up the motor vehicle completely eliminated the messy process of manually jacking up a vehicle.

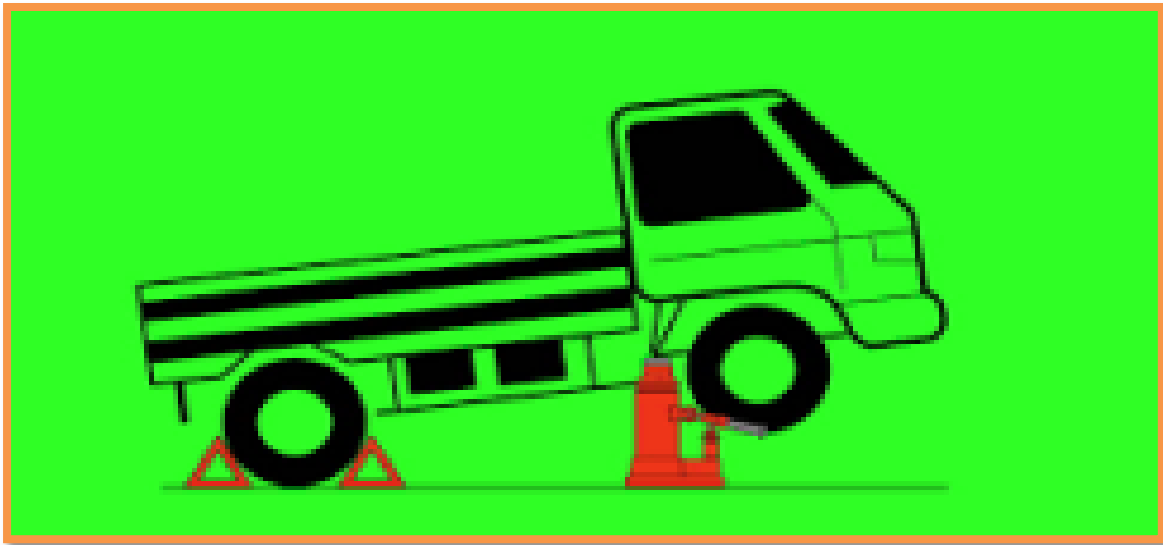


Figure 10.2 Vehicle Lift Mechanism

Conclusions

An inbuilt automatic jack system can be easily attached to all currently manufacture chassis and frames. By the android app the movement of jack from front suspension is mounted centrally to the front suspension of an automobile between its front wheels. According to the topological conditions jack will be sufficient enough in achieving the horizontal leveling. With the help of car battery which is of 12V battery source the movement of the jack from front to back and vice-versa is possible. Android app can be installed / mounted in the dash board for displaying the movement of jack. With all the car jacks available in the markets, this model is improvised on the features and design.

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11. Manual Sheet Metal Bending Machine

Introduction

Sheet metal fabrication plays an important role in the metal manufacturing world. Sheet metal is used in the production of materials ranging from tools, to hinges, automobiles etc. Sheet metal fabrication ranges from deep drawing, stamping, forming, and hydro forming, to high-energy-rate forming (HERF) to create desired shapes. Fascinating and elegant shapes may be folded from a single plane sheet of material without stretching, tearing or cutting, if shape rolling of sheet metal is the bending continually of the piece along a linear axis. This causes alteration of the original form of the sheet as it passes through a pathway of series of rollers. The present invention relates to plate bending machines of the type which operates with rolls. Such machines involve certain well-known difficulties in respect of bending plates into conical shape. The invention has for its object to remedy this drawback and to enable, by including auxiliary means, the bending of conical mantles and the like.

Objectives of the work

- To make a bending machine to bend metal sheets up to 8 mm.
- To make on simple working principle.
- To reduce the time for operation.
- To make in minimum cost.

Applications

- Fabricating/Rolling
- Boilers, Pressure Vessels
- Storage Tanks, Silos
- Tubes and Pipelines
- Pumps, Burners and Filters
- Heating and Ventilation
- Wind Towers, Power Generation

Parts of Bending Machine

As shown in the figure 11.1, in order to select a gearbox speed reducer, you will need to determine the required torque service factor for the application. The table below will assist in determining the service factor for service factor above 1.0; multiply the required torque by the service factor. • One-piece gear case, without external ribs, is made of close-grained cast iron and provides for rigid gear and bearing support .It also offers excellent heat dissipation.

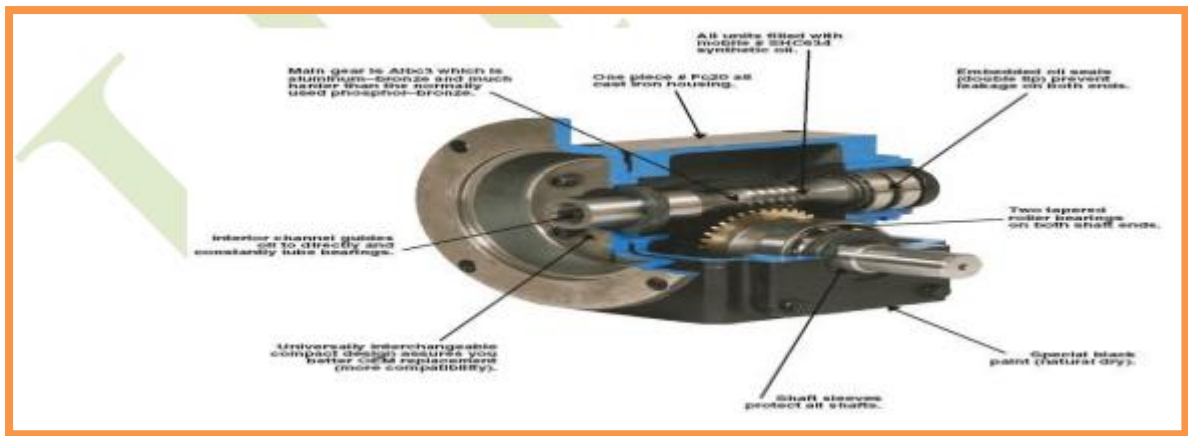


Figure 11.1 Sectional view of speed reduction gear box

Tyre Coupling F-60

F-60 couplings provide all the desirable features of an ideal flexible coupling, including Taper-Lock fixing. The F-60 coupling is a "torsionally elastic" coupling offering versatility to designers and engineers with a choice of flange combinations to suit most applications.



Figure 11.2 Tyre coupling

Conclusions

As compare to the manually operated sheet bending machine the power operated sheet bending machine is better. The productivity of power operated sheet bending machine is higher. The part of machine is able to handle the heavy load on machine. The time required to complete bending operation is less and the requirement of extra worker's reduced. Power operated sheet bending is less time consuming process with high productivity.

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12. Alcohol detection, self-locking system and Automatic Headlamp Dim or Bright Controller

Introduction

The current scenario shows that the most of the road accidents are occurring due to drunk-driving. The drivers who drink alcohol are not in an stable condition and so, rash driving occurs on highway which can be risky to the lives of the people on road, the driver inclusive. The enormity of the dangerous driving transcends boundary. The laws in India are currently prohibiting drivers to drink and drive so that the fine can stop them to drink and drive. Whatsoever, effective observation of inebriated drivers could be a challenge to the policemen and road safety officers, the rationale for this stems from the natural inability of citizenry to be present additionally as state among identical house and time. This restricted ability of enforcement agents undermines each manual effort geared toward edge drink driving.

There is therefore the need for an alcohol detection system that can function without the restriction of space and time. The Indian Ministry of Statistics reported thousands of road accidents in 2016. Though the report declared speed violation is the foremost reason for these accidents, it will safely be inferred that almost all of the cases are because of drivers unstable condition caused by drivers becoming drunk before they drive. The investigation done by the Planet Health Organization in 2008 shows that concerning 50%-60% of traffic accidents square measure associated with drink-driving. Moreover, WHO information on road traffic deaths disclosed. Auto safety is the prevention of car accidents or the minimization of accident related harmful effects, especially as regards human life and health.

the Indian road transport scenario, accidents are becoming a day-to-day incident as an effort has been made to eliminate these accidents. During pitch black conditions where there are no other sources of light, high beam is used. In all other cases, low beam is preferred. But in a two-way traffic, there are vehicles plying on both sides of the road. So when the bright light from the headlight of a vehicle coming from the opposite direction falls on a person, it glares him for a certain amount of time. This causes disorientation to that driver. This discomfort will result in involuntary closing of the driver's eyes momentarily.

Working

As shown in figure 12.1, this mechanism works by sensing the light intensity in the atmosphere around it. An LDR is the sensor, which can be used to detect light. It's inexpensive, and can be purchased from any local electronics store or online. When connected to VCC (5V), the LDR releases an analogy voltage which varies in magnitude in direct proportion to the intensity of the

input light on it. This is the higher the light intensity, the greater the equivalent LDR voltage would be. As the LDR produces an analogy. Voltage it is attached to the Arduino analog input board. With its builtin ADC (analog-to-digital converter), the Arduino then converts the analog voltage (from 0-5V) in the range of (0-1023) to a digital value. The converted digital values read from the LDR via the Arduino should be in the range of 800-1023, whether there is enough light in its atmosphere or on its surface.

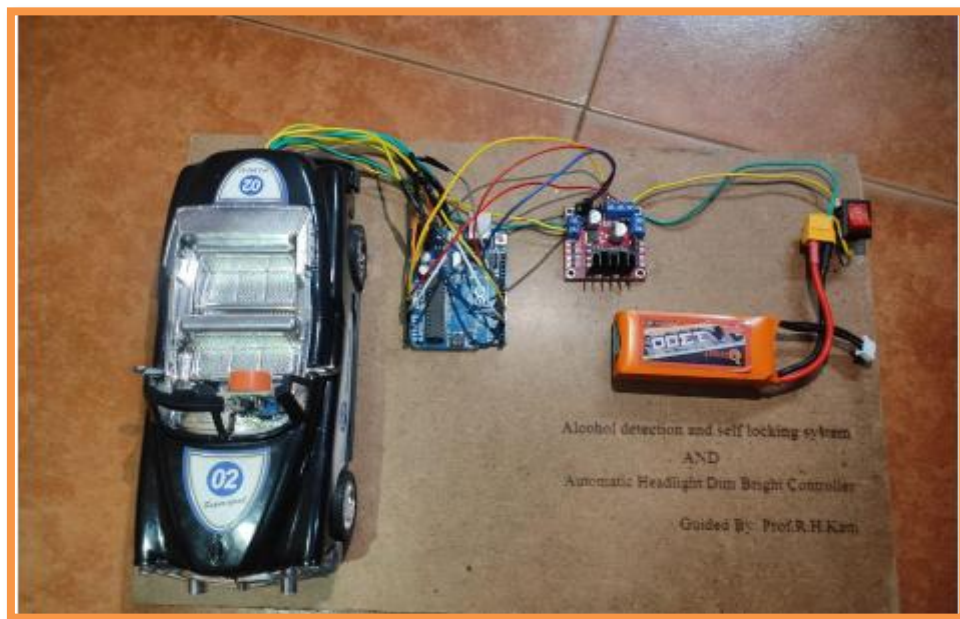


Figure 12.1 Working model

We then program the Arduino to turn a relay on. Accordingly, when the light intensity is small, switch on an appliance (Headlight), that is, when the read digital values are in a higher range than normal. Arduino Uno is micro-controller development board that works on Atmega-328P. The Arduino results to numerous various functions like Microcontroller area unit, computer circuit unit, primarily little computers that will run tiny easy software package programs, the area unit are enough low steam-powered which can steam powered by various batteries for years however area unit ready to measure information much quicker than a person's brain can method/suppose. The Board is an organization in the Italy which structures and sell-circuit sheets which make micro-controller simple to utilize, they coined those circuit sheets Arduino and there will be a variety kinds of Arduino, those can be utilized through variety of ways and has diverse usefulness of unique applications of instance we had straightforward Arduino's sheets which seems like Arduino-uno which can be conservative/very useful for each task. The MQ-3 sensor is made of Tin Dioxide (SnO_2) delicate layer.

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13. Pedal operated Hacksaw Machine

Introduction

Operating a hacksaw manually is a very tiring and time consuming task. It requires a lot of manual effort and delivers uneven cutting. Operating an electrical hacksaw does deliver good results but consumes a lot of energy. So here we propose a semi-automated hacksaw using pedal power. Here we design and fabricate a hacksaw that is run by pedal power and achieves even cutting with very less efforts. Here we use a chain sprocket arrangement to transfer power from pedals to hacksaw. A strong and firm base frame allows for efficient power transfer between the system. We use bearings and mounts to mount and setup the entire system and ensure a smooth circular motion of pedals. Now we attach a hub to the other sprocket. This hub is connected with a connecting rod which moves with the hub in order to produce a lateral motion. We now develop a supporting frame and connect a saw to the other end in order to achieve desired cutting movement of saw. We also attach some weight to the upper saw frame in order to have some load on the hacksaw for a cut through movement system as shown in figure 13.1.

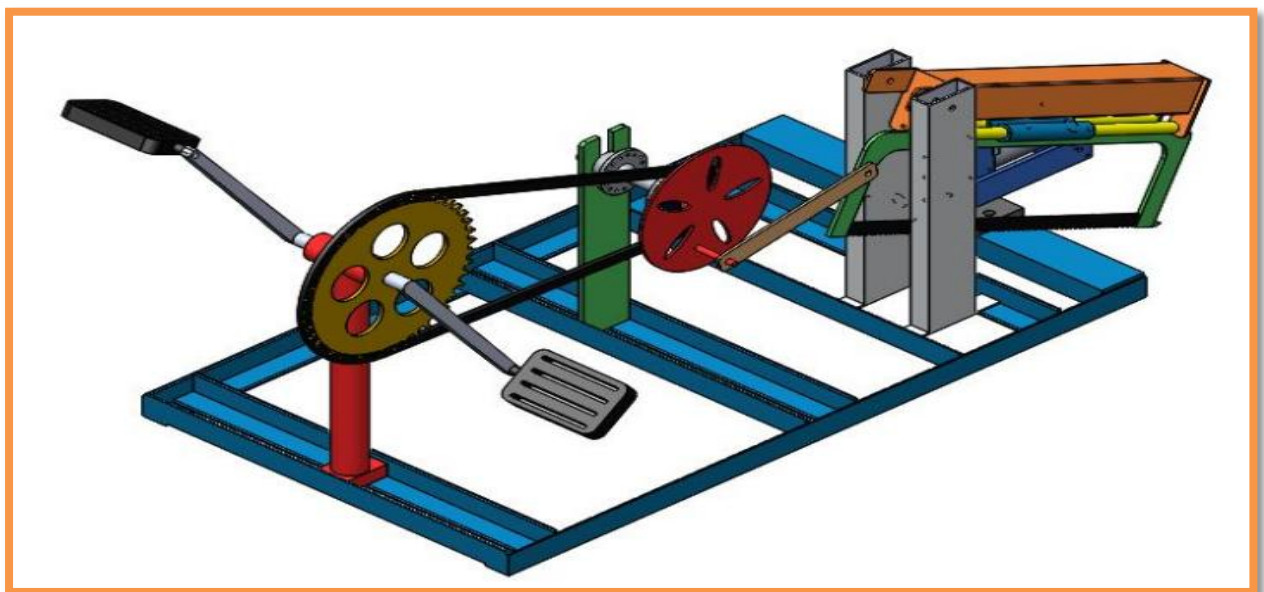


Figure 13.1 Block diagram

Advantages

- No Electricity Needed
- Can be Used Anywhere
- Less Efforts Needed
- Even cutting results

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14. Development of RFID Based Army Gate Security System

Introduction

RFID, Radio Frequency Identification is a central and cheap innovation that empowers remote information transmission. This innovation has not been all the time utilized as a part of industry because of absence of institutionalization among the assembling organizations prior. RFID advances are productive and secure contrast with other system. With RFID, remote programmed recognizable proof takes a certain frame: the question, area, or individual is set apart with a remarkable identifier code contained with a RFID tag, which is somehow connected to or implanted in the objective. RFID isn't a solitary item however a complete framework, an ordinary RFID framework incorporate three essential components: RFID tag, per user and back-end application framework, which requests the help of the PC organize.

Challenges Present in the System

Universally deploying RFID tags offers many potential security benefits, yet may expose new privacy threats. Otherwise intrusive or cumbersome security practices, such as airline passenger and baggage tracking, can be made practical by using RFID systems. Authentication systems already take advantage of RFID technology, for example car keyless entry systems. Embedding RFID tags as seals of authenticity in documents, designer products, and currency may discourage forgery. While RFID tags improve certain security properties in these applications, they may exacerbate privacy threats or pose new security risks.

System Architecture

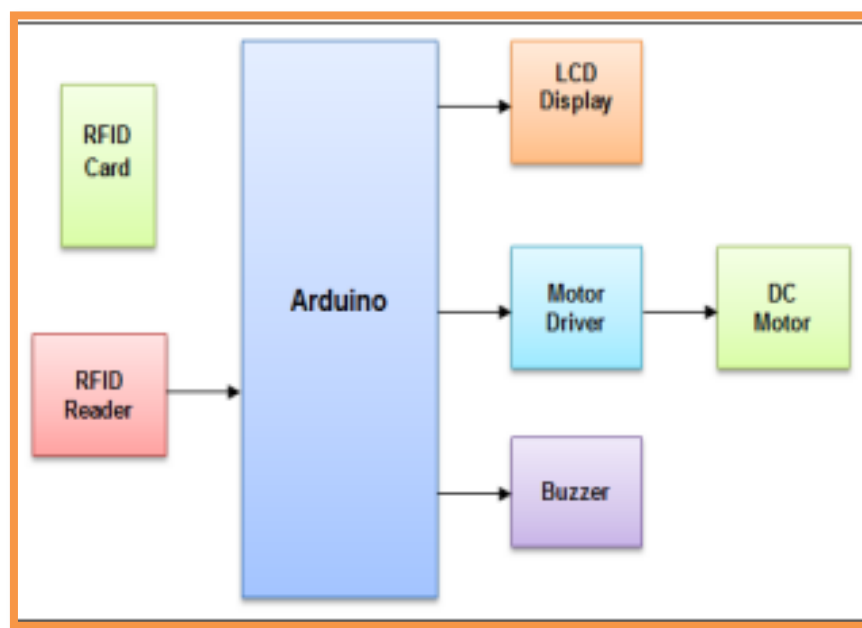


Figure 14.1 System architecture

The system architecture depicts the higher level design of the software product. The user must have the master key to enter the room. Once the user shows his/her key to the RFID reader, it scans the card and opens the gate and the will close after a few seconds. When there is an illicit entry i.e. when a person shows a wrong RFID card then there will be a warning sign and also an alarm will be triggered as shown in figure 14.1.

Future works and enhancements

The RFID business is going to enter an energizing period in which expanded selection will give the way to innovation suppliers to put resources into new, energizing developments. Alongside the new improvements depicted above, headways in materials, natural polymers, Nano innovation, and different territories will change the way RFID is fused into items. It relies on how unique one could be to improve the utilization of this venture. Yet, for us this task is reasonable for future uses, for example, Smart truck can be interfaced with remote innovations to make it totally versatile sooner rather than later. Installment of bills utilizing portable can be actualized. A minimal effort RFID scanner can be fabricated and utilized which can check different labels (items) all the while for speedier preparing and lesser assets. Programmed examining and accessibility of items can be presented. Pay planning highlight will be the most recent pattern in up and coming a very long time because of the lift in the internet business industry. Rather than a label connected to a piece of clothing, for instance, a RFID transponder could be printed straightforwardly into fabric or bundling utilizing biodegradable conductive inks. The eventual fate of RFID is here, so both end clients and RFID makers ought to be set up to use these new advances and prepare themselves for more boundless utilization of RFID.

Conclusions

RFID based security and access control system is more secure and fast responded as compared to the other system like biometric. The advantage of the RFID system is contact-less and works without-line-of-sight. By using Arduino it is easy to access and works very quickly while burning the code it is like Plug and Play device. Users can change the function accordingly by using Arduino. It is easier to use and accurate also. Hence this paper can be useful for implementation of access control application for tracking system as well as providing the security benefits. This paper can improve by raising the range of reader in which the tag read.

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15. Android Controlled Robotic Arm

Introduction

In a world of science fiction of yesterday is becoming a reality today such a world needs more productivity and less human interaction. We present you Android device controlled Robotic Arm using Wi-Fi technology in this paper. Such a device is very much applicable where human reach is not possible or must be avoided. This tool is useful in multiple industries as the design of this project is cheap and robust. The robotic arm, as the name implies, is designed to do the similar tasks as that of a human hand.

The main vision of this project is to come up with a technique for operating a robotic arm using an android application. A signal is produced when certain keys on the Android mobile application are clicked, allowing the microcontroller to move the arm as per the specified program. Using Android JAVA and a microcontroller, the Android program acts as the robotic arm's command location, guiding the arm to move or retrieve required parts. The signal is sent from the receiver to the microprocessor, which uses multiple scaling factors to manipulate the data and control the motors that move the robotic arm's velocity and direction.

Objective

1. In a typical household, robotics such as kitchen bots, lawnmowers, and vacuum cleaners support people by easing their efforts and acting as helpful assistants to fulfill given duties swiftly and smoothly.
2. Risky activities that require the usage of robots by doctors is quite beneficial. Robotic equipment in hospitals can provide 3D vision, a 10-fold increase in surgical area, and even instruments that are more mobile than human hands.
3. By delivering great precision and accuracy, robotics helps to decrease human errors in traditional procedures such as installing and inspecting dangerous gas pipes, disarming bombs, clearing hazardous nuclear waste, working as a firefighter, and even cleaning sewage systems.

Methodology

As shown in the figure 15.1, one of the most severe difficulties our country's defense sector faces is the spread of bombs. Because there is no physical danger to the warriors, this problem is overcome with a Robotic Arm. The android-based robotic arm can also enter locations where humans are not allowed, such as areas with extremely low or extremely high atmospheric pressure, conflict zones, and even bio hazardous areas. It can also be used for boring and repetitive activities in manufacturing operations, such as vehicle painting and assembly.

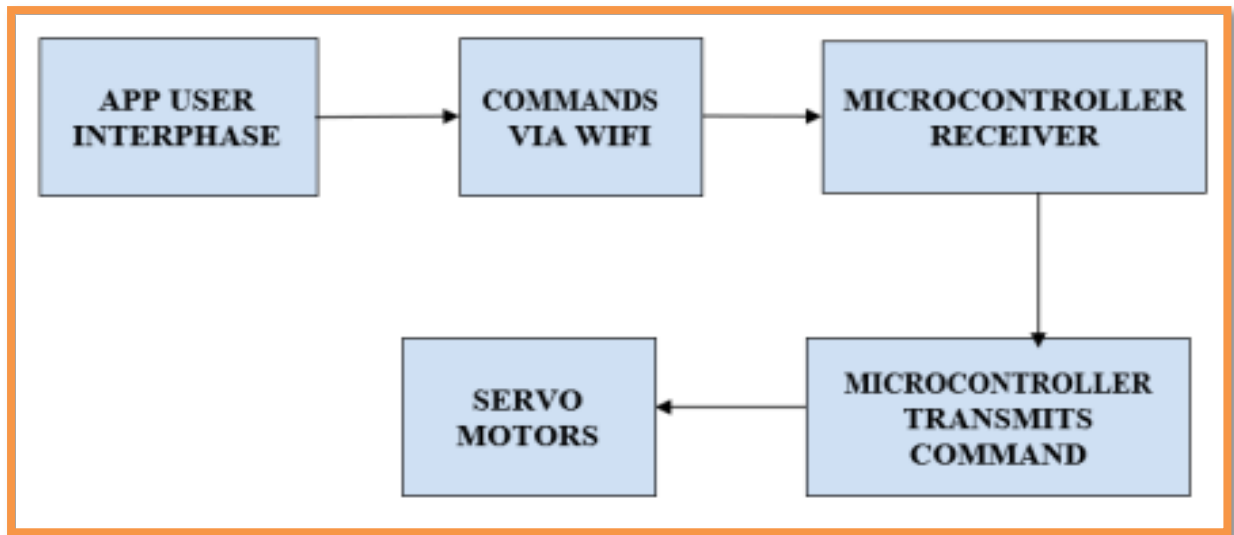


Figure 15.1 Block Diagram of Proposed Solution

When the operator sends a command to the robotic arm from an Android phone, the transceiver sends signals to the microcontroller, which completes all essential tasks. The microcontroller then sends an instruction to each of the communication links individual channels. The reaction of the electric motor is determined by the type of order sent, and the microcontroller controls the motor's direction, speed, and motion. The rotation of the powered motor impacts the movement of the robotic arm by moving the impacted link attached to the motor.

Results and Conclusion

In this proposed work, the commands given are successfully transmitted via Wi-fi module and by the user app interface. With the help of this, the desired operations can be successfully carried out. This project minimizes human effort and time in places or situations where it is difficult to intervene. Such systems can be used in a variety of settings, including industry, military, defense and research.

Future Work

As we all know, there is nothing in this world that is flawless, thus people are constantly working to improve technology and make it more efficient. On the other hand, this technology still needs a lot more work. Thus, by improvising its applications little farther, where at present we can think of installing a camera so that it can be detected and displayed on LCD making it more users friendly.

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16. Iot Based Belt Conveyor System

Introduction

The Internet of Things and Big data these days means big business. Monitoring Belt Conveyor Systems used to be performed by means of inspectors and off line. These days the developments are towards fully automated inspection systems. The IoT enables that more information from sensor systems becomes available that was not available in the past. Theoretically this means that monitoring Belt Conveyor systems 24/7 should become reality and downtime and unexpected maintenance a thing of the past.

All these sensor systems produce a vast amount of information. Big data implies a combination of databases too large and/or too diverse to maintain by regular database management systems. Big data plays an ever-increasing role these days. This paper discusses an application of the IoT in bulk solid handling and transportation systems and the utilization of big data. The IoT enables that more information from sensor systems becomes available that was not available in the past. Theoretically this means that monitoring Belt Conveyor systems 24/7 should become reality and down-time and unexpected maintenance a thing of the past

Objectives

1. By leveraging IoT sensors and devices, businesses can optimize operational efficiency
2. Reduce long (and expensive) shutdowns, and enhance overall productivity.

The Internet of Things

The IoT is defined as things or objects, which through addressing schemes interact with each other and cooperate with their neighbors to reach common goals. IoT are interconnecting physical objects with computing and communication capabilities across a wide range of services and technologies. IoT is perceived as Interconnection of sensing and actuating devices providing the ability to share information across platforms through a unified framework with Cloud computing as the unifying framework.

The first definition comes from a networking perspective, the second uses physical attributes as the base for the IoT definition and the third definition emphasizes the use of platforms and the cloud. This paper is party based. The IoT holds several disciplines and consists of multiple technologies. The technologies are structured in such a way that they form a value chain between a SO and an end-user, and they are also se Figure 16.1.

- Data acquisition
- Identification and tracking
- Communication and networking

- Middleware
- Data storage and analytics
- Applications



Figure 16.1 Value chain of IoT

Application of the Iot in Belt Conveyor Systems

The Internet of Things (IoT) can be used in belt conveyor systems to monitor the system's performance and help prevent issues. IoT sensors can record parameters like tension, speed, and temperature, and machine learning algorithms can analyze the data to predict problems.

Benefits of IoT in belt conveyor systems

- **Predictive maintenance:** IoT sensors can identify unusual patterns, which can help maintenance teams take action before a major issue occurs.
- **Reduced downtime:** IoT-based monitoring can help reduce downtime and unexpected maintenance.
- **Improved efficiency:** IoT-based machine learning can help identify factors that contribute to belt mist racking, which can reduce efficiency.

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17. Finger Print Based Vehicle Ignition System

Introduction

Fingerprint recognition technology allows access to only those whose fingerprints that are pre stored in the memory. Stored fingerprints are retained even in the event of complete power failure or battery drain. These eliminates the need for keeping track of keys or remembering a combination password, or PIN. It can only be opened when an authorized user is present, since there are no keys or combinations to be copied or stolen, or locks that can be picked. The fingerprint based lock therefore provides a wonderful solution to conventionally encountered inconveniences. This report focuses on the use of fingerprints to unlock locks, as opposed to the established method of using keys .In order to prevent unauthorized access to these devices, passwords and other pattern based authentication method are being used in recent time.

Finger Print Sensor

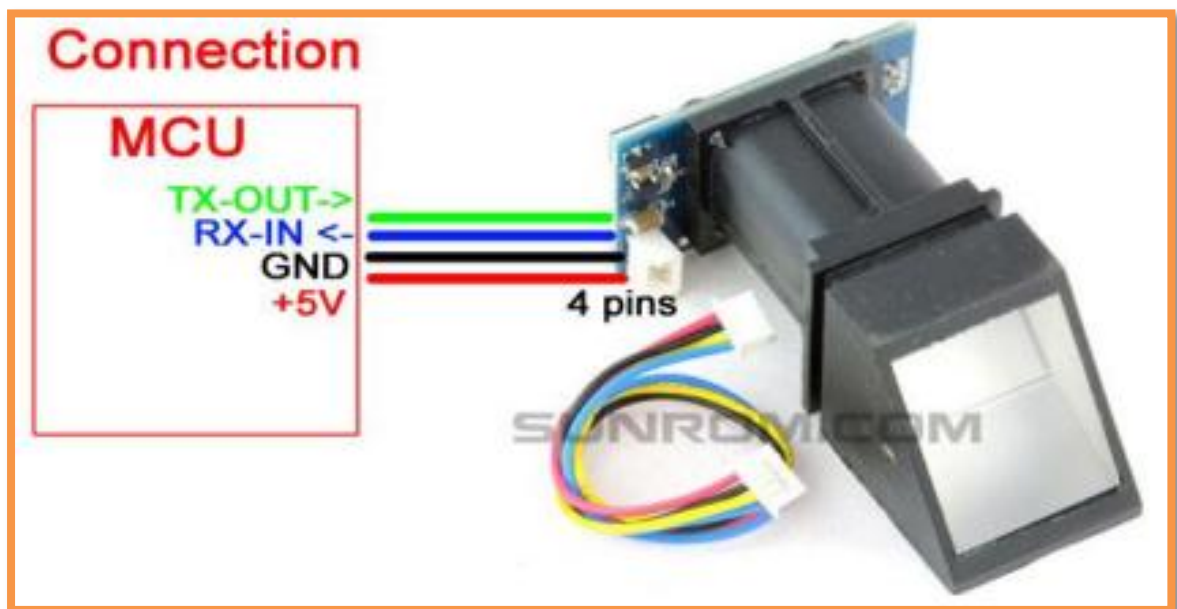


Figure 17.1 Finger print sensor

As shown in the figure 17.1 Secure with biometrics - this all-in-one optical fingerprint sensor will make adding fingerprint detection and verification super simple. These modules are typically used in safes - there's a high powered DSP chip that does the image rendering, calculation, feature finding and searching.

Algorithm of Finger Print Based Vehicle Starting System

- Start
- Place a finger and press enter button (top button) to start engine.
- If finger already stored in the scanner module, start the engine.

- If not, go back to number 1 and give no output.
- Press ENTER button (bottom button) to enter passcode.
- If passcode matches with saved code in chip's EPROM. Open user admin, activate module to receive finger image data and store it and go to number 7.
- If passcode entered does not correlate with chip's value in the EPROM, signify wrong passcode and go back to number 4.
- Navigate through options in user admin to edit passcode and exit interface.
- Stop.

Results and Discussion

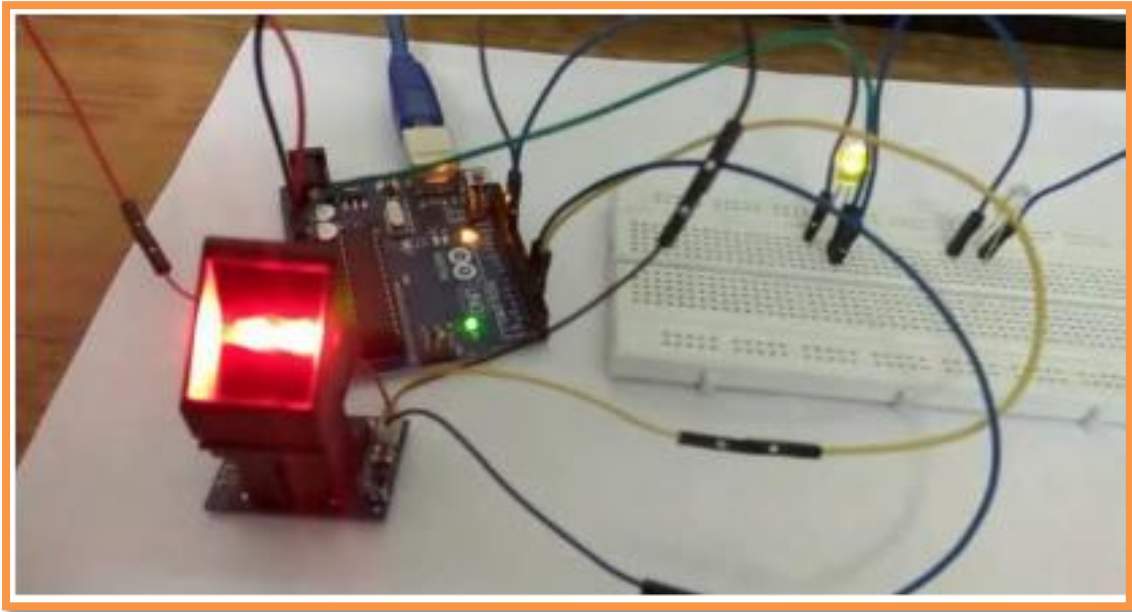


Figure 17.2 Interfacing fingerprint with arduino

Realizing a project physically has lots to do with research, choice of component and testing of the components. The project was implemented and tested to ensure proper operation under stated instruction. The various modules were tested and satisfactory results were obtained. As the components used fall within the tolerance value of the components, hence an assurance of the proper functioning of the system. . From the Figure 17.2 as depicted above, it shows that the designed system performs the measured values.

Conclusions

This work is a well operating prototype of a fingerprint based vehicle starting system. The system intelligent agents were able to communicate well and appropriate output is given under user input. The system requests for user's finger, process it and give appropriate output based on if the finger is stored in the fingerprint module or not.

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18. Agricultural Bicycle Sprayer Vehicle

Introduction

Despite its rich agricultural heritage and a significant rural population engaged in farming (approximately 35%), Nigeria's agricultural sector remains largely reliant on traditional, often outdated, techniques. While this sector contributes substantially to the national GDP, the persistence of these practices presents a significant obstacle to further development and economic growth. Effective utilization of agricultural tools is often hindered by challenges such as pest control, organic fertilizer and micronutrient application, and irrigation management.

Current fertilizer and pesticide application strategies present significant opportunities for improvement within the agricultural sector. Traditional spraying methods often require substantial time and resource inputs, raising concerns about sustainability and efficiency. Failure to address these deficiencies could contribute to declining farm yields, potentially leading to increased food prices, diminished affordability, and negative impacts on overall standards of living.



Figure 18.1 Model of the bicycle sprayer

The bicycle sprayer presents a portable and adaptable spraying technology, characterized by an adjustable boom, a fluid reservoir, a chain-and-sprocket system, and a cam follower mechanism that converts rotational motion into reciprocating motion for pump operation. The sprayed

solution is housed within a securely mounted tank on the bicycle frame. As the bicycle is in shown in figure 18.1 is propelled forward, the cam follower generates reciprocating motion for the pump, pressurizing the fluid in the tank. This pressurized liquid is then expelled as a mist through nozzles mounted on the adjustable boom. The development of the bicycle sprayer for pesticides, fertilizers, and other agricultural inputs aims to mitigate or eliminate the negative impacts associated with traditional spraying methods prevalent in the country. This innovative design represents a potential paradigm shift in local farming practices.

Design Considerations

The design of agricultural equipment, including the Bicycle Sprayer, incorporates components that can be adjusted to optimize performance for different operating conditions. This consideration aligns with the modern trend of adaptable machinery. The following factors were specifically prioritized during the development of the Bicycle Sprayer:

- Targeted plant/crop types: The sprayer's design features and functionalities cater to the specific needs of different plant species or crop varieties.
- Crop growth stages: The sprayer's adaptability allows for adjustments to accommodate varying plant sizes and spray requirements throughout their growth cycle.
- Planting density and spacing: The sprayer's configuration and application methods are tailored to ensure efficient coverage within diverse crop planting arrangements.

Performance and Testing



Figure 18.2 Developed bicycle sprayer

Following its construction, the Bicycle Sprayer underwent field testing to evaluate its spraying performance under diverse conditions. A liquid mixture was utilized to simulate spraying material, and testing was conducted on farmlands with both flat and uneven terrain. While even and efficient spraying was observed on flat terrain, the uneven topography presented challenges to its operation. Nonetheless, the test results indicated the sprayer's effectiveness in delivering the target amount of liquid to crops with precise control over spray direction, minimizing waste, and maximizing coverage. Field trials demonstrated the efficacy of the Bicycle Sprayer in achieving consistent delivery rates. Replicated tests confirmed its ability to dispense a predetermined volume of liquid through its nozzles while maintaining a set travel speed. These results suggest the sprayer's potential for accurate and reliable application in agricultural settings, potentially contributing to high-quality spraying outcomes.

Efficiency of the Bicycle Sprayer

The Bicycle Sprayer's efficiency was evaluated by calculating the ratio of its output to input, resulting in a 100% efficiency rating. Input refers to the volume of liquid mixture initially loaded into the tank, while output signifies the volume of liquid dispensed through the nozzles over a specific timeframe. During testing, the sprayer was filled to its maximum capacity of 20 liters and evaluated in three distinct locations.

Conclusions

The "Crank-Slider Mechanism" Bicycle Sprayer study presents a potentially valuable tool for small-scale farmers in remote locations with limited access to external power sources. Its fully mechanical design relies on readily available and affordable materials, potentially addressing the burden of manual pesticide application often faced by farmers. The project aims to minimize physical exertion during operation and requires minimal user training, promoting easy adoption. Furthermore, the study proposes automating the pesticide spraying process to optimize labour efficiency and achieve uniform liquid distribution.

Recognizing the critical need for user-friendly, effective, and affordable agricultural mechanization, particularly for pesticide and disease control equipment, the Bicycle Sprayer study seeks to contribute to improving the lives of small-scale farmers globally and potentially supporting sustainable agricultural practices. However, further research is necessary to rigorously evaluate its efficacy, usability, and economic viability under diverse conditions.

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USN: 2HN22ME424

19. Faulty Product Detection and Separation System

All product manufacturing units need to have a faulty product detection and separation system in order to maintain product quality and maintain a good reputation. So here we demonstrate such a system using a mini conveyer belt system. We propose to design and fabricate a faulty product detection and separation mechanism. Each product is different and thus has different mechanisms to detect faulty products. Here we detect faulty products based on product size. We use a sensor to detect each product height as products move over a conveyer belt. A defected product with height lower than minimum limit will be automatically detected as it moves on a conveyer belt and separated by a conveyer arm. Here we use rollers and rubber belt to develop a mini conveyer belt mechanism. This mechanism is operated by a motor. We use an ultrasonic sensor to detect product height and products with less than minimum height are detected as faulty products. The system uses a servo motor which has a separator arm as shown in figure 19.1

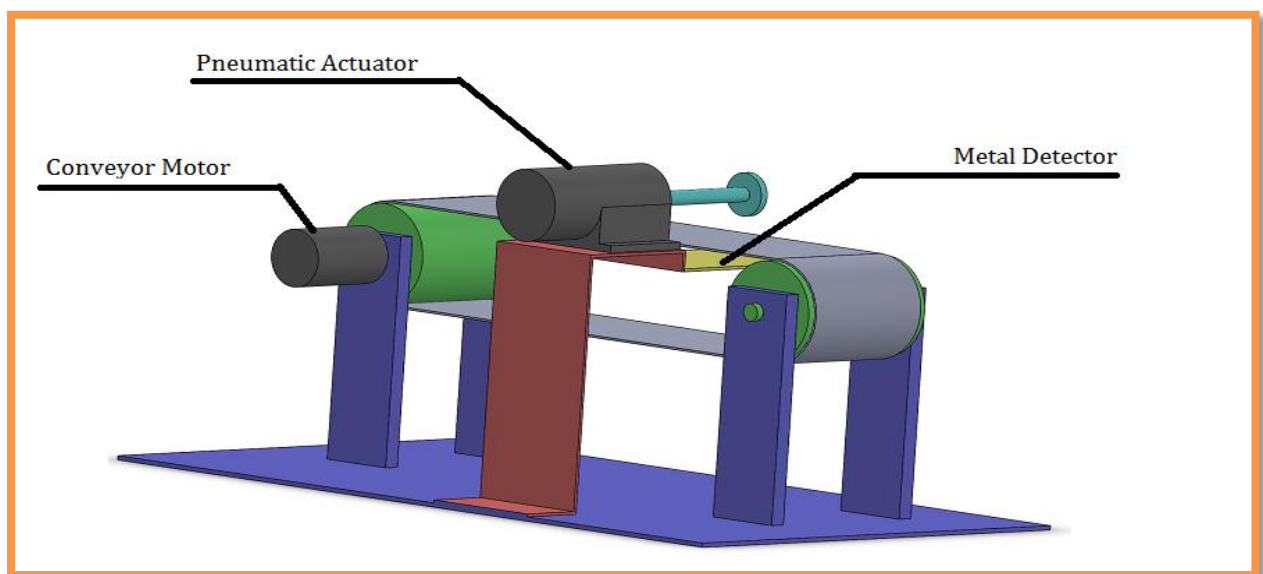


Figure 19.1 Schematic diagram of model

Advantages

- Automated Process
- Instant Separation
- Automated Quality Maintenance

Mr. Darshan Anil Kakati
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20. Automatic Seed Sowing Robot

Sowing is the most important process in farming. It is a very tiring and time consuming process that requires a lot of human effort. Here we propose the design and fabrication of a fully automatic seed sowing robot that automates this task. The proposed robot uses four motors for running it in desired directions. We use a small bracket for pouring seeds. The robot consists of a funnel like arrangement in order to pour seeds into a lower container. There we use a shaft with gear like bucket teeth to pick up limited quantity of seeds and pour them on the ground in a steady manner in proper quantity. The front of the robot consists of a bent plate that drags on the soil to make a slot ahead of the machine before seeds are poured in it. The back portion of the robot consists of a tail like bent rod that is again used to pour soil on seeds sowed thus covering them with soil. Thus the system completely automated the seed sowing process using a smartly designed mechanical robotic system.



Figure 20.1 Schematic diagram of model

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Group Photo of AIMSS - Special Task Team

Program Educational Objectives (PEOs)

The Graduates will be able to

- PEO1:** Acquire core competence in Applied Science, Mathematics and Mechanical Engineering fundamentals to excel in professional career and higher study
- PEO2:** Design, demonstrate and analyze the mechanical systems which are useful to society.
- PEO3:** Maintain professional & ethical values, employability skills, multidisciplinary approach & an ability to realize engineering issues to broader social context by engaging in lifelong learning.

Program Specific Outcomes (PSOs)

- PSO1:** Able to apply the basic principles of Mechanical Engineering in various practical fields to solve societal problems by engaging themselves in many state/national level projects.
- PSO2:** Able to analyze and design basic mechanical system using relevant tools and techniques.
- PSO3:** Able to resolve contemporary issues of industries through industry institute interaction and alumni social networks

Program Outcomes (POs)

- PO1: Engineering knowledge-** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Problem analysis-** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3: Design/development of solutions-** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: Conduct investigations of complex problems-** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5: Modern tool usage-** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: The engineer and society-** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Environment and sustainability-** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Ethics-** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Individual and team work-** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: Communication-** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO11: Project management and finance-** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: Life-long learning-** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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