

IEEE 2017-18 Mechatronics And Robotics Based projects

1) ADVANCED 5 IN 1 MULTI PURPOSE AGRICULTURAL ROBOTIC VEHICLE –AGRIBOT

This robotic vehicle is an agricultural machine of a considerable power and great soil clearing capacity. This multipurpose system gives an advance method to sow, plow, water and cut the crops with minimum man power and labor making it an efficient vehicle. The machine will cultivate the farm by considering particular rows and specific column at fixed distance depending on crop. Moreover the vehicle can be controlled through RF medium using a Controller. The whole process calculation, processing, monitoring are designed with motors & sensor interfaced with microcontroller.

2) DESIGN AND DEVELOPMENT OF PC CONTROLLED SMALL UNIT UNMANNED VEHICLE FOR TODAY'S ARMY

Unmanned robot vehicles are increasingly being used in a variety of military missions. One such mission is that of Intelligence, Reconnaissance, and Surveillance. In these missions, unmanned robot vehicles collect sensor data and communicate it to ground, air, and space assets to support decision-making. The model comprises of a PC which is interfaced to the transmitter through the RS232 cable. Transmitter is the desktop by which commands are sent wirelessly through serial port where RF transmitter is connected. Receiver consists of microcontroller, IR sensor to sense any obstacle within its range of 10 cms. If any object comes in its range it raises an alarm using piezo electric buzzer, it also observes for any noise within its locality, if any sound like, firing towards the Tanker gets noticed, a servo turned towards it which has got a rifle on it will start firing back towards the enemy region. Another servo motor has been fitted with wireless camera on it to observe the surroundings where the Tanker is moving. When IR sensors sense any obstacle within its range, it sends a bit one logic level high signal to microcontroller I/O pin where it is connected and this microcontroller checks for high signal and sends an alert beep sound by sending a high signal on buzzer, in the same way clap switch which senses any sounds around it will make its bit high and passes it to the microcontroller, the particular duration PWM signal will be sent to the servo motor which makes its shaft to rotate the firing point of the rifle towards the enemy and starts firing. Another servo motor will be controlled by the user so that he can adjust the direction of the camera and sense any foreign object.

3) DESIGN AND FABRICATION OF AN AUTOMATIC WINDOW OR GLASS CLEANING MECHANISM

The rapid growth of advanced robots has given researchers unprecedented opportunities to explore and discover new fields of research where robots can be used to assist humans in their daily life. There are many applications that use robots and automation in different aspects of life such as industry, medical, domestic machines and etc. In this paper, the work has been devoted for the use of robotics and robots in cleaning process. The window cleaning robot is one of the robots that have emerged in recent decay. This robot can be used in homes, offices and large buildings. The main target is to design a robot that can clean glass windows efficiently and rapidly even in dangerous and hazardous places. The robot will

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YES Complex, 19/3&4, 2nd Floor, Dinnur Main Road, R.T.Nagar, Bangalore-560032 Ph:080-40969981, Website:www.technofist.com. E-mail:technofist.projects@gmail.com

be controlled using a Microcontroller. The motion will generated by DC Motors.Robots have been created to assist or replace humans in various dangerous and difficult tasks. Robots have been used in construction, manufacturing, security and etc. This is because they are able to adapt to different environments and situations. They have conquered nearly all environments that humans have put them through. Cleanliness is one of the important aspects in human life.

4) DESIGN AND FABRICATION OF PIPE INSPECTION ROBOT

Inspection robots are used in many fields of industry. One application is monitoring the inside of the pipes and channels, recognizing and solving problems through the interior of pipes or channels. Automated inspection of the inner surface of a pipe can be achieved by a mobile robot. Because pipelines are typically buried underground, they are in contact with the soil and subject to corrosion, where the steel pipe wall oxidizes, and effectively reducing wall thickness. Although it's less common, corrosion also can occur on the inside surface of the pipe and reduces the strength of the pipe. If crack goes undetected and becomes severe, the pipe can leak and, in rare cases ,fail catastrophically. Extensive efforts are made to mitigate corrosion. Pipe inspection is necessary to locate defects due to corrosion and wear while the pipe is transporting fluids. This ability is necessary especially when one should inspect an underground pipe. In this work, Pipe Inspection Robot (PIR) with ability to move inside horizontal and vertical pipes has been designed and fabricated. The robot consists of a motor for driving and camera for monitoring.

5) DEVELOPMENT OF DATA ACQUISITION ROBOT FOR TOXIC ENVIROMENTAL MONITORING USING WSN – KROTO FINDER

This project is mainly implemented for industrial applications. Mainly for detecting the damages inside the oil pipe that cannot be detected by human beings. Kroto is the Greek word meaning to crack. Inside the pipe, there is very heavy temperature, pressure and toxic gases. So we are implementing a robot that have a camera, temperature sensor, pressure sensor etc which is used to detect the crack and conditions inside the pipe. This data from all the high precision sensors will be transmitted using ZIGBEE protocol from the robot to the control station. The robot incorporates a wireless camera and the data from the cam is transmitted to the frontend Visual studio.This Project is mainly for detecting the damages inside the oil pipe that cannot be detected by human beings. Kroto is the greek word meaning to crack. Inside the pipe, there is very heavy temperature, pressure and toxic gases. So we are implementing a robot that have a camera, temperature sensor, pressure sensor etc which is used to detect the crack and conditions inside the pipe. This data from all the high precision sensors will be transmitted using ZIGBEE protocol from the robot to the control station. The robot incorporates a wireless camera and the data from the cam is transmitted to the frontend Visual studio.

6) DEVELOPMENT OF ROBOT THAT APPROACHES PEDESTRIANS

When robots serve in urban areas such as shopping malls, they will often be required to approach people in order to initiate service. This paper presents a technique for human–robot interaction that enables a robot to approach people who are passing through an environment. For successful approach, our proposed planner first searches for a target person at public distance zones anticipating his/her future position and behavior. It chooses a person who does not seem busy and can be reached from a frontal direction. Once the robot successfully approaches the person.ROBOTS have started to move from laboratories to real environments, where they interact with ordinary people who spontaneously

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interact with them. Robots have been tested in guiding roles in museums and supermarkets. Social robots, such as receptionists and tutors, have been developed to interact like humans, communicating socially with people. The “initiating interaction” is one of the fundamental capabilities of human–robot interaction for such robots. That is, the initiating interaction would be commonly useful among these robots, while each of them would engage in task-specific interaction for each individual application after initiation.

7) DEVELOPMENT OF WHEELCHAIR CUM STRETCHER

The number of patients in India is increasing day by day. So in hospitals patients need to be shifted from wheelchair to stretcher, stretcher to beds, bed to wheelchair, or vice versa; which creates unsafe conditions for patients. Also transferring the patients from wheelchair to stretcher, stretcher to beds, bed to wheelchair is always an issue for the attendant or nurse. Sometime during handling, patient and hospital staff suffer from many problem like stresses are produced in the body, some time chances to sleep down the patient. It is required to eliminate all types of possibilities. Understanding the various issues regarding the mobility equipment, the better design will be an asset for the medical field and a helping hand for disabled individuals. There is a need for a wheelchair cum stretcher to facilitate the disabled patient’s mobility and to provide novel medical equipment for use in the Indian hospitals. The present research work proposes a development of wheel chair cum stretcher which will follow the standard specification of both wheel chair and stretcher with considering the issues like safety, hygienic, cleaning and functionality.

8) ELECTRIC BICYCLE

The main aim of this review paper is to present the idea of harnessing the various energy and use it in today’s existence of human life. For human being travelling has become vital. In order to sustain in this fast forward world he must travel from place to place. It is very important that time taking for travelling should be less, also it should be economical and easily available. With the fast depleting resources of petrol and diesel, there is need to find intermittent choice. Taking all this into account, a shift away from conventional based fuels to using a renewable sources of energy is a must. Electric bike which will be driven with the help of battery and thus provide required voltage to the motor. The focus of this report is to perform power calculations and system design of this Electric Bike. This bike can be driven with the help of electricity or also with the help of solar energy. Therefore the manufacturing of such bike is indispensable.

9) FABRICATION OF AUTOMATIC FOOT DUST CLEANING MACHINE

Automatic foot dust cleaner is an electronic project, which helps to clean the foot. This projects mainly focus on power saving that is the motor automatically turns OFF when there is no purpose for the machine to operate. The main parts for efficient working of this projects are motor with driver circuit, relay section, limit switch, belt and pulley, and foot dust cleanin arrangement The foot dust cleaning brush arrangement is placed under the foot rest. The foot rest is mounted on the base frame in such a way that any person stands on it the foot rest will go down for the weight to a small distance. Below the foot rest a limit switch is placed. When a person stand on the foot rest, the foot rest goes down and

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presses the limit switch and the corresponding signal is sent to the motor and it is switched ON. The motor shaft is coupled with the brush arrangement with help of belt and pulley. When the motor runs the brush arrangement also rotates to clean the dust under the foot with the help of belt drive. When the person on the foot rest gets down the limit switch is released and the signal sent is cut and switch off the motor. With the help of limit switch the motor is turned ON and OFF which helps to save power. Depends upon the motor speed the dust can be removed cleanly.

10) FABRICATION OF SOLAR POWERED WHEEL CHAIR

Physically challenged and old people those who face many problems in life have to be dependent on a third person to move from one place to another. Many scientists have been working for this solution for a long time. The invention of wheel chair is a great boon to them but it still restricts their motion. In order to make their life a bit easier, many developments in wheel chairs came into existing such as electric-powered, gesture based etc.,. Voice controlled wheel chair can be made using HM2007 voice recognition kit. The main objective is to design a system which provides solution for the physically handicapped (challenged) people those who can't move by themselves, using speech commands by interfacing the Speech Recognition kit with microcontroller and wheel chair. The voice commands are given to the speech recognition kit with the help of mic and the wheel chair moves according to the given directions. The movement of the wheelchair is controlled by the motors and motor drivers connected to the wheels of the chair. The interfacing between speech recognition kit and motors is done by microcontroller. Here in this project the microcontroller used is P89V51RD2BN. This concept was taken in this paper to reduce the human efforts in driving a wheelchair.

11) FABRICATION OF STAIRCASE CLIMBING WHEEL CHAIR

First wheelchair model evolved long back in 18th century, but rapid development in this field initiated since mid of 20th century. Since then, many varieties of models had been designed, extending into broad range of products. This project involves the design of an ergonomically designed electric wheelchair for domestic use by Indian old aged people. Stair climbing functionality is embedded in the design through its structure and mechanism. The product mainly consists of 3 modules viz. seat, links and frame. Anthropometric measures are considered in the dimensioning of seat. The frame and wheels are designed and developed through the equations generated from the statistical data of dimensions of staircases in Indian houses. Focus is laid on different parameters such as form, functionality, technology and architecture of the product. The design is validated by developing Digital Mockups of individual parts are generated in Creo and are assembled to form the final product. Necessary simulations of the product are generated in virtual environment of Creo. The physical and focused prototype indicating the structure and functionality is developed using thermocol material. Here wheel carriers are made in RP (Fused Deposition Modelling) using ABS (Acrylo Butadiene Styrene) material.

12) FABRICATION OF WHITEBOARD CLEANING MECHANISM

In our project, we design an Automatic Board Eraser (Blackboard or Whiteboard). The objective of this project is to minimize lecturer's effort. Our idea is come out for lighten a burden of lecturers. For Automatic Board Eraser, it is not just only save lecturers time but also use that time to do other thing while the machine is working. It is also healthful for lecturers because when cleaning of board by hand,

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it may cause hygiene problem. As a team, we designed the automatic board eraser. This eraser runs on dc power supply and will make it easier for teachers everywhere to clean their chalk/white board. This project consists of nut and screw mechanism. Square thread screw is coupled to motor. When motor shaft rotating, screw also rotating and nut slides linearly on screw. Duster is attached to nut. When nut slides, duster also slides and we will get desired rubbing effect. We began the project by first attempting to come up with an original idea to fit the problem. After coming up with an idea, we followed the usual design process to finalize our project.

13) HAPTIC ROBOTIC ARM (WIRELESS)

The integration of medical science and engineering has made the task like complicated surgery by robotic arm simpler. To capture the motion of human limbs, sensors can be used. These units can be worn for video game character modeling, virtual reality, and activity recognition. The arm movement is reciprocated almost exactly by the robotic arm. Data capture is achieved with the special motion capture sensor called "Shape Tape" that is worn by the human operator. Any human arm or even leg, neck or spine movement can be mapped on to any of the robotic arm manipulator. Flex sensor robotic arm deals with controlling a bionic/robotic arm with the help of motion sensing technology by Flex Sensors. The system is basically a master-slave system wherein the master motion sensing glove sits on the user's arm sensing motions of the finger and then using this data to control the servos which control the finger movement of the slave bionic/robotic arm. And a 3-axis sensor or tilt sensor is used for the movement of the arm to move upwards and down.

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15) INTELLIGENT COMBAT ROBOT

We cannot forget 9/11 when 101 people including nine foreigners and 14 policemen have lost their lives while about 300 people were injured in the worst terror attack seen in the country in which desperate men fired indiscriminately at people. It struck an idea that, why can't we make a robot to tackle such type of situation. Our brave soldiers were fought against the militants to free all the hostages from Mumbai hotels. For blocking these kind of attacks we are in need of the robots to save our valuable soldiers' lives. In such wars these robotic cameras can give very vital information to the soldiers and with that they will come to know more about the enemies and they can fight with them efficiently and effectively. This combat robot is radio operated, it has got two barrel turrets through which bullets can be fired, radio camera in synchronization with the turret can rotate up and down, left and right up to a safe

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firing limit. turret and camera mechanism has been installed, which has all the function like tank, turning to any angle on its axis, moving forward and reverse turning left and right, running instantly into reverse direction.

16) LOWER LIMB POWERED EXOSKELETON FOR PARAPLEGIC PEOPLE ASSISTING IN THEIR WALKING

The integration of medical science and engineering has made the task like complicated surgery by robotic arm simpler. To capture the motion of human limbs, sensors can be used. These units can be worn for video game character modeling, virtual reality, and activity recognition. The arm moment is reciprocated almost exactly by the robotic arm. Data capture is achieved with the special motion capture sensor called "Shape Tape" that is worn by the human operator. Any human arm or even leg, neck or spine moment can be mapped on to any of the robotic arm manipulator. Flex sensor robotic arm deals with controlling a bionic/robotic arm with the help of motion sensing technology by Flex Sensors. The system is basically a master-slave system wherein the master motion sensing glove sits on hosts' arm sensing motions of the finger and then using this data to control the servos which control the finger movement of the slave bionic/robotic arm. And a 3-axis sensor or tilt sensor is used for the movement of the arm to move upwards and down.

17) LOWER LIMB POWERED EXOSKELETON FOR PARAPLEGIC PEOPLE ASSISTING IN THEIR WALKING AUGMENTATION USING FLEX SENSOR AND ACCELEROMETER

The integration of medical science and engineering has made the task like complicated surgery by robotic arm simpler. To capture the motion of human limbs, sensors can be used. These units can be worn for video game character modeling, virtual reality, and activity recognition. The arm moment is reciprocated almost exactly by the robotic arm. Data capture is achieved with the special motion capture sensor called "Shape Tape" that is worn by the human operator. Any human arm or even leg, neck or spine moment can be mapped on to any of the robotic arm manipulator. Flex sensor robotic arm deals with controlling a bionic/robotic arm with the help of motion sensing technology by Flex Sensors. The system is basically a master-slave system wherein the master motion sensing glove sits on hosts' arm sensing motions of the finger and then using this data to control the servos which control the finger movement of the slave bionic/robotic arm. And a 3-axis sensor or tilt sensor is used for the movement of the arm to move upwards and down.

18) MOTORIZED WHEEL CHAIR

A motorized wheelchair, power chair, electric wheelchair or electric-powered wheelchair (EPW) is a wheelchair that is propelled by means of an electric motor rather than manual power. Motorized wheelchairs are useful for those unable to propel a manual wheelchair or who may need to use a wheelchair for distances or over terrain which would be fatiguing in a manual wheelchair. They may also be used not just by people with 'traditional' mobility impairments, but also by people with cardiovascular and fatigue based conditions. The electric motors of power chairs are usually powered by 4 or 5 amp rechargeable deep-cycle batteries, similar to those used to power electric outboard motors for boats. These are available in wet or dry options. As wet-cell batteries may not legally be carried on an aircraft without removing them from the wheelchair and securing them in a shipping container, dry-

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cell batteries are preferred for power chair use. Many power chairs carry an on-board charger which can be plugged into a standard wall outlet; older or more portable models may have a separate charger unit.

19) PICK AND PLACE ROBOT

Mankind has always strived to give life like qualities to its artifacts in an attempt to find substitutes for himself to carry out his orders and also to work in a hostile environment. The popular concept of a robot is of a machine that looks and works like a human being. The industry is moving from current state of automation to Robotization, to increase productivity and to deliver uniform quality. The industrial robots of today may not look the least bit like a human being although all the research is directed to provide more and more anthropomorphic and humanlike features and super-human capabilities in these. One type of robot commonly used in industry is a robotic manipulator or simply a robotic arm. It is an open or closed kinematic chain of rigid links interconnected by movable joints. In some configurations, links can be considered to correspond to human anatomy as waist, upper arm and forearm with joint at shoulder and elbow. At end of arm a wrist joint connects an end effector which may be a tool and its fixture or a gripper or any other device to work. Here how a pick and place robot can be designed for a workstation where loading and packing of lead batteries is been presented. All the various problems and obstructions for the loading process has been deeply analyzed and been taken into consideration while designing the pick and place robot.

20) PICK AND PLACE USING MOVING VEHICLE THROUGH REMOTE

The moving arm is mounted on four wheel vehicle. The vehicle movement and Arm of the pick and place are controlled through REMOTE using IR Transmitter and Receiver. The transmitter is connected with Relay and Receiver is connected with moving vehicle.

DC Motor is used to rotate the arm and electromagnet is used for pick and places the items.

- 1) The Arm can rotate in clockwise and anticlockwise rotation
- 2) The vehicle is moving around 360 degree
- 3) It can pick up the items in any place and drop in any place
- 4) We can monitor the activities from the Pc monitor

21) QUAD-COPTER

The use of quad copter in the field of armed appliances has grown drastically to operate in dangerous situations where human can be safe at a distance. The quad-copter is one of the most complex flying machines due to its versatility to perform many types of tasks. Classical quad-copters are usually equipped with a four rotors. Quad-copters are symmetrical vehicles with four equally sized rotors at the end of four equal length rods. The objective of this project is to build a quad-copter that can be controlled by joystick wirelessly. User is able to control motions of the quad-copter in three dimension. The objective of this project is to build a quad-copter that can be controlled by joystick wirelessly. The prototype has four arms made of light weight fibre frame to which four motors can be assembled. These motors are controlled by means of electronic speed controllers(ESC). These ESC's are connected to the pins of control board. The signal from microcontroller goes to ESC's which in turn control the speed of motor. In this design we are using four brushless motors which is able to make the

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prototype fly and to change its direction. In this type Invensense gyroscopes are used to attain stability of quad copter. These gyro's are used to maintain good stability condition so that it can balance the whole body of it. The power distribution in this system is done by a high capacity Li-Po battery of 11.1V giving adequate power supply

22) RESCUER DEVICE FOR LIFTING INFANTS STRUCK IN PITS

The proposed system is to save life from the bore wells. Small children without noticing the hole du for the bore well slip in and get trapped. Since the holes are dug too deep it is quite impossible to save life. The fire force and medical team find it difficult to rescue children due to unknown levels of humidity, temperature and oxygen in the depths of the bore well. Rescue work can be a long drawn affair lasting close to thirty hours. The time taken is long enough to kill a precious life. Even if rescued the child may die due to injuries sustained. This has created an open challenge to the field of medicine, rescue and the whole human society. To aid in such rescue we have proposed a system that will easily rescue within two hours of time without any major injury. By that a precious life can be saved, hardly nineteen incidents happened from 2013 till date.

23) SMART WINDOWS

The situation prevailing today always calls for people and property to be completely secure and safety . In early days security and safety was not of this concern. Advancement in every field and all walks of life has rendered the world with more of malpractice committed by a sect of people who are socially not unacceptable. Nowadays in organizations, other than conventional means of security and safety electronic security systems are a common feature. The devices provide a foolproof system from which everyone can feel highly secured. It based on micro controller 89c2051 which is control the window automatically open and close as per the situation.

24) UNMANNED RAILWAY GATE CONTROLLER

Railway", this term represents the India's largest transportation mediums. Today railway is the back done of the country. It facilities in moving large amount of cargo and millions of people travel daily from place to place. It is the cheapest medium which is affordable to every class of society. Unfortunately hundreds of people die in rail accidents due to lack of resources, so as to provide a person at every railway crossings. Any government cannot spend corers of rupees to keep a person on every crossing. Through at initial stage this may require some high amount of capital but at later stages, the cost come down. A prospective contraption of "pic micro controller based automatic railway accident preventer is deemed to be a noticeable turning point as this is microcontroller control and can efficiently do the work without any mistakes.

25) VOICE ENABLED WHEEL CHAIR

This Voice recognition wheel chair can be used for physically challenged persons. This wheel chair uses a voice recognition module HM 2007 and match with the data stored in the microcontroller .The microcontroller with the help of the motor driver circuit will drive the respective circuit and perform the operation The robot is controlled by microcontroller. In performs change the motor direction by giving signal to driver IC, getting command from the RF receivers a. LCD is connected to microcontroller as 4 bit data mode, before displaying anything in LCD Initialization have to do, so microcontroller will

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control the LCD initialization and select the data register and command register according to the purpose. Buzzer is controlled by the microcontroller using single pins, I.e. giving high means device will switch on and vice versa. Sometimes it may be interchange according to the transistor used to drive the device.

26) WALL PAINTING ROBOT

In today's world, painting the walls is certainly a time consuming and messy job to do. The required skilled labor is expensive, especially in the urban areas. Moreover, most of the times the owners are not satisfied with the work done by the masons (work done is of inferior quality). Also, some areas such as the outer wall of a high rise building are too risky for the labor to work on. With many new residential areas coming up in tier-1 and tier-2 cities, there is already a lot of work to do in building up the whole area. With autonomous painting, there can be a huge reduction in the time to market flats, and wastage of paint can be reduced. The current competition they face is from the manual wall painters. Their product has a low maintenance cost, thus providing long-term monetary benefits to the customers. Also, their product will provide a better finished paint job with lower paint wastage. It will increase the aesthetic value of the building and hence will affect the prices of the flat or offices positively.

27) WASTE SEPARATION USING SMART DUSTBIN

In recent times, garbage disposal has become a huge cause for concern in the world. A voluminous amount of waste that is generated is disposed by means which have an adverse effect on the environment. The common method of disposal of the waste is by unplanned and uncontrolled open dumping at the landfill sites. This method is injurious to human health, plant and animal life. This harmful method of waste disposal can generate liquid leachate which contaminate surface and ground waters can harbor disease vectors which spread harmful diseases and can degrade aesthetic value of the natural environment and it is an unavailing use of land resources. In India, rag pickers play an important role in the recycling of urban solid waste. Rag pickers and conservancy staff have higher morbidity due to infections of skin, respiratory, gastrointestinal tract and multisystem allergic disorders, in addition to a high prevalence of bites of rodents, dogs and other vermin. Dependency on the rag-pickers can be diminished if segregation takes place at the source of municipal waste generation. The economic value of the waste generated is not realized unless it is recycled completely. Several advancements in technology has also allowed the refuse to be processed into useful entities such as Waste to Energy, where the waste can be used to generate synthetic gas (syngas) made up of carbon monoxide and hydrogen.

28) WSN BASED ADVANCED IRRIGATION VEHICLE – AGRIBOT

This robotic vehicle is an agricultural machine of a considerable power and great soil clearing capacity. This multipurpose system gives an advance method to sow, plow, water and cut the crops with minimum man power and labor making it an efficient vehicle. The machine will cultivate the farm by considering particular rows and specific column at fixed distance depending on crop. Moreover the vehicle can be controlled through Bluetooth medium using a Android smart phone. The whole process calculation, processing, monitoring are designed with motors & sensor interfaced with microcontroller. Agricultural Robots or agribot is a robot deployed for agricultural purposes. The main area of application of robots in agriculture is at the harvesting stage. Fruit picking robots, driverless tractor / sprayer, and sheep shearing robots are designed to replace human labor. In most cases, a lot of factors

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have to be considered (e.g., the size and color of the fruit to be picked) before the commencement of a task. Robots can be used for other horticultural tasks such as pruning, weeding, spraying and monitoring.

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YES Complex, 19/3&4, 2nd Floor, Dinnur Main Road, R.T.Nagar, Bangalore-560032 Ph:080-40969981, Website:www.technofist.com.E-mail:technofist.projects@gmail.com