PERSONAL ASSISTANT DRONE (PAD)

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Abstract- **We would like to present the vehicle that take up the role of a personal assistant.UAVs are unmanned aerial vehicles. This is an emerging field that has a revolutionary impact on various sectors including agriculture, defense, industries etc. We have tried building drones that act as personal assistants which will aid in several commercial, recreational, rescue applications. These can be deployed in warfare too. The very important use case we aim to address is sending these to areas where humans cannot be sent and making them do the tasks intended to be done by us.**

Keywords— keywords: Unmanned Aerial Vehicles, voice recognition, object recognition thermal camera, Mechanical arm, Raspberry Pi, Pixhawk flight controller.

Introduction:

Nowadays Drones was used mainly used for surveillance and food delivery. But for the future it it poses endless opportunities. So making the future more viable and increasing the usability of drones, more human form of work needs to be replaced by drones. One of the most physical forms work done by humans and other big machines is lifting and moving and stationary objects. A system or a computational unit can be programmed to replicate non creative tasks. So the drone we developing are first of its kind in India and many other market hotspots. This drone can actually lift payload automatically using its g-coded mechanical arms and move it through an effective distance. This drone will be the most effective method of moving small objects as it involves travelling through air, which can save a lot of time and fuel used. This can be deployed in any terrain as the medium of transportation is air only. This gives a whole new set of possibilities to warehouses too. These can be used to move things around and a fleet of these drones can be used in supermarkets too. Mechanical arms we are developing are state of the art machines for lifting things. Also it can be a viable alternative for high altitude task like repairing of machines.

Project description:-

For doing many personal physical works human needs to depend on man power. Our creativity is what differentiates us as a superior species. When man power is used for non creative tasks too there are various problems. One of the common problems include the shortage of manpower for creative tasks. The next major problem will be the lack of interest in the people who are employed to do non creative tasks. As non creative tasks are somewhat rote involving a set of procedures, humans who are employed to do them are not inclined to enjoying it. To overcome this personal assistant drones can be used. These rote routine non creative tasks can be automated. The actions undertaken by humans are observed and machines are built to replicate those movements or functions. The best non creative works that can be automated as we observed were the tasks which include fetching things. This may look so simple, as its just about getting to a place and bringing back things. But what makes this so important and significant is the application this caters to. In places like warehouses or supermarkets, this merely involves spotting and fetching things. But in places critical to human safety, this means a lot. These drones are capable of lifting weights, mapping local area, identification of objects ,voice regananisation.So comprising these features the drone can be as personal assistant. The drone is fed with datasets too that makes it to decide. This decisional input is what makes it smart. This employs machine learning and this helps it to assist personnels in commercial as well as recreational activities. This can also be employed in

hotels etc and the man's efforts and energy can be wholly saved for the creative things that counts and can't be done by machines that merely act on procedures.

Eg:If the user of the drones needs to pick a box that is placed on the top a chair. which is a 20ft distance from him. He can order the drone to bring that box. For this process the user only needs to mention the colour material and direction of the material.The drone can detect the voice of the user and verify the voice and start the process needed to get the box.

PAD:

The personal assistant drones can be constructed by installing raspberry pi that is used to control the voice recognition,object recognition system and the the mechanical arm which is used to perform the physical operation. It is also programed to navigate accurately to and from the user.

Hardware Design:

In this paper we prefer raspberry pi and Pixhawk as the microcontrollers to operate the PAD. A mechanical arm is installed which is to be controlled by the Raspberry pi. A voice recognition module is installed with the Raspberry pi. A global positioning system and a Thermal camera is also used. Now let us see each components in detail

Pixhawk:

It is used as the flight controller for this PAD.

The customization can be easily done in the pixhawk.This Pixhawk is used to control the direction and the speed of the PAD and it also used to fetch the current location from the gps and transfer this information to the Raspberry pi for further process to take place. The flight of the drone is due to the thrusters. Motors act as thee thrusters. For instance take a quadcopter. Obviously it has four rotors. When all the four rotors operate at the same speed they exert the same thrust, which enables the drone to lift off the ground. Varying the speed changes the direction, which is the work of the flight controller. Thus the speed too is controlled by it.

Raspberry-PI:

It is a tiny and affordable computer that can used to control more than one device at a time. It is an Soc (system on chip).

In this PAD,Raspberry pi is used to control the Mechanical arm and the speech recognition module. This is a mini computer in itself and can track objects too. it can map its own path to and from a destination. Being smart enough it also works with the fed datasets.
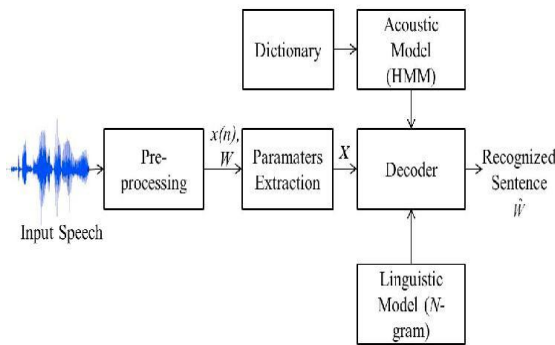

Mechanical Arm:

A robotic mechanical arm is installed in the PAD.which is used to perform the physical activity that is instructed by the user. This performs simple actions like pick and place. It grabs, holds, and hands an object with the utmost care possible. In this PAD a six freedom mechanical arm is used which can lift a payload of 2kg.

Voice Recognition system:

A voice recognition module is connected with the raspberry pi. This module is used to identify the voices and recognise the commands. Recognised commands are taken up and executed.

Thermal Camera:

A thermal camera is used to detect the object physical structure and colour due to which the identification of the object can be performed easily. We are even planning to switch to computer vision (CV) if the thermal cameras don't turn out to be up to the mark. Not just objects but humans, hurdles, target, source etc are also sensed by it.

Construction:

The drone is constructed using a customized flight controller.which is connected with a internal global positioning system that is used to map the location of its existence. A raspberry pi is installed along with the flight controller that is interconnected with each other.That is they exchange the details with each other.the raspberry pi is the starting part of the PAD. Once the user orders the drone the raspberry pi detects the voice of the user and using the voice recognition system.If the voice matches with the pre-installed user voice then the drone starts.The mechanical arm is connected to the basement of the drone and its acts as a standing frame for the PAD.The flight controller and the raspberry pi is packed inside the drone chamber and covered with the frame.The flight controller and the raspberry pi is interconnected using a bluetooth/wifi module to transfer the information among them.A thermal imaging camera is fixed at the front mid of the PAD due to which the identification of the object can be performed.
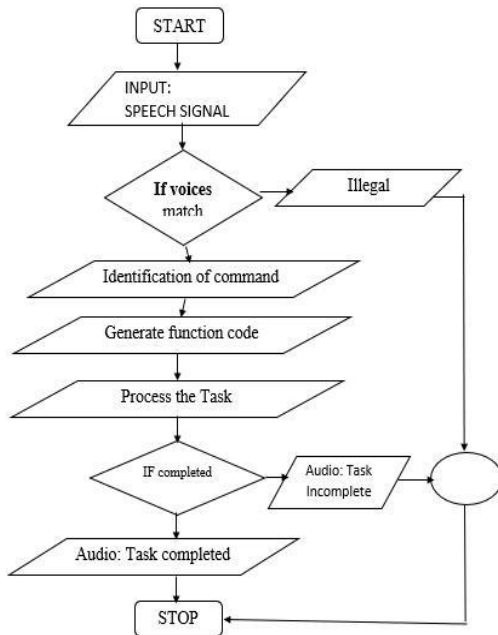

Working of PAD:

In the working of this drone,Machine learning,Artificial Intelligence and Image processing plays a major role. When the user orders the PAD to perform a task.The PAD checks the user voice as the access code to start the flight controller.When the instructed voice matches with the pre installed voice signal then the task performance is started.The PAD records and process the user command.As soon as the flight controller starts working it sends a location signal to Raspberry Pi, After which the thermal camera switches ON.

The speech signal is analyzed and the command is passed to the Raspberry pi,Using the command the Raspberry pi generates G-code to access the mechanical arm and It only sends the voltage signal to the flight controller Due to the voltage signal only the speed of the PAD is controlled.The travels to the direction mentioned by the user.the Thermal camera records the path and it searches for the object.The object details are pre-installed in PAD and training is done to auto generate the physical characteristics of the object.Once the object is detected then the thermal camera pass the information and distance of the object to the Raspberry pi.The identification of the object and the distance between them is performed using Image Processing. Once the identification is done the Raspberry pi switch on the mechanical arm and when the mechanical arm is switched on the process that to be done by the mechanical arm is instructed by the Raspberry pi.when the location is reached the raspberry pi generate the machine code to move the mechanical arm. So using the code the mechanical arm can perform the task that is instructed by the user.After the task is completed the PAD produces a sound which indicates the completion of the task.When the task is completed successfully the

PAD lands on the location that is mentioned of it and it uses the mechanical arm as the stand frame to withstand its weight.

Applications of PAD:

This PAD can be used as a personal assistant other than that it can be used in many sectors ,In defence it can be used as a navigator and a luggage carrier for the soilders.It can also be used for electrical line inspection in the power management sector.It can also be used as a armed robotic soldier in the defence sector.Postal deliveries in snow and hilly region can be done easily with the help a PAD.It can also be used in agriculture sector to monitor the crops and useful in harvesting,The thermal camera attached to the PAD is helpful in the identification of the pest and unwanted crops that are grown in the field and also it can be eliminated using PAD. In industrial sectors it is used to lift the payload with more efficiently and quickly.It can also be used as an medical emergency drone which can easily connect with the patient in the emergency cases.The agent of the PAD is to be a personal assistant for the user and help him to do all sorts of physical works easily and efficiently.

Future Development of PAD:

In future the total control of the PAD can be accessed using an APP. which can be used as a communication medium between the user and the Personal Assistant Drone.Using this App the user need not to mention the direction the camera itself will produce a 360º view of the Environment which can be seen through the app .If the user needs to access a object he only needs to touch the object that is displayed by the app.The PAD automatically generates the path to the reach the object and generates necessary function codes to complete the task.In future the PAD is connect to the network cloud and it can be used to store the necessary details that are instructed by the user and can deliver the information whenever needed.so that it can became a perfect robotic Personal Assistant which can assist the user in all cases.

Conclusion:

This is an innovation that takes benefit of many available inventions. This is kind of assembling many available works in technology to execute the intended tasks. This plays a vital role in places critical to human safety. The PAD is used to reach such places too. The g-coded mechanical is conventional and we are looking into ways to further customize it to suit each application we cater to. The benefit of our work can be shown only by executing it. This is not just confined to the documented applications these can be sent into tunnels etc too to fetch objects. Modifying the arm can also aid in rescuing kids stuck in tunnels, natural disasters etc.

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