

Fabrication of Autonomous Fire Fighter Robot

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ABSTRACT: Fire incident could be a disaster which will doubtless cause the loss of life, property injury and permanent incapacity to the affected victim. they'll conjointly suffer from prolonged psychological and trauma. hearth fighters area unit primarily tasked to handle hearth incidents, however they're typically exposed to higher risks once conclusion hearth, particularly in venturous environments like in atomic energy plant, fossil oil refineries and gas tanks. they're conjointly sweet-faced with different difficulties, significantly if hearth happens in slim and restricted places, because it is critical to explore the ruins of buildings and obstacles to extinguish the fireplace and save the victim. With high barriers and risks in hearth extinguishment operations, technological innovations will be used to help firefighting. For that purpose, we've got used the CATIA V5 R20 computer code. within the second semester we have a tendency to area unit producing the system and testing are carried out.

KEYWORDS: fire fighting robot, 3D model, CATIA V5 R20, smart phone.

I. INTRODUCTION

A robot is an automatic device that performs functions typically attributed to humans or machines tasked with repetitive or versatile set of actions. varied studies have shown that golem are often useful in drugs, rehabilitation, operation and trade. Over the years, AI has been introduced in numerous industries. the economic robots are multi-function manipulators designed for additional specialised materials, divisions, gadgets or devices through numerous programmatic movements to perform numerous tasks. In line with the Fourth industrial revolution (4IR), there's demand for a one system which will management, communicate and integrate completely different robots no matter their sorts and specifications. Machine learning has also set up interest in robotics, though solely some of recent development in robotics are often related to machine learning. Recent robotic development project has embedded machine learning algorithms to extend the intelligence in robots. this may increase the productivity in trade whereas reducing the price and electronic waste in an exceedingly long-term. Studies on the utilization of automaton robots are actively carried out to attenuate firefighters' injuries and deaths furthermore as increasing productivity, safety, potency and quality of the task given. golem are often divided into many teams like Tele-robots, Telepresence robots, Mobile robots, Autonomous robots and Androids robots. Telepresence golem are almost like a tele-robot with the most distinction of providing feedback from video, sound and alternative information. Hence, tele-presence robots are wide employed in several fields requiring observance capability, like in kid nursery and education, and on rising older adult's social and daily activities. Mobile robot is designed to navigate and do tasks with the intervention of men. Meanwhile, autonomous robots will perform the task severally and receive the ability from the setting, as opposed to android robots that are engineered to mimic humans.

II. RELATED WORK

Kirti Kadam et. Al. [1] In this mobile robot comprises of sensor like LM35 and Arduino Flame Sensors are utilized to recognize the fire and separations on its way towards fire. In this for the portability of the Robot, two wheels made of Nylon and a caster ball is utilized. This is for the most part a back wheel drive kind of vehicle. The water compartment has the ability to contain in any event 1L water. It is made of solid cardboard which has water safe property. A fluffy controller is utilized to control a hindrance evasion of Vehicle. The point is to control the Vehicle along its way to keep away from any static situations containing some static snags before it. Snag shirking progressively is a required

component for Vehicle in an obscure domain. In this the human can control the robot by utilizing the Bluetooth module. The Bluetooth module is work with the android application. Sharavanan. S et. al. [2] This paper has introduced an extraordinary vision of the ideas which are utilized in this field. It intends to elevate innovation development to accomplish a dependable and productive result from the different instruments. With a typical digitalized stage, these most recent instruments will empower expanded adaptability in charge, activity, and development, additionally inevitably advantage the clients with improved administrations, unwavering quality and expanded comfort. This leads interface planning for improved man machine association. The mechatronics application guarantees a helpful method of rearranging the life by giving progressively sensitive and easy to understand offices in processing gadgets. Since we have demonstrated the strategy, the following stage is to improve the equipment. Rather than utilizing lumbering modules to assemble data about the client, it will be smarter to utilize littler and less nosy units. Aldeel Rehman et. al. [3] proposed a novel structure of an independent robot. This robot, called Autonomous Fire Fighting Mobile Platform or AFFPM, has a fire sensor and a hindrance evasion framework. The AFFPM finishes a preset way a structure and uses a guide rail or markers, for example, dark painted line or a tape to explore through nature until it recognizes a raised chance of a fire. By then it will leave its track and follow the fire coming to inside 30 cm of the fire. It at that point would draw in the fire douser that is mounted on the stage. When it has left the route course, the snag evasion will begin to perform and it will have the option to control the AFFPM unequivocally closer to the wellspring of the fire. Alhaza T. et. al. [4] In this paper, another idea of indoor firefighting robot is proposed and created. It has the capacity to climb steps and arrange a few sorts of floor materials inside structures. It can withstand high temperatures up to 700° C for around an hour utilizing various warm protection method. It can speak with caught and harmed casualties inside the fire seen and can send video and sound data to the control unit portraying the fire condition inside the structure. A few of those firefighting robots can be propelled to cooperate cooperatively with the help of a remote control unit. Teh Nam Khoon et. al. [5] The created Autonomous Fire Fighting Mobile Platform has demonstrated to be a possible task. In light of the discoveries, coordinating all the equipment, for example, fire sensors, engine driver hardware, LDR sensors, the normal watching and fire stifling undertakings are conceivable to be done and executed with least degree of mistake. By sending the AFFMP to screen for unsafe site by means of watching process, it helps to share out the weight of firemen in putting out fires undertakings as the firemen can securely assign the putting out fires errands to AFFMP. For future improvements to the present undertaking, extra highlights can be coordinated onto the framework, to be specific the remote correspondence module, so it can impart between the administrator and the casualties inside the fire site; picture preparing procedure to examine for fire source as opposed to utilizing the fire sensors; usage of inexhaustible wellspring of vitality, for example, sunlight based capacity to drive the primary hardware on the AFFMP's foundation; capacity to explore on lopsided surfaces; and capacity to climb flights of stairs.

III. METHODOLOGY

We started our work with literature survey. Search many research papers from various articles and published journal papers. Then we collected all the topic related data from these research papers and studied them in detailed manner along with the standard reference books and academic books. Worked on diff. Mechanisms that can be useful for our project. We have done a rough 2D sketch of model in Auto-CAD. After the final analysis and material selection we go out in the market to purchase the required components with required specifications. In this purchasing process we approximately estimated the cost required to purchase the components and for machining. We selected standard components. Finally, our product will be manufactured in second semester and results and testing will be carried out.

IV. EXPERIMENTAL RESULTS

Figures shows the Cad model and drafting of fire fighting robot Figs. 1 (a) shows the Cad image. (b) is the image obtained by applying drafting command on Catia model

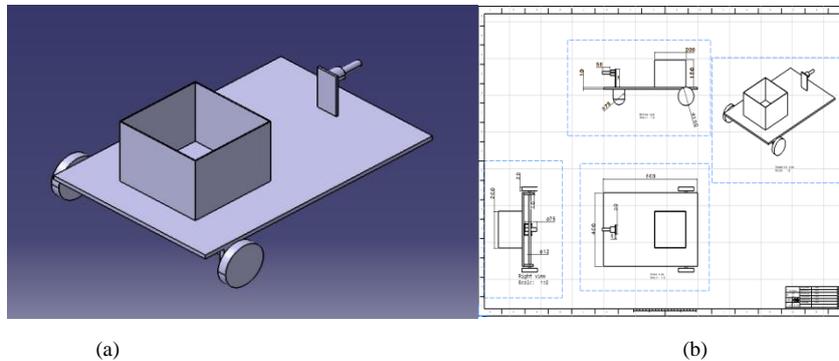


Fig. 1. fire fighting robot (a) CAD Model (b) Drafting of CAD Model

2.Components Used

Some Technical Hints on the Choice of Components

DC motors with encoder :

The advantage of **encoder** DC motor over a simple DC motor is the ability to compensate speeds when having more than one motor and the same speed for all of them is desired. Generally, when you have more than one motor with the same input (Voltage and current) and your target is to have them exactly with the same speed, what might happen is that some motors might slip which will cause a difference in speed between them which e.g. for our case (two motors as driving power) could cause a deviation to one side when the target was to go forward. what encoders do is to count the number of rotations for both motors and in case of having a difference, compensate them. However since when we have tested our robot, no difference was observed in the speed of the two motors, we did not use the encoders.

Servo motors :

For the water gun mechanism what we wanted was to possess motors which will give comparatively precise motion in an exceedingly specific vary. For what regards, there exist 2 selections : servo motor OR stepper motor usually a stepper motor is cheaper than a servo motor. However, depend upon the appliance, there square measure several different factors that ought to be taken under consideration. For our project we've thought-about the subsequent factors: 1) The Power/mass quantitative relation of servo motor is over steppers, which implies for having an equivalent quantity of power the stepper goes to be heavier than the servo motor. 2) A servo motor consume less energy than a stepper that is thanks to the actual fact that servomotor consumes power because it rotates to the commanded position then again the servomotor rests. Stepper motors still consume power to lock in and hold the commanded position.3) Servo motors are additional capable of fast hundreds than steppers. These reasons will lead to less consumption of energy which was important in our case since we used a Battery as the power supply for all motors.

H-bridge : What it will is to form you capable of dominant each direction and speed of your dc motors. In our case we tend to simply used them to manage the direction of rotation for each DC motors (Connected to driving wheels). additionally, another h-bridge is used as an easy on/off switch for the pump. (This is also done by suggests that of a transistor)

Ultrasonic sensors: These are used for being able of avoiding obstacles. We have used 2 sensors, however you can increase the range of observable area by increasing the number of sensors. (Effective range of each ultrasonic sensor : 15 degrees)

Flame sensors : Totally four flame sensors area unit used . three sensors beneath the chassis area unit connected to each analogue and digital pins of Arduino. The digital connections area unit used for detective work the fireplace for

additional actions whereas the analogue connections area unit used solely to supply readings of the gap to fireplace for the user. the opposite detector on the highest is employed digitally and it's perform is to send the command for stopping the vehicle at an appropriate distance from the fireplace, therefore within the moment that the detector on the highest that has associate specific angle sight the fireplace, it'll send the command for stopping the vehicle and beginning the pump the water and running the toy to place the fireplace off.

ArduinoMega : The reason for choosing an arduino mega over an arduino UNO is as following :

- 1) Having a Wi-Fi module increase the number of lines in the code dramatically and needs a more powerful processor to avoid possible chance of crashing while running the code.
- 2) having higher number of pins in case of being interested to expand the design and add some more features.

Rubber Tracks:

Rubber tracks are used to avoid any problem or slippage in case of having a slippery floor or small objects in the way of moving.

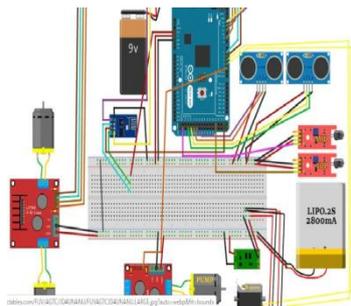


Fig. 2. car towing machine Rubber tracks

V. WORKING METHODOLOGY

There are many possibilities of fireside in any remote space or in an business. for example, in clothes go downs, cotton mills, and fuel storage tanks, electrical leakages might end in vast fireplace & damage. within the worst of cases & situations, fireplace causes serious losses each financially and by taking lives. artificial intelligence is that the absolute best way to guard human lives, wealth and surroundings. A Firefighting mechanism is designed and engineered with an embedded system. it's capable of navigating alone on a sculptured floor whereas actively scanning the flames of fireside. The mechanism may well be used as a path guide in a very fire device or, in traditional case, as AN emergency device. Basically, operating of our project are going to be completely rely upon detector . In our project we've got Infrared detector that sense the hearth , if it's then it provides message to controller and another detector apply brakes to wheels. then it sends the output to the controller to pump water from vessel and sweep everywhere space. when this it sense ,another generating fireplace it apply a similar operation for it and recover all the fire sight.

VI. CONCLUSION

As we have a tendency to producing of fire fighting robot for remote location wherever human cannot go directly. The robot is extremely intelligent and certain able to be extended to a wider-range of applications and situations. Smoke detectors that depart hearth alarms can be accustomed initiate the sound-activated robot. Pre-programming the robot with a plan and space locations would build it straightforward to search out and extinguish a fireplace before humans area unit even attentive to things.



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