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An IoT Based Fire Fighting Robot Using Arduino Microcontroller

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ABSTRACT

This advanced project allows a user to control a fire fighter robot equipped with water tank and gun remotely wirelessly for extinguishing fires. For this purposes the system uses an Rf remote for remote operation along with rf receive based microcontroller circuit for operating the robotic vehicle and water pump. The rf based remote transfers users commands through rf signals which are received by the receiver circuit. The receiver circuit now decodes the data commands sent. It then forwards it to the microcontroller. Now the microcontroller processes these instructions and then instructions the vehicle motors to run the vehicle in desired directions. It also operates the water pump motor and pump direction motor to spray water based on users commands. This allows the user to operate the robot and put off the fire by standing at a safe distance. The robot operates within a 8 meter range of the remote.

KEYWORD: Rf remote, water pump, Vehicle Motors, Fire fighter robot.

1. INTRODUCTION

A Fire Fighter Robot with Night Vision Camera, that can be used to extinguish fire automatically also works with remote handling. The paper is discussing the prototype of robot that is able to move and extinguish fire using water. Implementation of this robot is with high fire temperature to assess the affectability of distinguishing, after that cancels the fire by utilizing water instrument . Work region with boundaries can be stayed away from by this robot, in seeking after its capacity to quench fire . The development and conduct of this robot is completely controlled by the programmable raspberry pi. All types of flag gotten by the raspberry pi will be prepared and executed to achieve the mission of the robot . Robot will screen the work zone by performing arbitrary developments; it as an elective medium utilized by people, particularly the fire fighter to battle fire. The vehicle comprises of a water tank alongside a siphon which can toss water when required

These stay then bolstered to the engines in charge of controlling the vehicle developments in front, back, left and right headings. The raspberry pi in the wake of accepting info directions, works the engines through a driver IC for vehicle developments. This robot body also has a thermal camera to detect fire and an infrared camera mounted over it to provide night vision imaging which can do live recording of the extinguishing This is on the grounds that whatever zone that will be caught by this camera can be seen in the PC for reference which gives a sign in framework too. The robot works inside a 2-meter scope of the Fire. In this way, this framework smothers

fire fighter robot is mainly bringing the idea to reduce mankind source and save human lives. There were 3 problems that was identified, first problem is high risk life of firemen which is vulnerable to death because of their daily routine job. The second problem is that, the time factor of how long does a manual firemen system works and how draggy the incident take place. The last problem is temperature level of fire which is past the limit of human senses temperature [4]. This paper discussing the respective objectives for the problem stated above the first objective is to make utilization of robots is one of the elective routes for decreasing fire fighters hazardous life and upgrading fire fighters abilities. The second objective is to caution through the generation of firefighting robot, the time can be diminished putting the robot in a high-hazard region of flame. The last objective is to decide the robot is fit doing its activity in the zone that hazardous which is high at temperature.

2. RELATED WORK:

2.1 Industrial Robotics.

AUTHORS: Haggle, M., Nilsson, K., and Pires, J. N.

Industrial robotics is characterized by sophisticated mechanical components and highly developed control algorithms. However, the efficient use of robotic systems – with regard to flexibility, reusability and extensibility – is very much limited by existing programming methods. As a consequence, software development for industrial robots is a complex and time-consuming task which generates considerable costs. This work performs an analysis of

the current software development for robotics systems and identifies shortcomings from a software engineering point of view. Based on that, it outlines an architectural approach that addresses the identified problems and allows efficient software development for industrial robotic systems.

2.2. Aerial Robotics

AUTHORS: Feron, E. and Johnson, E. N.

Aerial robots must be equipped with reliable position and actuation equipment so as to be capable of controlled flight, and this constitutes nontrivial requirement prior to doing researcher development in this field. However, many universities, research centers, and industries have now met this requirement and are actively working on the challenges presented above. The largest obstacle to the commercial development of aerial robots is, however, the necessity to comply with and support a regulatory environment which is only be-ginning to address these rapidly developing systems.

2.3. Mining Robotics.

AUTHORS: Corke, P. I., Roberts, J. M., Cunningham, J., and Hainsworth, D

This thesis presents a method to identify oversized fragments below the surface of a rock pile using Ground Penetrating Radar (GPR). The radar response to the rock characteristics was determined from experimentation in the laboratory. Different antenna arrangements were tested and a method for auto-calibration of zero-time at a remote antenna developed. Two approaches were taken in this thesis to identify oversized fragments below the surface of a rock pile.

2.4. Underwater Robotics.

AUTHORS: Antonelli, G., Fossen, T.I., And Yoerger, D. R.

This thesis deals with the further development of an existing underwater vehicle for autonomous navigation. The vehicle was conceived to navigate over the sea surface and, at certain fixed points, to dive vertically in order to obtain a profile of a water column. The main objectives of the thesis are the improvement of the hardware and software of the vehicle in order to make it fully operational, and the design and implementation of control techniques for autonomous navigation.

2.5. Space Robots And Systems.

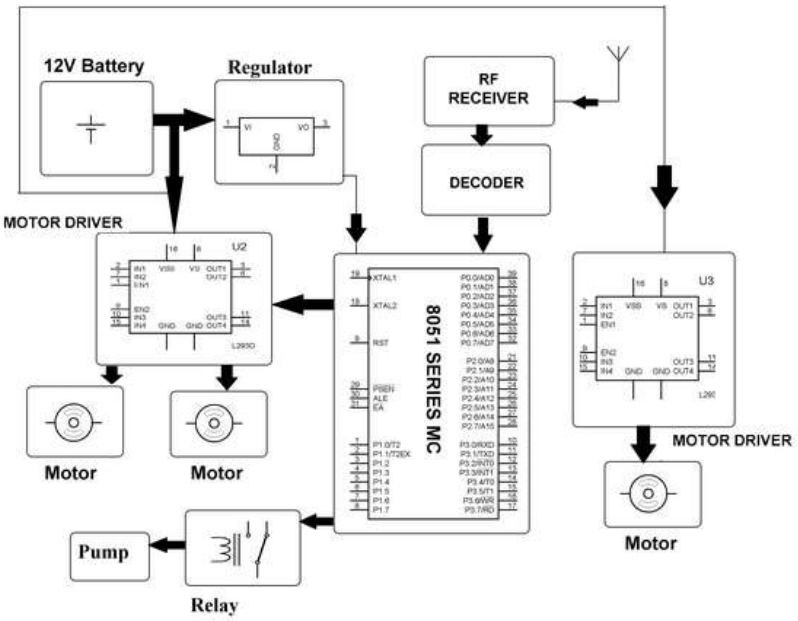
AUTHORS: Yoshida, K. and Wilcox, B.

The dynamic model of a UAV with an attached robotic arm is derived in a symbolic matrix form through the Euler-Lagrangian formalism. A Cartesian impedance control, which provides a dynamic relationship between external generalized forces acting on the structure and the system motion, is then designed.

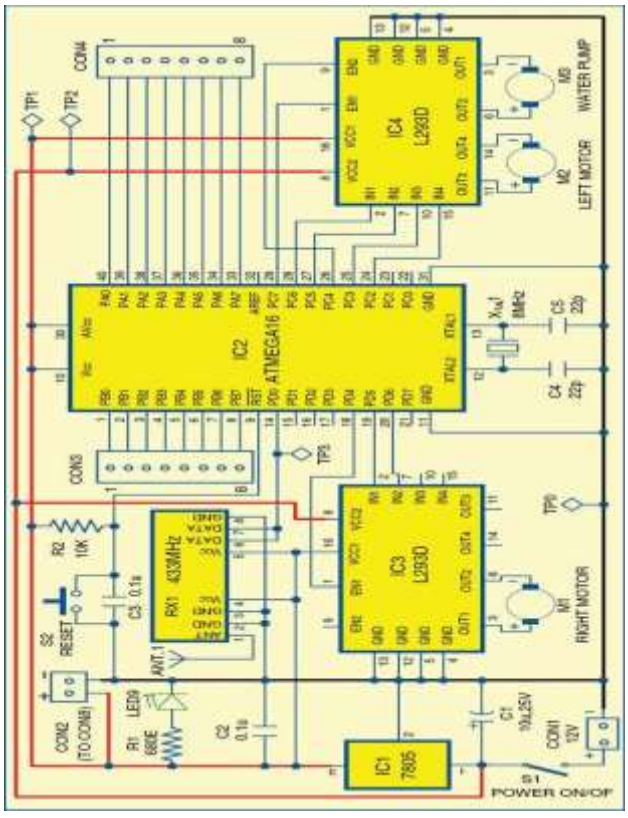
PROPOSED SYSTEM

This project is the ATMEL, but in-order to sense fire we use the LDR's and Temperature sensors. These sensors ere used to detect the fire. When fire burns it emits a small amount of Infra-red light, this light is received by the LDR on the sensor module. We will detect the direction of the fire we can use the motors to move near the fire by driving motors through the L293D module. When near a fire we have to put it out using water. Using a small container, we can carry water and a 5V pump is placed in the container and is placed on top of a servo motor so that we can control the direction in which the water has to be sprayed.

BLOCK DIAGRAM



CIRCUIT DIAGRAM



WORKING OF PRINCIPLE

1. This highly new technology base or advanced project Fire Fighter Robotic Vehicle allows a user to regulate a fire fighter robot which is equipped with water storage tank and gun remotely wirelessly for extinguishing fires.
2. To control this robotic vehicle and water pump we uses RF remote and RF receive based microcontroller circuit.

3. The receiver circuit receives RF signals through RF based remote transfer user's commands.
4. The receiver circuit now decodes the data commands sent. It then forwards it to the microcontroller.
5. Now the microcontroller processes these instructions and then instructions the vehicle motors to run the vehicle in desired directions.

The block diagram of farming bot consists of Atmel which is the heart of the whole assembly and solar panel is attached with the lead-acid battery for storing energy and further it is given to power supply circuitry which is providing +5V for Arduino board. Optical Compass Sensor HMC5883L is used for compassing and ultrasonic sensor HCSR05 is used for obstacle detection. It requires +12V supply for driving DC motors using l293d. Optical Compass Sensor servomotor is used for seed sowing and Bluetooth HC-05 module is connected with Atmel and wirelessly with android Smartphone to controlling the whole assembly. The hardware of farming bot is mounted on Chassis which is 28cm long and 22.5 cm wide.

CONCLUSION

All through this examination; structure and assembling process are clarified, elements of the robot are talked about. The fabricated robot is a model of the arranged progressed firefighting robot. The financial plan of this task is constrained and propelled fabricating machines, sensors and equipment can't be utilized, so the robot is delivered utilizing the least expensive segments that can be found in the market effortlessly. Regardless of the inconveniences, fire recognition robot breezed through the capacity's tests effectively.The versatile combination calculation technique is for tire identification of firefighting robot. This venture is accepted to be assembled effectively utilizing the above instruments and programming dialect referenced as the abovementioned. Like some other projects, there are upgrades which could be made into this Fire Fighter Robot .

FUTURE ENHANCEMENTS

1. Take up build a full-scale prototype which can be utilized in the fields in real time, monitoring system using IOT.

2. Facilitate charging of the battery using a solar charger thus bringing the costs even further down.

3. Battery energy can be saved by using driving pump.

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