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Automated Gate of Animal Cage using Arduino Mega 2560 and Raspberry Pi

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Abstract:
Procedure of increasing importance is a condition monitoring of electromechanically machines, It is mandatory in many applications as a fault tolerance system. Our system contains a animal cage and an electronic system which makes the cage system automated which reducing the manually controlling of door and reduce the risk of the person by using aurdino system and raspberry pi.

Keyword: Arduino, Raspberry Pi, Automation, Dcmotor, TFT screen, camera.

I. INTRODUCTION:

The major advantage of this generation has become a use of technology has been from various applications so, using the technology this project intent to propose automated gate of animal cage by using arduino mega 2560. Automatic gate is widely used in public places such as transportation stations, malls, etc. but this is specially design for animal cage to eliminate the need of manually opening and closing the gate. Now-a-days what happen while leaving the animals in forest a particular person goes manually from the upside of cage and control the motion of opening and closing the gate but sometimes it may be dangerous if the animal is aggressive he may attack on him. Contemporary sensor based mechanically animal cage gate is available using pressure detector, infrared and other wire-less sensing technique but it fails when the animals are light weighted. In this paper this system is divided in two parts hardware and software. so hardware part consist of gears, motors etc which will helps to controlling the gate and software part consist of arduino kit, camera which will be interfaced with arduino kit and gives the live footage of near about area of the cage on the display.

II. HARDWARE IMPLEMENTATION:

The materials and components that are used in automated gate of animal cage will be discussed in the following. As in normal control design, system can be roughly divided as input, output and processing sections.

The main components of system are:

1. Arduino Mega2560

Arduino is used as a main control unit to control the process of the whole system which eliminate the manually controlling of gate.

2. Gears:

In this system we are using rack and pinion. The gear type we are using is a linear actuator which comprises a pair of gears and responsible for converting rotational motion into linear motion. "The pinion" is a circular gear engages teeth on a linear "gear" bar called "the rack; translating the rotational motion of the pinion into the linear motion. by applying rotational motion to the pinion which is responsible for rack to move relative to the pinion.

3. Motor Driver:

The motor driver is placed at two sides of gate. They are used opening and closing the gate by rotatating the DC motor forward or reverse direction.

4. Camera:

Camera is placed inside the cage which makes possible keep watch on animal all time.

5. Raspberry pi:

Raspberry pi. is a small card size computer various application are interfaced with it easily thus, camera and TFT screen is interfaced with raspberry pi which makes gives the live footage of inside area of the cage .

6. Push Buttons:

A push-button or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. It is used for the gate open and closed process.

7. TFT Screen:

Display of live footage of inside and outside of the animal cage will be seen on TFT screen which is interfaced with raspberry pi3 and raspberry camera which is fitted in cabinate.

8.Power Supply:

It is needed to provide 12V DC for motor and 5V DC to microcontroller.

III. BLOCK DIAGRAM:

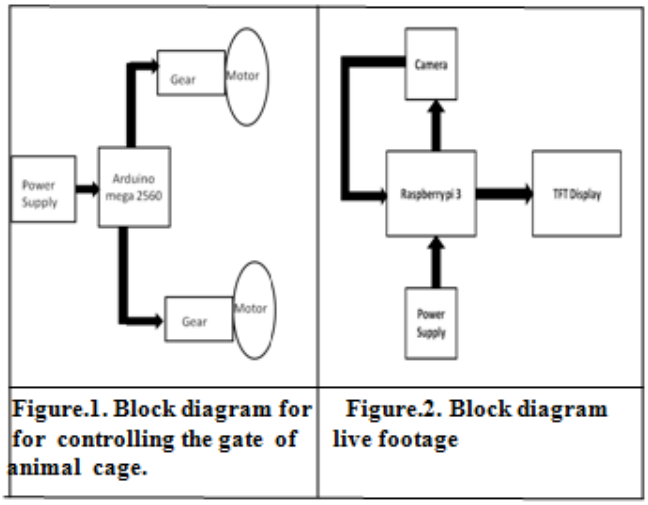

Figure.1. Block diagram for for controlling the gate of animal cage.

Figure.2. Block diagram live footage

Fig 1 shows over all block diagrams for controlling the gate of animal cage by using Arduino mega2560 Firstly, the required 5V-12V power supply is provided to arduino mega. However, the power supply of 230V of AC is very high so it is first converted to 12V of DC via Adapter which is required for arduino kit. For the opening and closing of gate rolling of gears is most important. But this action is only performed once the motor is activated. Hence, after the conversion of power supply,arduino sends a command to motors to get activated which then guides the rolling of gears. In a chronological order, first converted power supply is provided to arduino. After that, arduino gives commands the motors which at last help gears to spin. As a result, the operation of opening and closing of cage is performed in upward and downword direction. In the fig.2 Block diagram for live footage of inside area of the cage camera mentioned is placed inside the cage whereas TFT display is placed inside the cabinet. Both of them are interfaced with Raspberry Pi 3 which takes the input from camera and display live broadcast output on TFT display. But first and foremost, the power supply is converted from 230V of AC to 5V of DC via adapter after which it enters raspberry pi 3. Once raspberry pi 3 gets turned on, a person incharge can start TFT Display and Camera for proper broadcast and gets the live footage of inside and outside of the cage on TFT screen without stepping down from the cabinate.

IV. FLOW CHART:

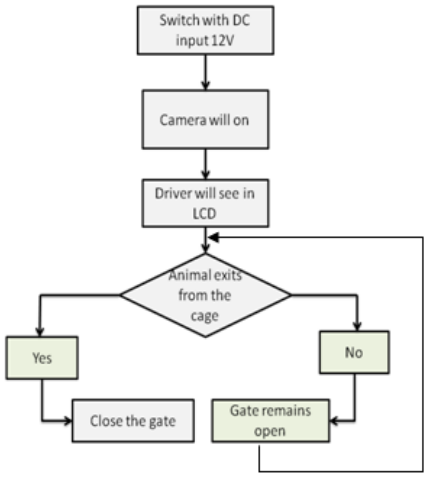

Figure.3. Flow chart of the System

V.ALGORITHM:

The algorithms used in the flow chart in Fig.3 are described in steps.
STEP 1: Start.
STEP 2: Set the switch with DC input of 12V.
STEP 3: Camera will be ON.
STEP 4:If the animal enter in the cage. Go to step 4 and step 5 otherwise gate remains open and go to step 3.
STEP 5: Close the gate.

VI. CIRCUIT DESCRIPTION:

The Automatic door of animal cage by using arduino mega2560 is accomplished to use various electronic components. This system can be simply divided into two main parts: the cabin and the cabinet. The detail circuit diagram of the automated door of animal cage is shown. This system composed of switch, Arduino mega2560, motor driver, Rack and pinon, TFT display, Raspbeery camera RaspberryPi3 and power supply. The main control unit of this system is Arduino mega2560 and it can manage the control process of all input and output units. The TFT display is used to show the live footage of the surrounding area of the cage. motor driver is use to drive the DC motor for gate open and close control.

Figure .3.proposed model.

Fig3. shows the proposed model of the system. The gate control system consists of two rack and pinon gears. The gears are fixed at the certain distance on both sides of the gate, that is for controlling the door before the animal is arrive and after the animal step down. As the switch is ON the arduino gives command to the motor and it gear will rotate and the door of cage will open as well as camera will also ON which will give us the live footage on the TFT screen.

VII. ADVANTAGES:

- This system is an effective and a safe system to ensure that there are no animal attacks during shifting animals.

- The controlling/operating system is simpler to understand and ease in handling system.
- Reduces the man power and consume time.
- As the such system is not yet implemented in Indian forest the system will be safer and more secure for animals as well as the humans.
- Now-a-days persons goes upside of the cage and manually operates the door but during this there is a risk of animal attack on him, thus possibilities of such attacks gets eliminates due to this system.
- It work efficiently

VIII. DISCUSSION:

The live footage will display in the TFT screen the user will gives command to the arduino with predefined algorithm The background algorithm which can be easily changed and modified using arduino. The DC motor is also controlled by the arduino for rotations by calculating the code of proper delay in to the arduino. This system, a scaled down model attempts to mimic the real time door of animal cage control. This can be realized in real time with the higher horse power motors, controlled by Programmable Logic Controllers and through several Distributed Control Systems (DCS). Employing the automatic door of animal care system may offer several advantages for rescue centers and forest departments. Since, the operation is automatic; error due to manual operation is prevented.

IX. APPLICATIONS:

- Used in zoo, rescue center and forest for shifting animals.
- In any transportation trucks.

X.RESULT

XI. CONCLUSION

This is real time system which is used to control the door and elimate the manually opening and closing of door. By using Arduino operations of the entire system is going to be controlled the system saves the man power, and reduces the risk factor and also ease in shifting of animals by keeping watch on them. live footage is also the best outcome of this project. Hardware implementation are reliable and cheap of this project.

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