Unmanned Coastal Monitoringandpropulsion System

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Abstract: *The International Maritime organization (IMO) sets regulations for marine vessels to insure safety and prompt response to various demands. when it comes to an unmanned vessel it has been done with PID controllers in which it operates enormous variables. In order to ease the operation of an unmanned vessel, we used an Arduino Uno Controller to monitoring and transferring the data from shore base station. The function of this controller is giving the particular location of the vessel and a real stream image of the situation surrounding the vessel. For that it's necessary a GPS,GSM & WEBCAM in which an Arduino Controller control and operate the system (input/output),the remote is giving a signal to the controller to ON the motor and adjust the particular degree to move at that exact time the signal will be given to GPS System and further to GSM and the location and real image of the vessel will be recorded,the project ensures an accurately and real response to dangerous situations like piracy or oil leakage/spill as a surveillance method.*
Keywords: *Unmanned Vehicle, Coastal Monitoring, Remote Propulsion System*


I. Introduction

In recent years, despite of the huge technological advances on controllers to operate unmanned vehicles, the monitoring of vessel was done by the PID& FUZZY LOGIC Controllers.A proportional–integral–derivative (PID) controller is a generic control loop feedback mechanism widely used in industrial control systems. APID controller calculates an "error" value as the difference between a measured process variable and a desired set point. The controller attempts to minimize the error by adjusting the process control inputs, controller used for simulation is PID controller. The only major limitation of predictive and adaptive controllers is that they are computationally heavy.

Fuzzy logic has the advantage that the solution to the problem can be cast in terms of that human operators can understand, so that their experience can be used in the design of the controller, fuzzy logic is proposed here which controls the path of the ship with collision avoidance system, keeping track of the movement of ship. Fuzzy logic-based controller is shown to be better than PID controller.

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System Description:

Figure.1 shows the general block diagram of the proposed system. In this system, the entire system is controlled from the base station located at the shore. Arduino Uno Controller is used as controlling system. Arduino Uno does not require any coefficients to perform the task.The transmitter and receiver will give the best-established communication (satellite communication,GSMcommunication).The live stream camera system for monitoring the field is wireless.This work is fully automated and less man power isrequired.The Arduino UNO is a hardware which used as a controller to control the ship speed and servo motor. The Arduino has fed control programs. When the input is given, it will compare with the program and generate output pulse and it is given to the driver circuit.The Arduino will generate pulse at 5 volt and these pulses are given to the driver circuit to regulate the power supply and for safer operation of the stepper motor.
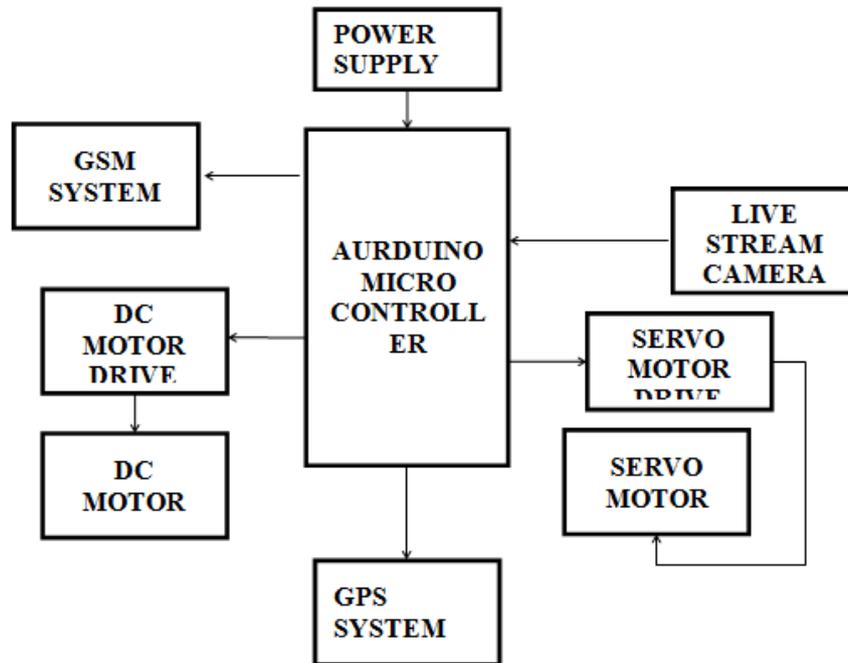
Figure. 1 Block Diagram of Unmanned Coastal Monitoring and Propulsion System

A propeller is a rotating fan like structure which is used to propel the ship by using the power generated and transmitted by the main engine of the ship. The transmitted power is converted from rotational motion to generate a thrust which imparts momentum to the water, resulting in a force that acts on the ship and pushes it forward.DC motor is an electrical device which is used to convert the electrical power into mechanical power and the converted mechanical power is used for the propulsion of the ship.By receiving the command from the Arduino servo motor is operated and its operation is used to turn starboard and portside.This drive is used to give the required operating voltage for the servo motor and the driver is connected to the Arduino.

The Global Positioning System (GPS) is a space-based radio navigation system. It is a global navigation satellite system thatprovides geolocation and time information to a GPS receiver anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA).

Live stream camera is use to monitor the coastal area for critical situation likeCoastal sea traffic monitoring, Safety and rescue operation, Fishing boat monitoring in coastal area, Oil spillage in Costal area, etc.,

Hardware Description:
The Arduino Uno is a microcontroller board based on the ATmega328(datasheet). It has 14 digital input /output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial drive chip. Instead, it features the Atmeg8u2 programmed as a USB-to-serial converter."Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0.The Uno and version 1.0 will be the reference versions of Arduino, moving forward .The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform, for a comparison with previous versions,see the index of Arduino board.

The DC motor drive is an interface between the Arduino and the motor. The performance of the DC motor is strongly dependent on the drive circuit. Torque curves may be extended to greater speed if the stator poles can be reversed more quickly, the limiting factor being to the necessity of limiting the current that this high voltage may otherwise induce.The output from the Arduino is given to the drive circuit as the input and the rated power supply has to be given the drive circuit which provides the sufficient voltage for the DC motor operation.The drive used in the project is L293D.This is used as the interference between the Arduino and the DC motor. When the Arduino generate pulse, the drive will regulate the power and will give the output to the motor which will turn to the specific angle. Thus, the angle of the blade will be changed and the trust produce on the desired direction and the desired direction of the ship can be achieved without the use of rudder.

GSM is a mobile communication modem; it is stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands.GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.There are various cell sizes in a GSM system such as macro, micro, pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.Though all these methods are used there may still be an inaccuracy of (5-10) meters. This can be reduced only by upgrading the satellites. This is because, the radio signals from these satellites will be affected by the ionosphere. But, this accuracy (5-10)meters was obtained only because of Differential GPS.Using Differential GPS all these errors can be corrected. For this a stationary receiver is introduced. This receiver location is also known and is used to gauge the inaccurate data. This corrected signal is then provided to all the other Differential GPS equipped receivers and thus the signal is corrected.Differential GPS (DGPS) helps correct these errors. The basic idea is to gauge GPS inaccuracy at a stationary receiver station with a known location. Since the DGPS hardware at the station already knows its own position, it can easily calculate its receiver's inaccuracy. The station then broadcasts a radio signal to all DGPS-equipped receivers in the area, providing signal correction information for that area. In general, access to this correction information makes DGPS receivers much more accurate than ordinary receivers.

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops.The term "webcam" (a clipped compound) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet. Some of them, for example, those used as online traffic cameras, are expensive, rugged professional video cameras.

Figure.2 Prototype Model of the Constructed System

Figure.3 Remote Control Unit of the Prototype

Figure.4DC Motor Running and Servo Motor Angle 90°

Figure.5 Output of GPS Longitude and Latitude Value

II. Conclusion

The new mechanism has been introduced for the unmanned vessel controlled by Arduino Uno Controller supported by GPS, GSM & Webcam systems,reduces the man power as much as possible and give the live status of the field of coastal area if any emergency, in which it ensures an accurately and real response to dangerous situations like piracy or oil linkage/spill as a surveillance method.

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