Unmanned Amphibian Vehicle

SANAL P JOSEPH
B-Tech student
Applied Electronics and Instrumentation Department
Adi Shankara Institute Of Engineering And Technology
Ernakulam, India

SANDRA P D
B-Tech student
Applied Electronics and Instrumentation Department
Adi Shankara Institute Of Engineering And Technology
Ernakulam, India

S YADHUKRISHNAN
B-Tech student
Applied Electronics and Instrumentation Department
Adi Shankara Institute Of Engineering And Technology
Ernakulam, India

PRIYANKA MUKESH
Guide
Applied Electronics and Instrumentation Department
Adi Shankara Institute Of Engineering And Technology
Ernakulam, India

Abstract— **Moving from water to land or vice versa, is a tough problem for a robot, because it has to completely change its gait and adapt to the new environment, without stopping. Animals deal with this problem by using sensory inputs as switches, which turn different neural control mechanisms on or off. These in turn are transformed into complex and coordinated movements in the body. The aim of this project is to develop a mobile robot, which can propel both in land and water. A robot could be a mechanical device, a manipulator designed to perform many different tasks and capable of repeated, variable programming. To perform its assigned tasks, the robot moves parts, objects, tools, and special devices by means of programmed motions and points.**

Keywords- **Bluetooth, robots, sensors, Unmanned amphibian vehicle, zigbee.**

INTRODUCTION

Robot is a computer controlled machine that is programmed to move, manipulate objects and accomplish work while interacting with its environment. Robots are able to perform a repetitive task more quickly, cheaply and accurately than humans. The term robot originates from the Czech word "robota" meaning compulsory labour. The unmanned amphibian vehicle is developed by a four wheeler/propeller connected for rolling and swimming robots using wireless means. The robot can also detect obstacles in its path by verifying the output from the distance sensing sensor; along with microcontroller section and humidity senor is sed. This project consists of a microcontroller section and a mechanical section. The microcontroller section stores a program that controls the movement of robot, atmospheric parametric sensor and obstacle detect. The device is a computer composed of hardware and software, combined to enable it to carry out its assigned tasks. The mechanical section of robot consists of servo motors for the movement of robot.

LITERATURE SURVEY

As most traditional robots have closed loop control with feedback, force feedback or both and the operator closing the loop the operator controls rate via a mouse or joystick using information received back from the robot. Typical robot system operates in a continuous loop. Controllers require good concentration as they are in direct control of the manipulator and there are many interfaces and control, for example; force feedback joysticks. These approaches work fine when there is little delay in communications.

Types of controls

- Shared continuous control: control is at a higher level than position serving i.e. device may vary from course if encounters an obstacle.
- Discrete command control: This implies a higher level of capability in the remote portion of the controller, as it must be able to carry out the command without help.
- Supervisory control: The remote device operates in a largely autonomous mode and only interacts with human when it encounters an unexpected situation.

Here we use ZIGBEE wireless transmission protocol for the data transfer between the control section and the robotic section. Zigbee protocols a higher end of the Bluetooth and works on the same principle. The ZIGBEE is a duplex data transmission device which works on RF principle. This is used to establish connection between client and server. Once the connection is established the consumer's energy meter is on real time conversation with the server.

DESIGN AND ANALYSYS

A. Project outline

The unmanned amphibian vehicle has a motor-driven mechanical device and a brain in the form of a computer or a microcontroller that controls its movement. The microcontroller stores in its memory a program detailing the course the device follows. When the program is run, the controller sends signals activating the motors which move the robot. The controller is that part of the robot which

operates the mechanical section and maintains contacts with its environment. The device is a computer composed of hardware and software, combined to enable it to carry out its assigned tasks. The mechanical section of robot consists of Dc motors for the movement of robot. The robot has also a module of obstacle detection.

B. System architecture

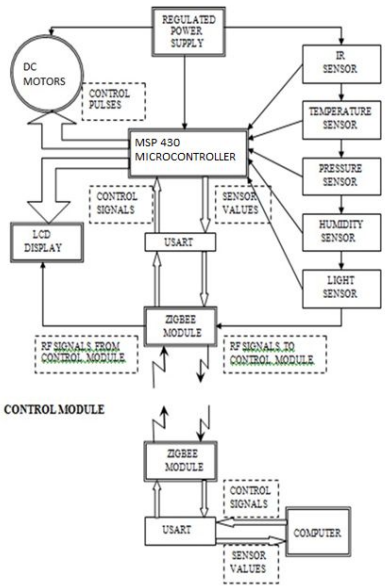

FIGURE I: FUNCTIONAL BLOCK DIAGRAM

C. Design theory

The design of the project is divided into 4 sections.

***ZIGBEE Protocol*:** The ZIGBEE is a duplex data transmission device which works on RF principle. This is used to establish connection between server and client. Once connection is established, the consumer's energy meter is on real time conversation with the server. Since we have to transmit data over a distance of 1-2 km, ZIGBEE proves to be very efficient.

Obstacle detection module: Obstacle is detected by using infrared based distance sensors. If the distance of the object found by the system is less than the predefined value, the robot detects it. The user has the option of fixing the safe distance.

Motor driving section: It consists of 4-geeared DC motors. The microcontroller provides the suitable instruction to the motors for the moving mechanisms. The direction of rotation of the geared motors is determined by the control signals generated from port.

Sensor section: Here we use different sensors. Some of them are temperature sensor, humidity sensor and light sensor. The sensors used include moisture sensor, which senses moisture content in the surroundings and determines whether it should adopt walking gait or swimming gait.

D. MSP Microcontroller

The MSP-430 is mixed signal microcontroller family from Texas instruments. Built around a 16-bit CPU, the MSP430 is designed for a low cost, specifically, low power consumption embedded applications. The electric current drawn in idle mode can be less than 1µA. The top CPU speed is 25MHz. It can be throttled back for lower power consumptions. The MSP 430 also uses six different low power modes, which can be disabled unneeded clocks and CPU. Additionally the MSP 430 is capable of wake-up times below 1µsec, allowing the microcontroller to stay in sleep mode longer, minimizing its average current consumption.

E. LCD

LCDs are materials which combine the properties of both liquids and crystals. Rather than having melting points, they have a temperature range within with the molecules are almost as mobile as they would be in liquid, but are grouped together in an ordered form similar to a crystal. Recent LCDs are field effect LCDs. They are based on optical action of polarized light on properly oriented liquid crystal. LCD consists of 2 glass panels within the liquid crystal material sand witched between them. The inner surface of glass plates are coated with transparent electrodes which defines the character, symbols or patterns to be displayed. The polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle. The polarizer would rotate the light rays passing through them to a defined angle. In a particular direction.

F. Obstacle Sensor

In robotics, obstacle avoidance is the task of satisfying some control objective subject to non-intersection or non-collision position constraints. In unmanned air vehicles, it is an important topic. What is critical about obstacle avoidance concept in this area is the growing need of usage of unmanned amphibian vehicle in urban areas for especially military applications where it can be very useful in city wars. Normally obstacle avoidance is considered to be distinct from path planning in that one is usually implemented as a reactive control law while the other involves the pre-computation of an obstacle-free path which a controller will then guide a robot along.

G. Camera

Sky cam is a computer controlled, stabilized, cable suspended camera system. The system is manoeuvred through three dimensions in the open space over a playing area of a stadium or arena by computer- controlled cable-drive system. It is responsible for bringing video-game like camera angles to television sports to converge.

H. Crystal

A crystal oscillator is an electronic oscillator circuit that uses a mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. The frequency is commonly used to keep track of time, to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuit incorporating them became known as crystal oscillators, but other piezoelectric materials including polycrystalline ceramics are used in similar circuits.

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