Design of Hybrid Boat using Microcontroller Atmega 328

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Abstract - - *We are making a hybrid model which consists of a system which comprises and works on both the conventional IC engine and the electric motor. We are designing it as to switch between motor and engine. We will make electric system by designing charging circuit and driver. Also with addition to charging system a solar panel will also be present for charging the battery as most of the time the boat stay in between the lake. For motor and as for mechanic system we are going to take engine and combine them (engine and motor) in the transmission with parallel design hybrid propulsion model. The switching part is done with means of microcontroller manually or automatically as per user.*

Key Words: Hybrid, Propulsion System, Solar, Electric, Solar charge controller, microcontroller.

1. INTRODUCTION

Now-a-days the fisherman use local boats that are hand peddled or the boats that works with engine, but by doing this the cost of fuel is added to their expenditures and is deducted with their profit. So, for such cases they spend a lot in fuel, also the fuel prices are escalating day by day which again reduces the income of the fishermen. And the engine boat which is used causes harm to the marine life as well like creating noise pollution.

This is the reason why we have selected this project which comprises of hybrid system which will help relieve at least some of the load and fuel consumption off the fisherman's boat that he/she is using. This make him/her to put less on petrol and hence more profit.

We are making a hybrid model of the ship which consists of both the conventional IC (Internal combustion) engine and the electric system to power the boat. While fishing the boat usually stays in water for more than 10hrs so we have an electric system which takes power from solar give it to battery and drive the motor. This is for the normal cruising of the boat. As for situations where there is demand for speeds is critical we can switch to engine which we kept as secondary system on standby.

Its importance lies in future where every vehicle or boat will run on electricity and not on petrol or dieses, will be more eco-friendly and green.

1.1 Scope of Project

This project can then be extended to provide not only small scale transportation medium for small business but also for large ships using this mechanism. Also it can be equipped with GPS and RADAR facilities to navigate in the sea. This hybrid system can also be used for military for the electric drive for reconnaissance purpose as electric drive is much more silent with use of motor i.e. for spy purpose.
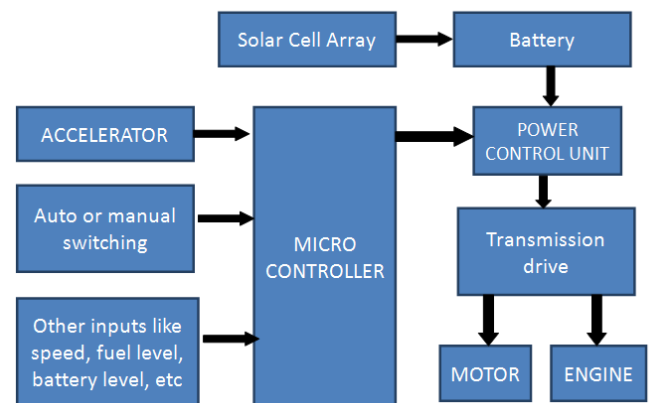
1.2 Proposed Design

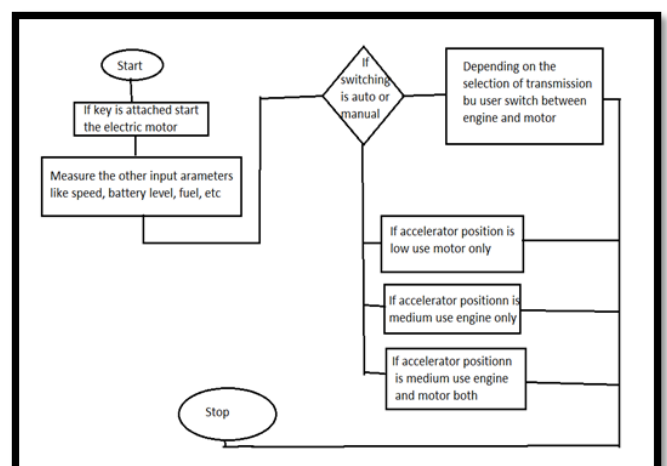Fig 1.2.1: Block diagram of hybrid boat.

1.3 Algorithm

Fig 1.2.2: Algorithm of working of project

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2. WORKING PRINCIPLE

2.1 Implementation and Design

It was done using the propeller on the outside part of the rod of grass cutter engine i.e. at the fan blade side the blade was removed and the rod was made straight which was initially slanted at 40 degrees.

Fig 2.1.1 Shaft redesigned to meet drive requirements

Again engine was placed with the rod for direction and whole setup was mounted on the wooden platform as shown below.

Fig 2.1.2: Whole mechanical setup of engine and boat

MPPT Solar charger controller

In this charge controller we have implemented the load and battery control by continuously sensing the voltages of both.
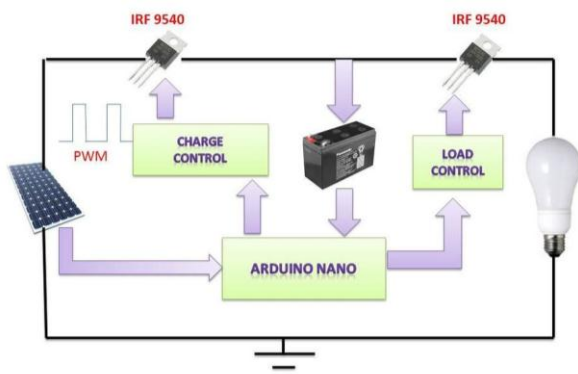

Fig2.1.3: Block diagram of solar charger.

The Main Functions of Solar Charge Controller are:

The charge controller is planned & scheduled by taking care of the following points.

1. **Prevent Battery from Overcharging**: To limit the energy brought to the battery by the solar panel when the battery becomes fully charged. This is realized in charge cycle () of my code.

2. **Prevent Battery From Over discharging**: To disengage the battery from electrical loads when the battery reaches low state of charge. This is executed in load control () of my code.

3. **Provide Load Control Functions:** To automatically connect and disconnect an electrical load at an indicated time. The load will ON when sunset and OFF when sunrise. This is realized in load control () of my code.

4. **Monitoring Power and Energy**: To monitor the load power and energy and display it on screen.

5. **Protect from abnormal Condition:** To protect the circuit from different irregular situation like lightening, over voltage, over current and short circuit etc.

6. **Indicating and Displaying:** To specify and display the various parameters

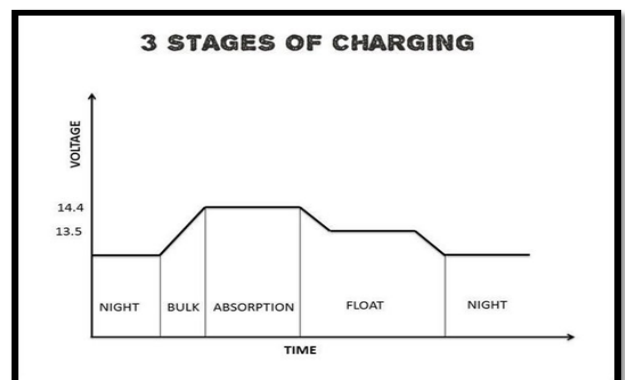7. **Serial Communication:** To print various constraints in serial monitor

Fig 2.1.4: 3 stages of charging

1. **Bulk: At this method**, a preset maximum constant amount of current (amps) is fed into the battery-operated as no PWM is present. As the battery is being charged up, the voltage of the battery increases progressively

2. **Absorption:** When the battery reaches the bulk charge set voltage, the PWM begins to grasp the voltage constant. This is to avoid over-heating and over-gassing the battery. The current will fall down to safe levels as the battery becomes more completely charged.

3. **Float:** When the battery is completely recharged, the charging voltage is reduced to prevent additional heating or gassing of the battery

3. RESULT

3.1 Output of Mechanical System

So in this project we are trying to achieve hybrid propulsion system for boat. Up till now we have done all the analysis and design needed for the project. In this this semester end we are going to run the boat using engine only and after that in next semester we will incorporate motor as second drive.

Fig: 3.1 testing of the engine with boat on gorai beach

We have made the boat and tested it right away after completing the necessary modifications and joining the various components. We also attached the light weight engine to boat and drive it out for testing on beach. The propeller and shaft was manually modified to produce thrust and handling control for steering purpose. Below is the pic of our testing the boat.
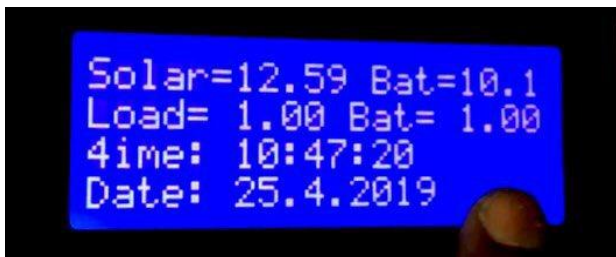
3.2 Output of the solar charge contoller

Fig: 3..2 Solar charge controller output

3.3 Output of Auto start System

Fig 3.3: Testing auto start for manual engine.

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