Features

FEATURES
ADMIN

View/Edit/Delete Vehicle Details

View/Edit/Delete Driver Details

Fuel Expences/ Oil Change Details

Vehicle Repair History

Booking Status Detail

USER MODULE

Login/Registration of User

Take a Car trip (Google Map Integration)

View Car Details

Car Booking

Code-Layout, Readability And Reusability

```
public void trigger(Events event)
{
        switch(event) {
                <% for each (transition t in current state) { %>
                case Events.<% transtion t's event %>:
                        <% if (transition t has condition) { %>
                        if(<% transition name %>_Condition()) {
                        <% } %>
                        <% if (transition t has action) { %>
                        <% transition name %>_Action(event);
                        <% } %>
                        <% transition name%>_Fire();
                        <% if(transition t has condition) { %>
                        }
                        <% } %>
                        break;
                <% } //end for each %>
                default:
                        for each (AND-State as contained) {
                                as.trigger(event);
                        }
        }
}
```

```
<% for each (transition t in current state) { %>
<% if(transition t has action) { %>
/**
 * @model type=transition_action name=<% transition name %>
 */
private void <% transition name %>_Action(Object parameter) {
        <% transition t's action %>
}
<% } %>
```

```
<% for each (transition t in current state) { %>
/**
 * @model type=transition_fire name=<% transition name %>
 */
private void <% transition name %>_Fire() {
        Create target state object;
        make transition;
}
<% } %>
```

Utilization Of Algorithms, Dynamic Programming, Optimal Memory Utilization

Abstract – **A PEM (Proton Exchange Membrane) fuel cell city bus utilizes a PEM fuel cell engine as the primary source, and a li-ion battery system as the auxiliary power source. By optimizing the power split strategy and recycling braking energy, this kind of power-train has advantages of zero emission and high energy efficiency. However, the cost of hydrogen gas is far more expensive than that of the electric energy. How to split the power between the two power sources so as to minimize the operating cost, as well as guarantee the vehicle dynamic performance, becomes an important topic. This paper proposes a Dynamic Programming Algorithm (DPA) to solve the minimizing problem. Some details of the DPA are discussed, e.g. the principles of selecting parameters for the algorithm. The effectiveness of the algorithm is verified by comparing simulating results of different algorithms. Results show that, 1) by using the DPA algorithm, we can find the optimal control strategy in an objective way. 2) The constraints of vehicle dynamic performance on the optimal problem have great influences on the optimal results. 3) To predict the power requirement in the near future is very important to achieve an optimal real-time strategy.**

I. Introduction

In recent ten years, different kinds of electric vehicles, e.g. PEM (Proton Exchange Membrane) fuel cell vehicles, ICE (Internal Combustion Engine) hybrid vehicles and battery electric vehicles, have attracted great attentions from governments, automotive industry, universities and research institutes. PEM fuel cell EVs developed very rapidly in the past five years. United Technologies Corporation (UTC) reported that, its 120kW Fuel Cell System PureMotion Model 120 had been operating for 7,000 hours without changing any subsystems until the end of June, 2010. This working life time is much longer than the target of proposed by DOE in 2009. General Motor Company (GM) has developed several generations of PEM fuel cell vehicles. In March of 2010, the fifth PEM fuel cell vehicle was launched, the Chevrolet Equinox FCV. With the same output power 94kW, the size of the fifth PEM fuel cell engine is about half of the size of former generations, and the weight is reduced by 100 kg. The cost of noble metal Pt in one engine was reduced from 80g to 30g. GM claimed that the consumption of Pt in one engine will decrease to 10 g in 2015. Toyota Company also has invested in PEM fuel cell vehicles in recent decades. Both of the consumption of noble metal Pt and the system cost have greatly reduced. High officer of Toyota announced that, the retailing price of a PEM fuel cell vehicle can be reduced to 50,000 $ in

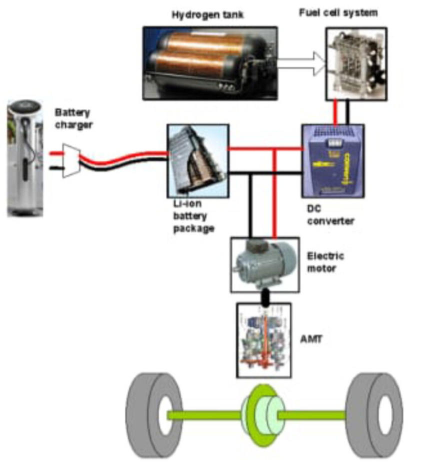


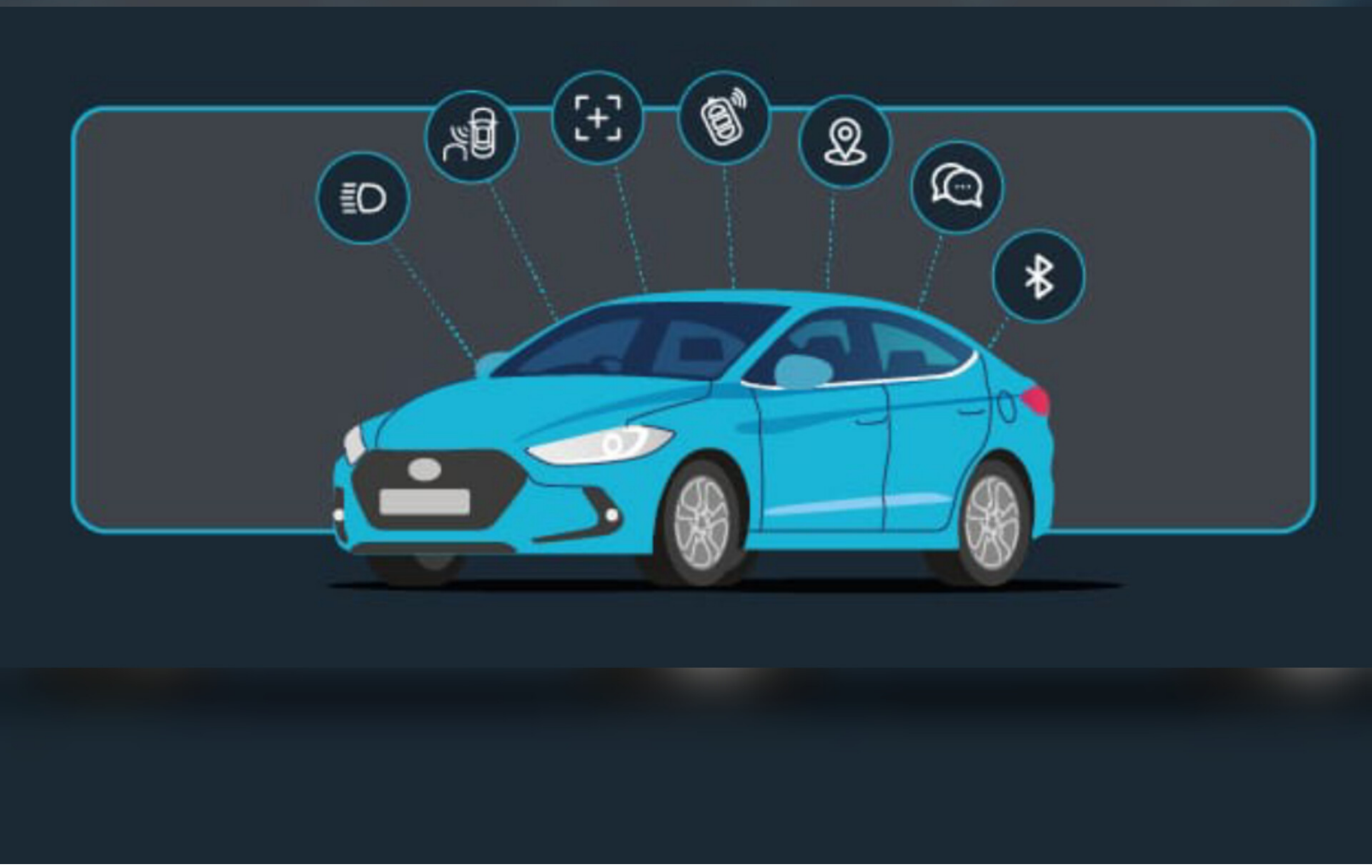
Fig. 1. Structure of the fuel cell/battery hybrid powertrain for a city bus

2015, meaning that the vehicle can be put into normal market [1].

A PEM fuel cell vehicle utilizes a fuel cell engine as the primary power source, and a battery or an ultra capacitor as the auxiliary power source, as shown in Fig. 1. In order to avoid oxygen starvation on the cathode, the fuel cell engine always provides a stationary output power. A DC converter is installed to control the output power of the fuel cell system. The li-ion battery is connected to the inverter of the electric motor directly, so that it can recycle braking energy and provide boost power in accelerating.

The daily operation cost of PEM fuel cell vehicle is far more expensive than that of traditional vehicles. It therefore becomes a big problem to minimize the daily cost. With a plug-in function, we can reduce part of the daily cost by charging the battery from the grid, but not from the fuel cell engine. The operation cost and the vehicle dynamic performance is a basic conflict in this problem. Because the price of hydrogen gas is much more expensive than that of electric energy, we trend to use electric energy as much as possible in order to reduce the cost. However, if too much energy is delivered from the battery, the bus voltage will become very low and the dynamic

Debugging & Traceability



Exception Handling