

模糊-PID控制技术运用到程控电压源的设计中，从而使得电压源的输出电压值达到预定的要求，提高输出电压的精度和反应速度。

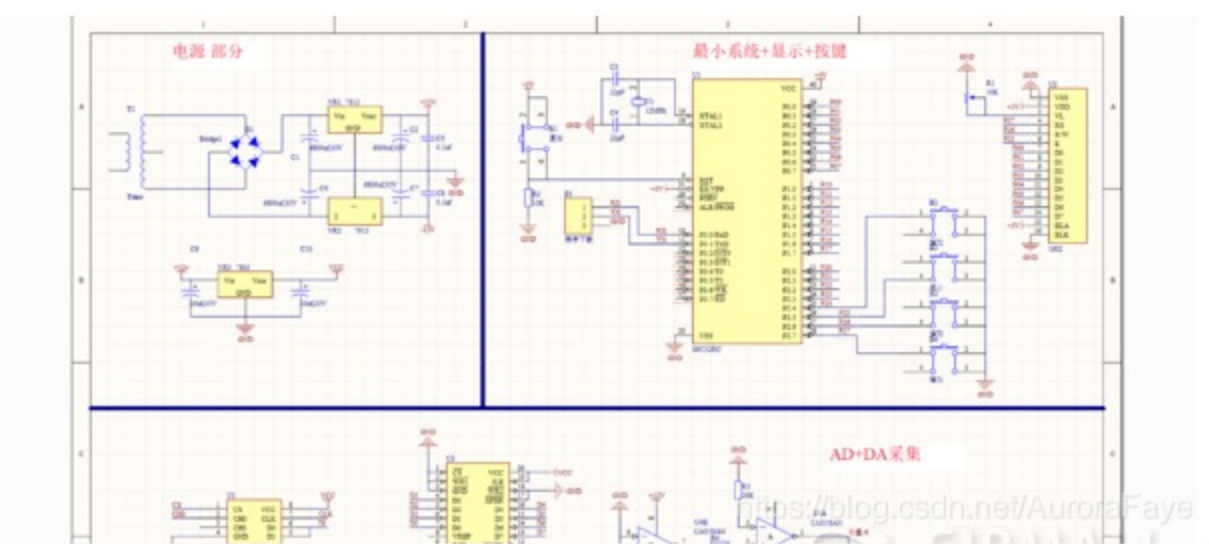
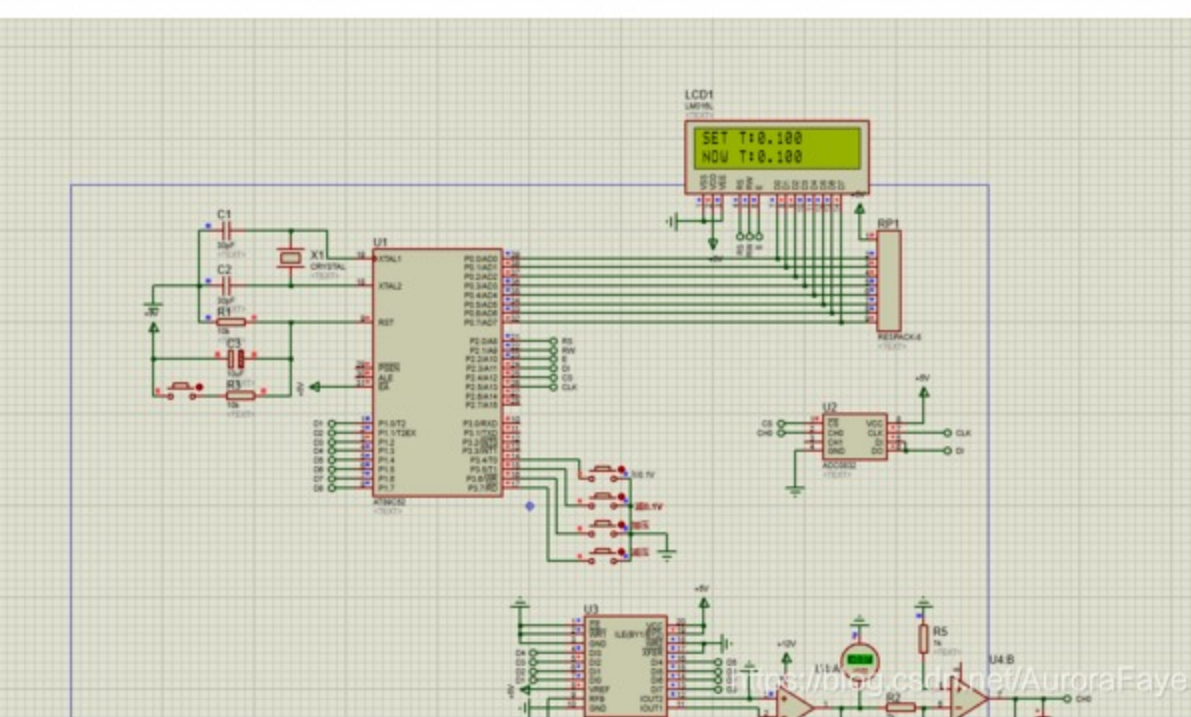
采用51单片机，利用adc0832和DAC0832，通过220V市电通过整流得到 12V再由12V转5V。LM358搭配DAC0832电路实现电压的输出。通过ADC采集。

最终得到电压。

1: 电压的整定时间小于0.5S

2: 电压的精确度再0.02以内

3: 论文中涉及到第二种硬件设计方案，使用更高精度的采集。



```
1 typedef struct{
2     float Kp;
3     float Ki;
4     float Kd;
5 }PID;
6
7
8 PID fuzzy(int e,int ec)
9 {
10
11     int etemp,ectemp;
12     int eLefttemp,ecLefttemp;
13     int eRighttemp ,ecRighttemp;
14
15     int eLeftIndex,ecLeftIndex;
16     int eRightIndex,ecRightIndex;
17     PID fuzzy_PID;
18     etemp = e > 3.0 ? 0.0 : (e < - 3.0 ? 0.0 : (e >= 0.0 ? (e >= 2.0 ? 2.5: (e >= 1.0 ? 1.5 : 0.5)) : (e >= -1.0 ? -0.5 : -2.5)));
19
20     eLeftIndex = (int)e;
21     eRightIndex = eLeftIndex;
22     eLeftIndex = (int)((etemp-0.5) + 3);          //[-3,3] -> [0,6]
23     eRightIndex = (int)((etemp+0.5) + 3);
24
25     eLefttemp =etemp == 0.0 ? 0.0:((etemp+0.5)-e);
26     eRighttemp=etemp == 0.0 ? 0.0:( e-(etemp-0.5));
27
28     ectemp = ec > 3.0 ? 0.0 : (ec < - 3.0 ? 0.0 : (ec >= 0.0 ? (ec >= 2.0 ? 2.5: (ec >= 1.0 ? 1.5 : 0.5)) : (ec >= -1.0 ? -0.5 : -2.5)));
29
30     ecLeftIndex = (int)((ectemp-0.5) + 3);          //[-3,3] -> [0,6]
31     ecRightIndex = (int)((ectemp+0.5) + 3);
32
33     ecLefttemp =ectemp == 0.0 ? 0.0:((ectemp+0.5)-ec);
34     ecRighttemp=ectemp == 0.0 ? 0.0:( ec-(ectemp-0.5));
35
36     /*****反模糊*****/
37     fuzzy_PID.Kp = (eLefttemp * ecLefttemp * fuzzyRuleKp[ecLeftIndex][eLeftIndex]
38                     + eLefttemp * ecRighttemp * fuzzyRuleKp[ecRightIndex][eLeftIndex]
39                     + eRighttemp * ecLefttemp * fuzzyRuleKp[ecLeftIndex][eRightIndex]
40                     + eRighttemp * ecRighttemp * fuzzyRuleKp[ecRightIndex][eRightIndex]);
41
42     fuzzy_PID.Ki = (eLefttemp * ecLefttemp * fuzzyRuleKi[ecLeftIndex][eLeftIndex]
43                     + eLefttemp * ecRighttemp * fuzzyRuleKi[ecRightIndex][eLeftIndex]
44                     + eRighttemp * ecLefttemp * fuzzyRuleKi[ecLeftIndex][eRightIndex]
45                     + eRighttemp * ecRighttemp * fuzzyRuleKi[ecRightIndex][eRightIndex]);
46
47     fuzzy_PID.Kd = (eLefttemp * ecLefttemp * fuzzyRuleKd[ecLeftIndex][eLeftIndex]
48                     + eLefttemp * ecRighttemp * fuzzyRuleKd[ecRightIndex][eLeftIndex]
49                     + eRighttemp * ecLefttemp * fuzzyRuleKd[ecLeftIndex][eRightIndex]
50                     + eRighttemp * ecRighttemp * fuzzyRuleKd[ecRightIndex][eRightIndex]);
```