

浙江大学 实验报告

课程名称： 嵌入式系统 指导老师： 蔡铭 学生姓名： 李磊
实验名称： 任务 36：随时随地控制 pcd 实验类型： 操作实践 学生学号： 3110102782

一、实验目的和要求

通过手机或者平板随时随地控制自己的 pcDuino

二、实验内容和原理

做一个网络时钟，通过 ntp 从一个互联网服务器得到时间，实时在 7 段数码管或 LCD 上显示时间。

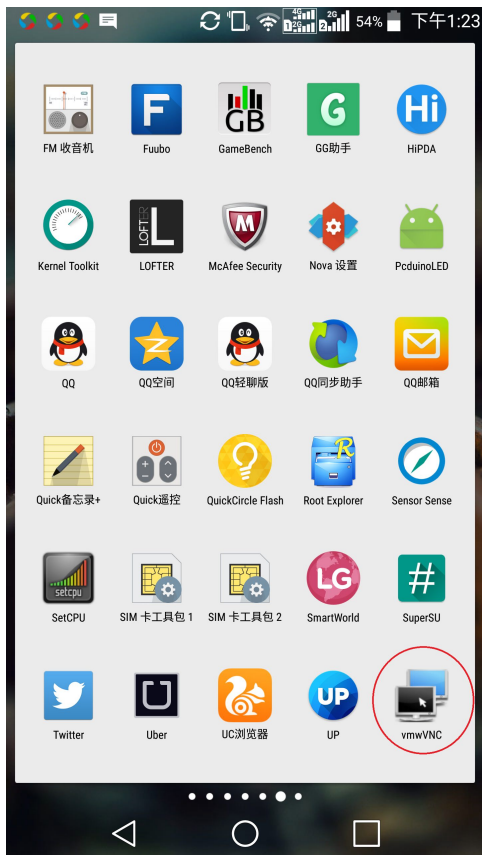
三、主要仪器设备

1. pcDuino v2 板一块；
 2. 5V/1A 电源一个；
 3. microUSB 线一根；
 4. USB-TTL 串口线一根（FT232RL 芯片或 PL2303 芯片）。
 5. 手机或平板一部
- 以下为自备（可选）器材：
6. PC（Windows/Mac OS/Linux）一台；
 7. 以太网线一根（可能还需要路由器等）。

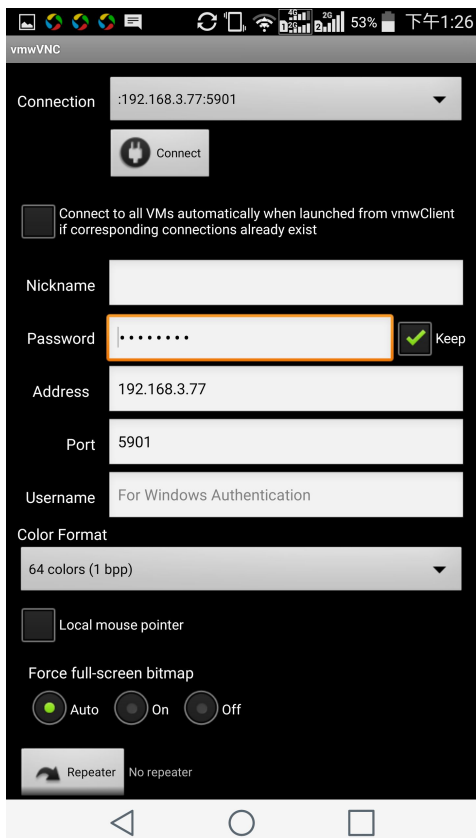
四、操作方法和实验步骤

1. 在手机或平板安装上安装 ssh 或者 vnc 软件访问 pcDuino

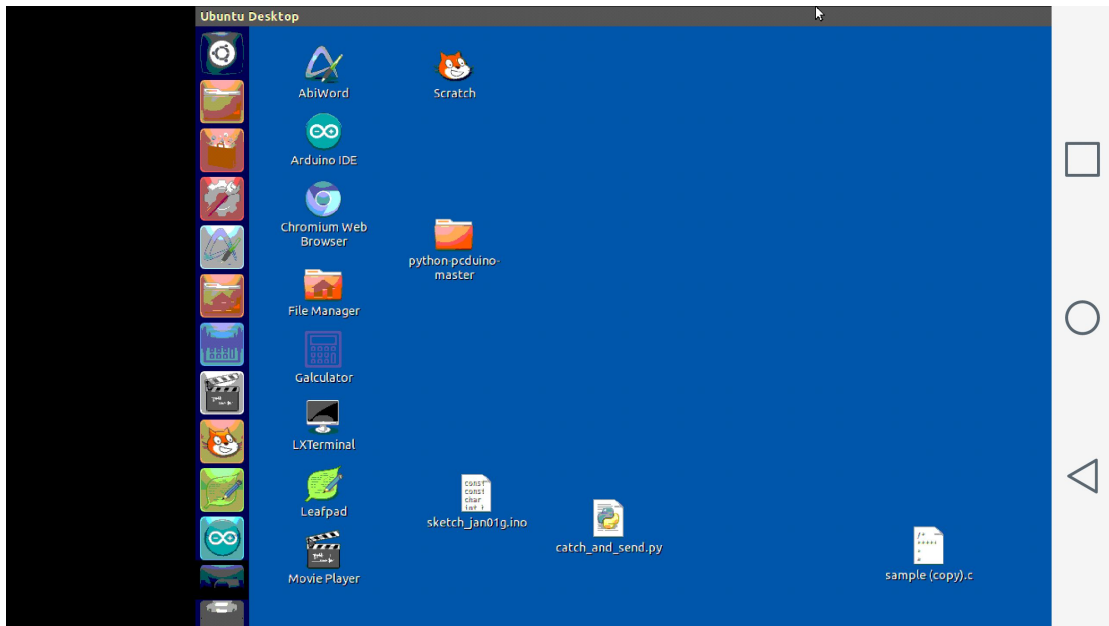
手机安装 vmwVNC:



配置 VNC:



启动连接:

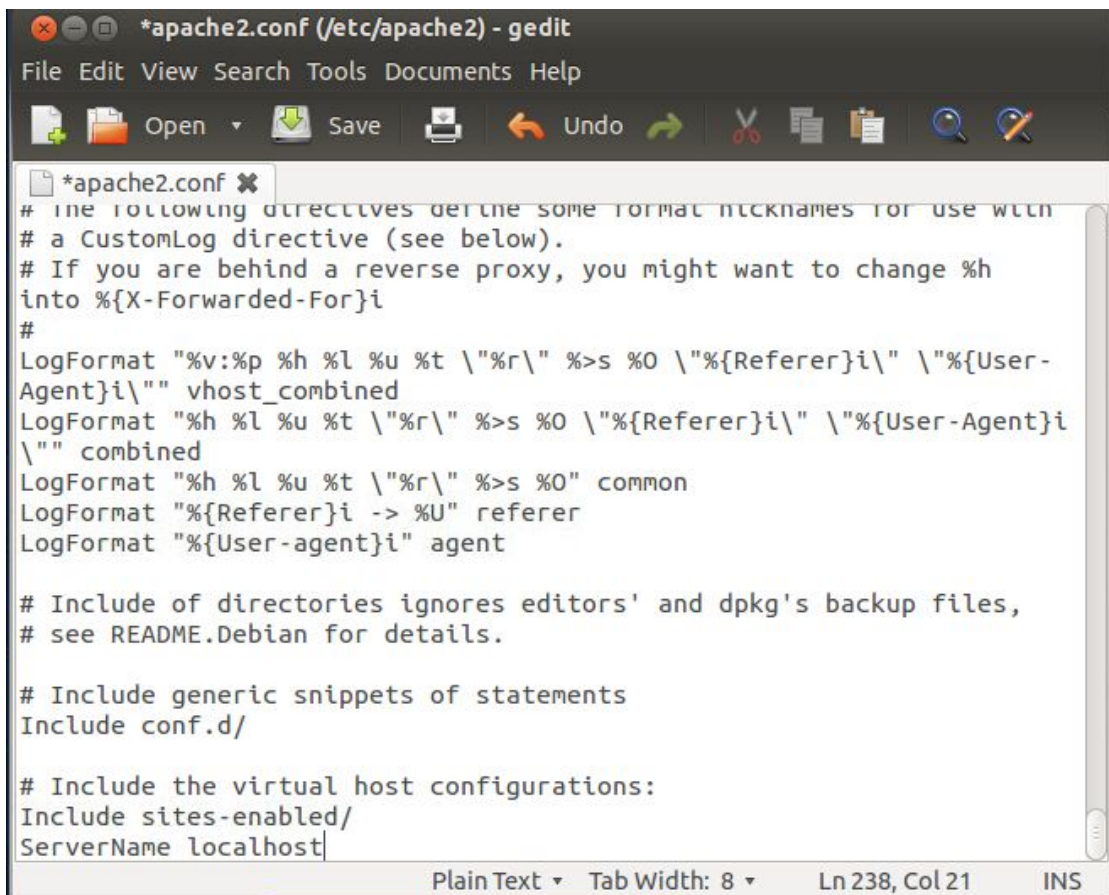


2. 通过 Apache（具体参考春学期任务 1）或其他工具在 pcDuino 上搭设一个网站
安装 apache2:

```
$ apt-get install apache2
```

```
root@Acadia: ~  
  
New 'X' desktop is Acadia:1  
  
Starting applications specified in /root/.vnc/xstartup  
Log file is /root/.vnc/Acadia:1.log  
  
root@Acadia:~# apt-get install apache2  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following extra packages will be installed:  
  apache2-mpm-worker apache2-utils apache2.2-bin apache2.2-common libapr1  
  libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap  
Suggested packages:  
  apache2-doc apache2-suexec apache2-suexec-custom ufw  
Recommended packages:  
  ssl-cert  
The following NEW packages will be installed:  
  apache2 apache2-mpm-worker apache2-utils apache2.2-bin apache2.2-common  
  libapr1 libaprutil1 libaprutil1-dbd-sqlite3 libaprutil1-ldap  
0 upgraded, 9 newly installed, 0 to remove and 0 not upgraded.  
Need to get 1590 kB of archives.  
After this operation, 4209 kB of additional disk space will be used.  
Do you want to continue [Y/n]? y
```

修改 apache2 配置文件 etc/apache2/apache2.conf:



```
*apache2.conf (/etc/apache2) - gedit
File Edit View Search Tools Documents Help

*apache2.conf ✕
# The following directives define some format nicknames for use with
# a CustomLog directive (see below).
# If you are behind a reverse proxy, you might want to change %h
# into %{X-Forwarded-For}i
#
LogFormat "%v:%p %h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" vhost_combined
LogFormat "%h %l %u %t \"%r\" %>s %O \"%{Referer}i\" \"%{User-Agent}i\"" combined
LogFormat "%h %l %u %t \"%r\" %>s %O" common
LogFormat "%{Referer}i -> %U" referer
LogFormat "%{User-agent}i" agent

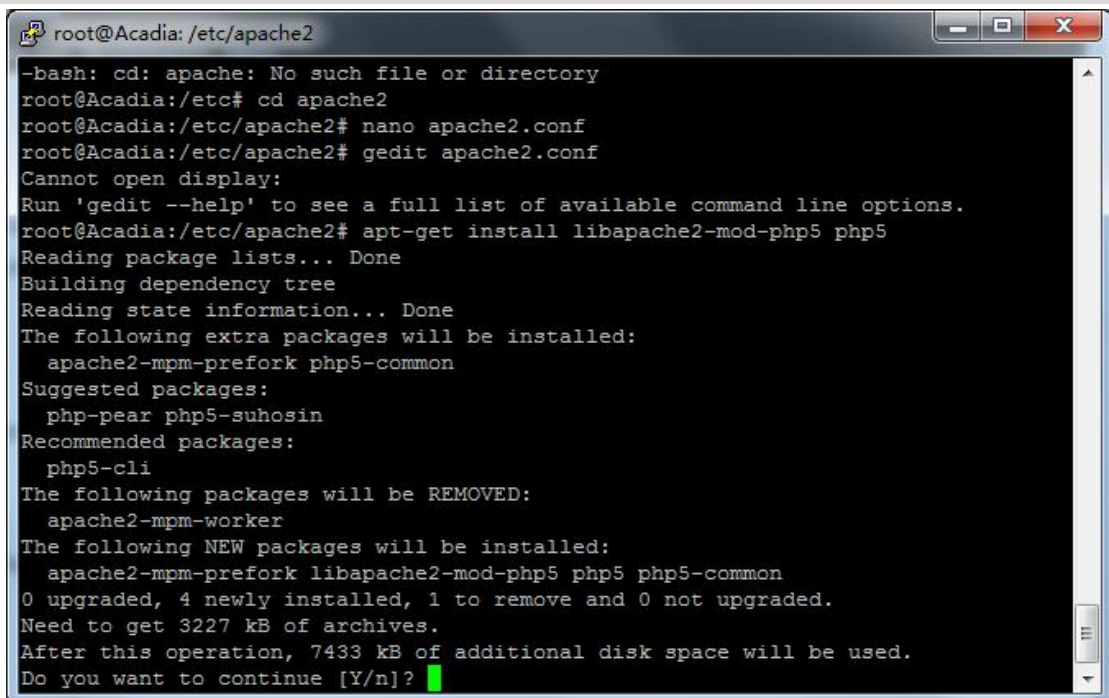
# Include of directories ignores editors' and dpkg's backup files,
# see README.Debian for details.

# Include generic snippets of statements
Include conf.d/

# Include the virtual host configurations:
Include sites-enabled/
ServerName localhost
```

安装 php5:

```
$ apt-get install libapache2-mod-php5 php5
```



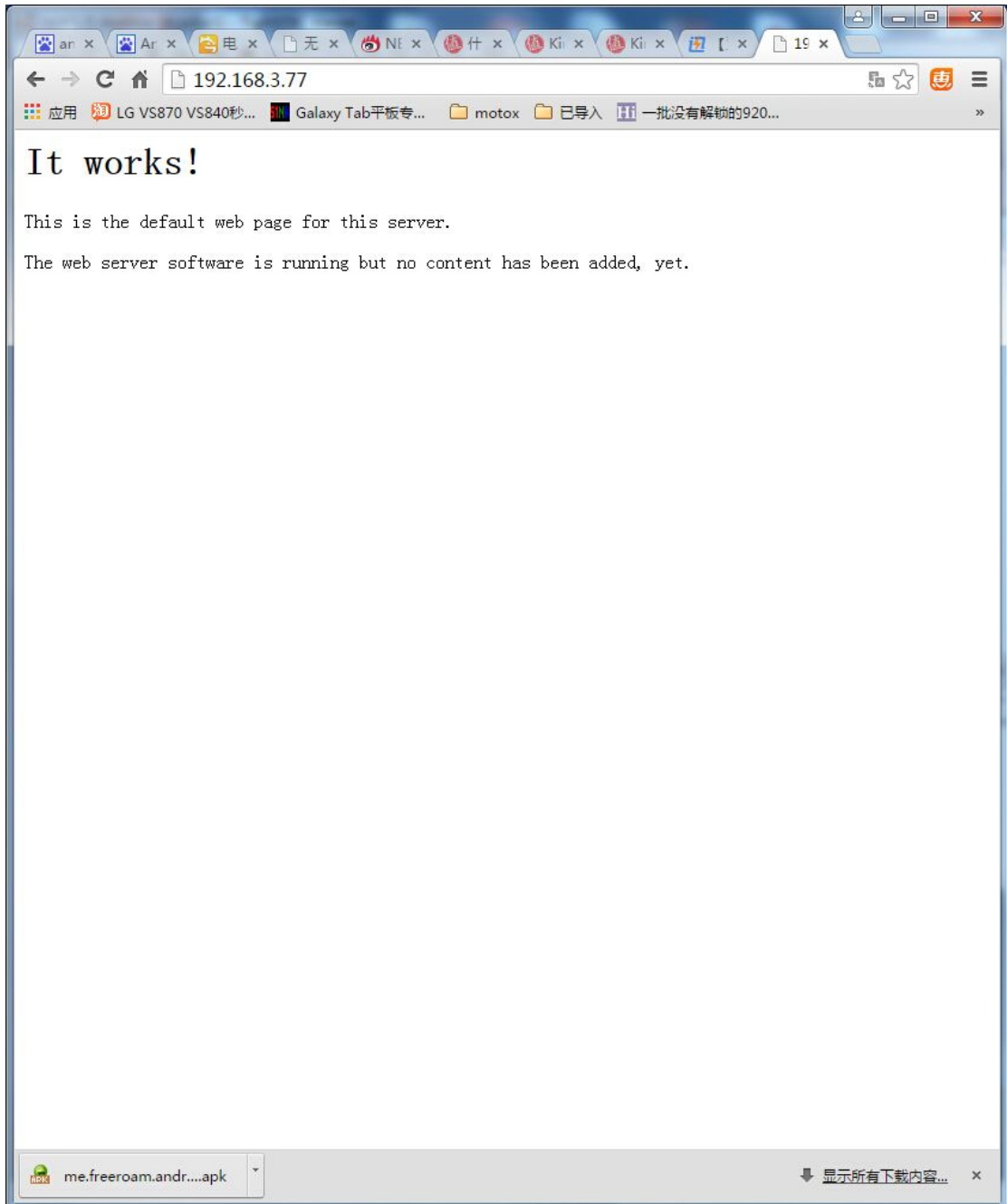
```
root@Acadia: /etc/apache2
-bash: cd: apache: No such file or directory
root@Acadia:/etc# cd apache2
root@Acadia:/etc/apache2# nano apache2.conf
root@Acadia:/etc/apache2# gedit apache2.conf
Cannot open display:
Run 'gedit --help' to see a full list of available command line options.
root@Acadia:/etc/apache2# apt-get install libapache2-mod-php5 php5
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
  apache2-mpm-prefork php5-common
Suggested packages:
  php-pear php5-suhosin
Recommended packages:
  php5-cli
The following packages will be REMOVED:
  apache2-mpm-worker
The following NEW packages will be installed:
  apache2-mpm-prefork libapache2-mod-php5 php5 php5-common
0 upgraded, 4 newly installed, 1 to remove and 0 not upgraded.
Need to get 3227 kB of archives.
After this operation, 7433 kB of additional disk space will be used.
Do you want to continue [Y/n]? 
```

查看 apache2 状态（如果是 running 表示运行正常）：

```
$ service apache2 status
```

```
root@Acadia:/etc/apache2# service apache2 status
Apache2 is running (pid 5058).
```

测试 apache2 服务器，浏览器打开 <http://192.168.3.77>:



编写网站：

主页面 Controller.php 源代码：

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<link href="acaDia.css" type="text/css" rel="stylesheet">
```

```

<title>我的 PCDuino</title>
</head>

<body>
<h1 class = "welcome">欢迎使用<span class = "en">acaDia</span>远程终端</h1>
<div class = "layout">
<div class = "inputbox">
<p class = "input-tips">请输入您的<span class = "enr">Linux</span>指令</p>
<form class = "CmdForm" method = "POST" action = "Console.php">
<div class = "inputField">
<input class = "Cmd" type = "text" name = "CmdLine" placeholder = "Input
Command Here" />
<input class = "button" type = "submit" name = "subm" value = "执行" />
</div>
</form>
</div>

</body>
</html>

```

执行脚本 Console.php 源代码:

```

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=gbk" />
<link href="acaDia.css" type="text/css" rel="stylesheet">
<title>我的 PCDuino</title>
</head>

<body>
<h1 class = "welcome">欢迎使用<span class = "en">acaDia</span>远程终端</h1>
<div class = "FeedBack">

<p class = "CmdTitle"> Console: </p>
<div class = "consoleArea">

<p class = "returnStr">

<?php
$CmdStr = $_POST['CmdLine'];
system($CmdStr,$msg);
str_replace("\n",'',$msg);

echo $msg;
?>

</p>

</div>
<button class = "return" type = "button"
onclick="location='Controller.php'">返回</button>
</div>
</body>
</html>

```

Css 样式 acaDia.css 源代码:

```

@charset "utf-8";
/* CSS Document */
body{background-color:#bbb;}
h1.welcome{

```

```

        color:#09C;
        font:"Microsoft YaHei UI";
        font-size:40px;
        text-align:center;
        height:100px;
        width:600px;
        margin:auto;
    }
    span.en{
        color:#fff;
        font:"Courier New", Courier, monospace;
        font-size:45px;
    }
    span.enr{
        color:#06C;
        font:"Courier New", Courier, monospace;
        font-size:20px;
    }
    div.layout{
        width:800px;
        margin:auto;
        background-color:#FFF;
        border:3px solid #666;
        padding-bottom:40px;
    }

    div.inputbox{
        width:650px;
        height:150px;
        margin-left:100px;
    }
    p.input-tips{
        color:#06F;
        font:"Microsoft YaHei UI";
        font-size:20px;
    }
    div.inputField{
        height:100px;
        width:700px;
    }
    input.Cmd{
        height:40px;
        width:340px;
        background-color:#FFF;
        font:"Courier New", Courier, monospace;
        border: 2px solid #f66;
        font-size:16px;
        padding-left:20px;
        padding-right:15px;
        color:#039;
    }
    input.Cmd:focus{
        background-color:#FFF;
    }

```

```

border: 2px solid #d66;
}
input.button{
    height:47px;
    margin-left:20px;
    width:170px;
    background-color:#09F;
    color:#FFF;
    font:"Microsoft YaHei UI";
    font-size:20px;
    border: 2px solid:#09c;
    border-radius: 5px;
}
input.button:hover{
    background-color:#09F;
    border: 2px solid:#0ac;
    color:#FFF;
}
div.FeedBack{
    height:auto;
    width:600px;
    margin:auto;
    background-color:#FFF;
    border:1px solid #aaa;
}
p.CmdTitle{
    font:"Courier New", Courier, monospace;
    font-size:18px;
    color:#039;
    text-align:left;
    line-height:5px;
}
p.returnStr{
    width:570px;
    height:auto;
    font:"Courier New", Courier, monospace;
    font-size:17px;
    line-height:20px;
    padding-left:5px;
    padding-right:5px;
    word-wrap:break-word;
    word-break:normal;
}
div.consoleArea{
    width:580px;
    height:auto;
    margin:auto;
    background-color:#fff;
}
button.return{
    height:30px;
    width:100px;
    margin:0px 0px 10px 10px;
    font:"Microsoft YaHei UI";

```



```
}  
color:#033;
```

将这些文件放到 acaDia 的/var/www/文件夹下，就可以通过浏览器访问。

3. 登陆网站之后可以输入命令控制 pcDuino
4. 同时把输出的结果返回给用户

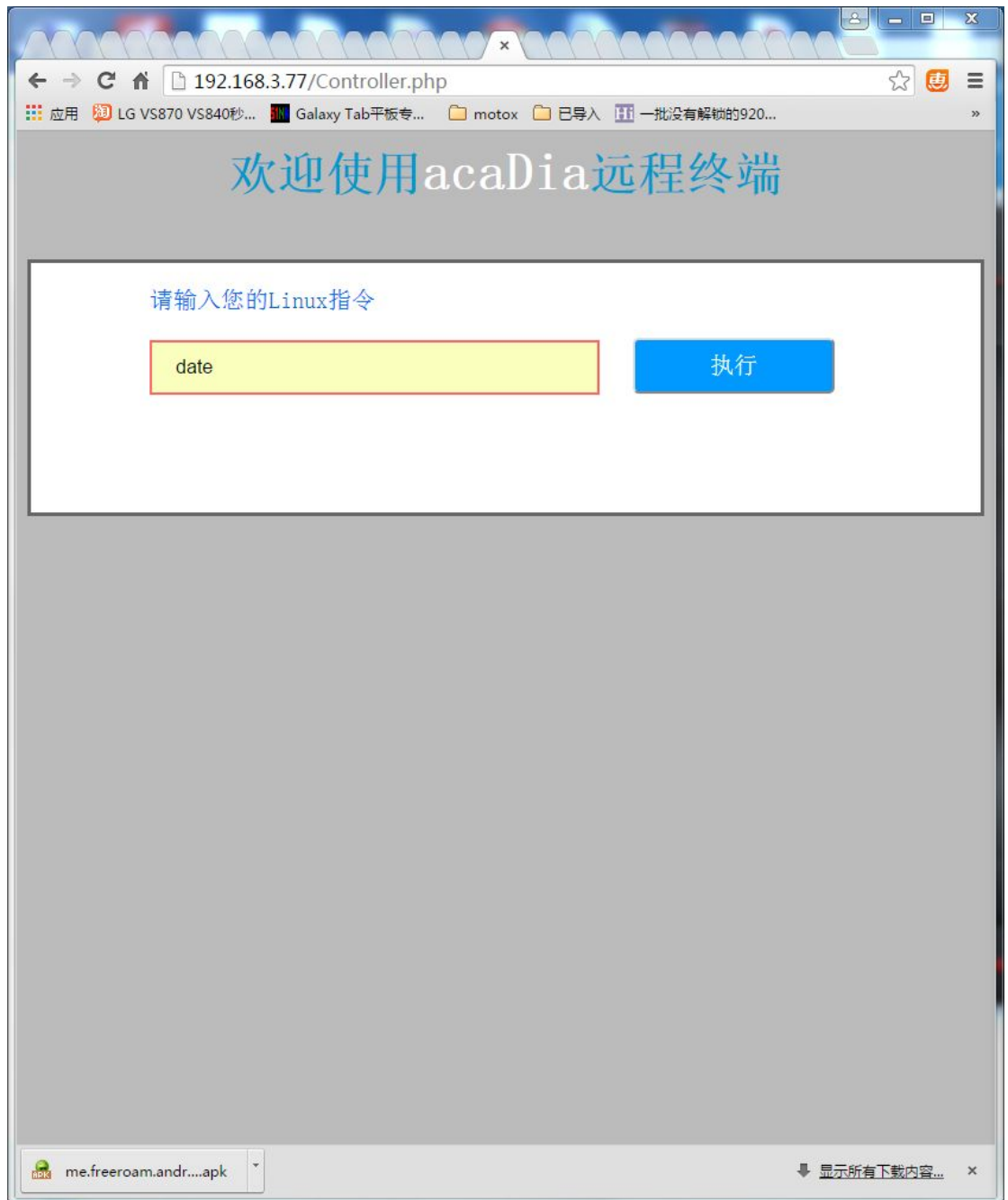
五、实验数据记录和处理

击 upload，开始执行程序：

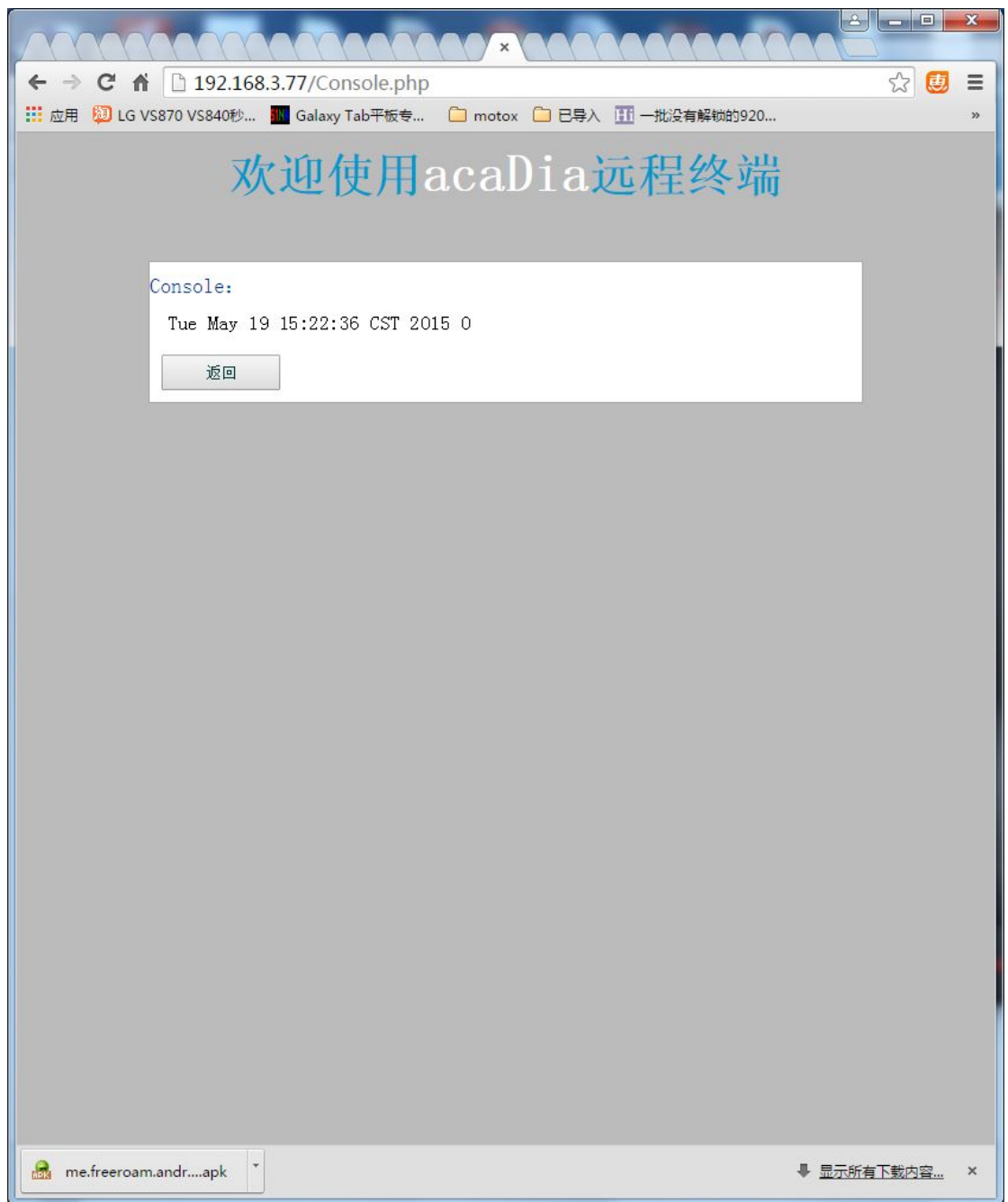
浏览器登录 <http://192.168.3.77/Controller.php>:



输入 date，点击执行：



返回输出结果：



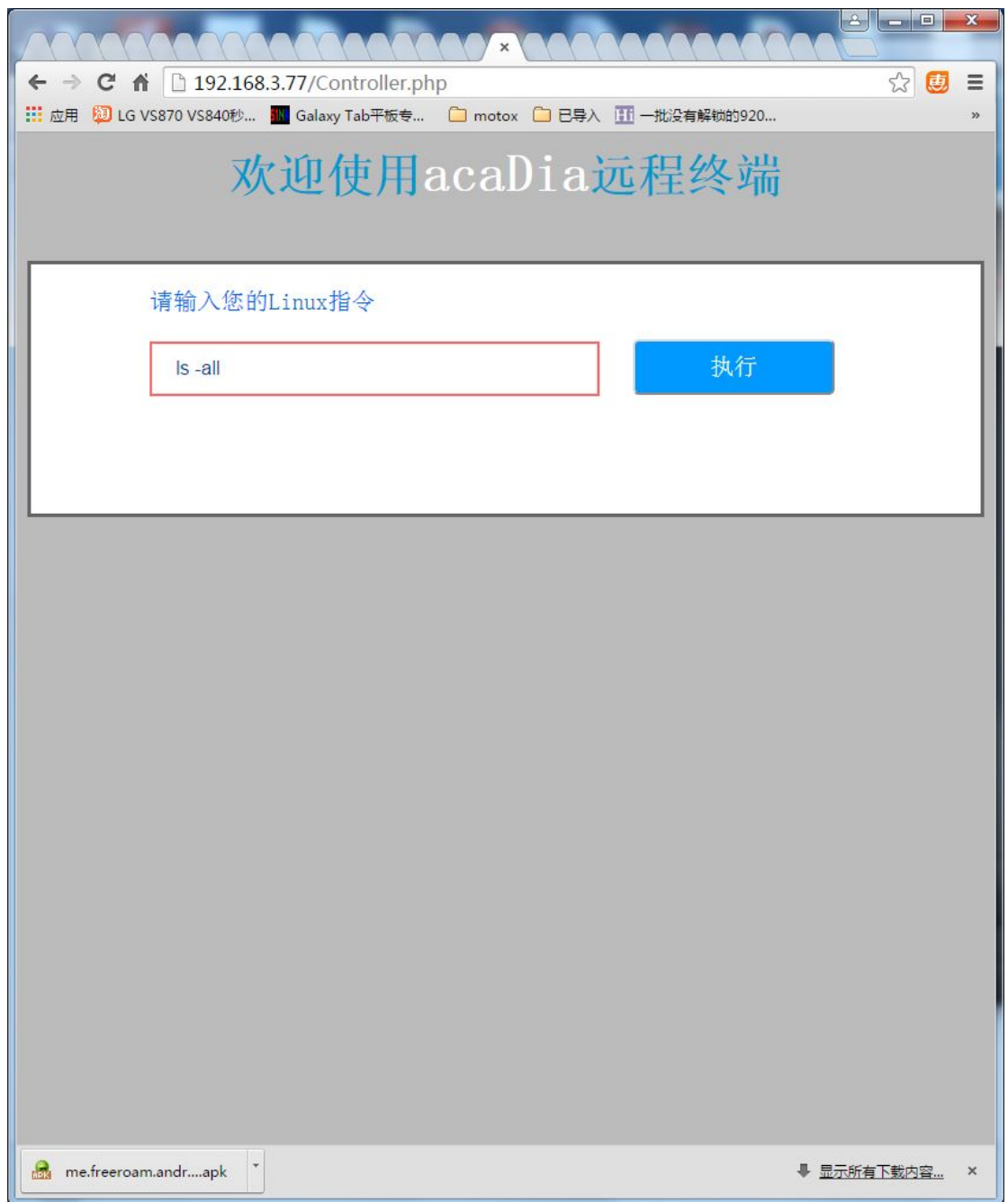
点击返回，输入 **whoami**，点击执行：



返回输出结果:



点击返回，输入 `ls -all`，点击执行：



返回输出结果:



六、实验结果与分析

实验成功。

七、讨论、心得

出于安全考虑，在网站上访问 PCduino 时，php 使用 `system()` 函数执行指令，故有权限限制，有些指令无法执行，但如果想要获取所有权限，可以使用 `popen()` 函数执行 `sudo su` 来获取全部权限，但这出于风险的考虑，一般不会这样做。