

## 13. RPi Side as systemd Service

**NOTE - December 11, 2023:** I am continuing with this project pushed down onto my stack (so-to-speak) in order to give my time to several other projects and activities that have fallen a bit to far by the wayside. Do not yet have a sense of when I'll return back to this project. But in order to have the sensor running 'in the field,' in an actual flower pot, I feel the need to have the RPi side application autostart at reboot time. So I have take some time to add this feature.

**Purpose:** Make the RPi application, RPi\_CapDataReceive, into a systemd Service that starts at reboot.

**Goal:** Create a systemd unit file. Make any needed mods to the RPi\_CapDataReceive.cpp code to support running as an autostart background service.

### Design Notes:

#### *Considerations:*

1. Absolute minimal change to the code.
2. Might want to consider writing a log file for error/debug info as I won't have a terminal screen available to be able to see any program output. NOTE: I elected not to do this as, instead, I modified the program to write good system log entries which I can inspect with journalctl.

### Key References --

#### **systemd Service Instructional References --**

<https://linuxhandbook.com/create-systemd-services/>  
<https://www.tecmint.com/create-systemd-service-linux/>

#### **Raspberry Pi Login --**

Pi user is: pi. So SSH login is:

```
ssh pi@[ip address of the RPi on my LAN]  
password to the pi is: pi9012
```

NOTE: I have created an alias command in my .bash\_profile for the login: **pilogin'**

To see user custom services:

```
systemctl --user list-unit-files -a
```

And then once in, get into the working directory for the nRF24 utilities and programs:

```
cd /home/rf24libs/RF24/examples_linux/build
```

The run the RPi receiving program:

```
./RPi_CapDataReceive
```

Good reference for running the process detached from terminal: <https://linuxconfig.org/detach-process-program-from-current-shell-to-keep-it-alive-after-logout>

Based on this, the command to run in an SSH terminal to keep the RPi programming forever, even after detaching the SSH session, is:

```
nohup /home/rf24libs/RF24/examples_linux/build
/RPi_CapDataReceive &
```

### Working with Service --

To see user custom services: `systemctl list-unit-files -a`

To modify the service file follow these steps:

`nano /etc/systemd/system/RPi_DummyService.service` || Then save the file.

Reload services: `systemctl daemon-reload`

Disable Service: `systemctl disable RPi_DummyService`

Enable Service - in theory this will cause it to auto-start at boot: `systemctl enable RPi_DummyService`

To start service manually: `systemctl start RPi_DummyService`

To filter journal entries for the service: `journalctl -u RPi_DummyService.service`

### To Modify RPi side .cpp code --

Use Kate on my desktop.

Then copy to the RPi using below command:

```
scp /home/jroc/Dropbox/projects/MoistureSensor/Software/RPi/RPi_CapDataReceive.cpp pi@[ip-address-of-
the-RPi-on-my-LAN]:/home/rf24libs/RF24/examples_linux/
```

NOTE: My bash alias command for the above is: **'picodecopy'**

Then on the RPi, cd into the build directory and execute 'make'

BUT if this is the first iteration of the program, you need to first add it to CMakeLists.txt in the examples\_linux directory (above the build directory).

NOTE: *All the code is under git version control.* So the executables for both the ATtiny and RPi are on my desktop.

**GitHub Repo:** <https://github.com/JeffRocchio/Wireless-Soil-Moisture-Sensor>

**Next Step:** Fabricate a few different capacitor sensors to test.

### 12/11/2023 --

**Results:** **Success** in having RPi-CapDataReceive auto-run on the Raspberry Pi boot-up as a systemd service.

#### Changes from 12/08:

1. Modified `RPi_CapDataReceive.cpp` so it's console output makes better sense in the system journal as a service. Also added a parameter switch, "-v," for 'verbose' output which a user could use when invoking the program from a terminal to get the same verbose and real-time output as prior releases.
2. Created a systemd service file: `/etc/systemd/system/RPi_CapDataReceive.service`.
3. Enabled the above service file to run at boot.

**ATTiny Code:** No changes made to this code today.

**RPi Code:** `RPi_CapDataReceive.cpp`. Made mods so that it writes nice journalctl log entries. Added the -v parameter to obtain the old verbose output onto a terminal screen, if desired, when manually run from an open terminal window.

**Raspberry Pi Config:** Created systemd unit file: `etc/systemd/system/RPi_CatDataReceive.service`.

**Git:** Commit Description: MS13, 2023-12-11: RPi\_CapDataReceivesystemd service running on RPi, autostart at bootup. SUCCESS - COMPLETE.

**Next Steps:** None for this milestone - Milestone complete.

**12/08/2023 --**

**Results:** **Success** in getting a dummy service to auto-run on the Raspberry Pi boot-up.

I created a simple CPP program to act as a dummy service. Wanted to do this before trying to configure the main RPi sensor data capture program as a service so that I could work out the details of how best to do this.

1. Installed the `RPi_DummyService.service` file as a root system service by placing it in `/etc/systemd/system/RPi_DummyService.service`.
2. Set the After target to [multi-user.target](#); same for WantedBy in the [Install] section.
3. 'enable'd the service.
4. Rebooted the PI.
5. `RPi_DummyService` ran just fine; and exited with success. And this includes both writing to my specific log file `dmyservice-log.txt` and the 'cout' lines in my code also wrote very nicely into the journalctl system log such that I could execute `sudo journalctl -u RPi-DummyService` and see the entries for the services being started up, my 'cout' strings, and systemd telling me the service completed successfully.

So this proof-of-concept is a success. Now I can modify my sensor-server code accordingly to run as a boot-up service.

**Changes from 12/07:**

1. Modified `RPi_DummyService.cpp` so it's console output makes better sense in the system journal.
2. Moved the service file from `/home/pi/.config/user/RPi_DummyService.service` TO `/etc/systemd/system/RPi_DummyService.service`. (Thus removing it from `/home/pi/.config/systemd/user`).
3. `sudo enable'd` the now root system service.

**ATTiny Code:** No changes made to this code today.

**RPi Code:** `RPi_DummyService.cpp`. Made mods so that how it writes to it's own log file and the journalctl log is more sensible.

journalctl -e is more concise.

**Raspberry Pi Config:** Created systemd unit file: `etc/systemd/system/RPi_DummyService.service`.