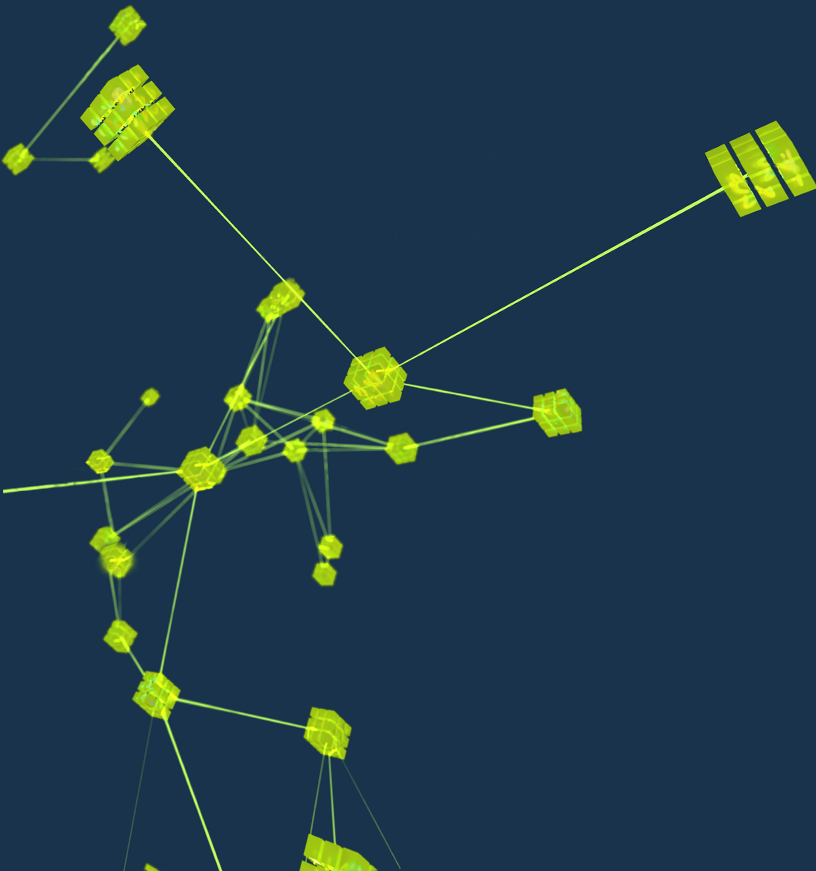


EPICS

A electronic balance for beehives
(a more private project)



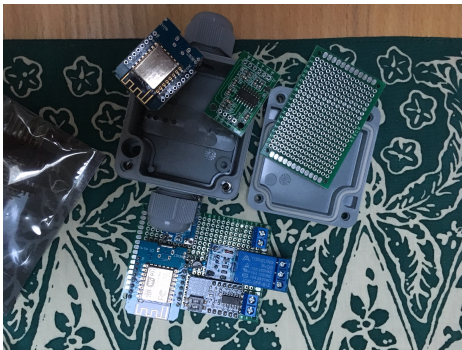
WHY AN ELECTRONIC BALANCE (SCALE)

- A hive scale is an important tool which gives assessment if food consumption has been high and whether there is a need for feeding
- It is important to know how long the winter storage is, in addition it gives a very good indication of periods without any nectar flow



HOW IS IT IMPLEMENTED

The central module is placed between two wooden plates under the hive and consists of an Arduino WeMos D1 (including WiFi), a temperature sensor, a single point load cell for weighing purposes (BOSCHE H30A), a load cell amplifier (HX711), and a pb accu (4V)



- With the deep sleep function of the Arduino platform one can maximize the battery life. In deep sleep it consumes just 40 μ A.
- WeMos D1 is a ESP8266 WiFi based board
- It's super easy to program



```
bbbGreenUdpSender | Arduino 1.8.5  
bbbGreenUdpSender §  
void loop() {  
  double Weight;  
  double Temp;  
  char buffer[64];  
  scale.power_up();  
  Weight = scale.get_units(20);  
  scale.power_down();  
  Weight -= bbbOffset;  
  Temp = readTemp(tAddr, ds);  
  /* Gruen (4711), gelb (4712), blau (4713), braun (4714) gelb, braun, */  
  sprintf(buffer, "%f,%f\n", Weight, Temp);  
  int res;  
  UDP.beginPacket(bienenwaagenIp, bienenwaagenPort);  
  UDP.write(buffer);  
  UDP.endPacket();  
  yield();  
  delay (1000);  
  ESP.deepSleep(sleepSeconds * 1000000, WAKE_RF_DEFAULT );  
}
```

125 WEMOS D1 & mini, 80 MHz, 115200, 4M (3M SPIFFS), Disabled, None on /dev/cu.wchusbserial1410

- Arduino sends UDP messages to an IOC running on a VServer
- IOC receives data and “put” them into PV’s

```
epics@bienenwaagen:~/bb/BBB/bbbApp/Db$ cat bbb.db
record(waveform,"$(P)") {
  field(DTYP,"UDP Intr")
  field(DESC,"$(D)")
  field(SCAN,"I/O Intr")
  field(INP,"$(PORT)")
  field(FTVL,"DOUBLE")
  field(NELM,"4")
}

record(subArray,"$(P)[0]") {
  field(INP,"$(P) CP")
  field(INDX,"0")
  field(MALM,"4")
  field(NELM,"1")
  field(FTVL,"DOUBLE")
  field(FLNK,"$(P):Weight")
}

record(ai,"$(P):Weight") {
  field(INP,"$(P)[0].VAL")
  field(EGU,"Kg")
}

record(subArray,"$(P)[1]") {
  field(INP,"$(P) CP")
  field(INDX,"1")
  field(MALM,"4")
  field(NELM,"1")
  field(FTVL,"DOUBLE")
  field(FLNK,"$(P):Temp")
}

record(ai,"$(P):Temp") {
  field(INP,"$(P)[1].VAL")
  field(EGU,"gradC")
}
```

```
epicsFloat64 *dbuf;

while(1) {

  if(!buf) {
    /* allocate and initialize a new buffer for later (local) use */
    buf = callocMustSucceed(1, nbytes, "buffer");
    dbuf = (epicsFloat64*)buf;
  }

  // try to receive some data, this is a blocking call
  if ((recv_len = recvfrom(s, receiveBuf, RECV_BUFLEN, 0,
                          (struct sockaddr *) &si_other, &slen)) == -1)
  {
    perror("recvfrom()");
    return;
  }
  receiveBuf[recv_len] = 0;
  /* print details of the client/peer and the data received */
  printf("Received packet from %s:%d\n", inet_ntoa(si_other.sin_addr),
         ntohs(si_other.sin_port));
  printf("received: %s\n", receiveBuf);
  if (nbytes >= 2 * sizeof(double)) {
    sscanf (receiveBuf, "%lf%lf", &dbuf[0], &dbuf[1]);
    printf("scanf : %lf, %lf\n", dbuf[0], dbuf[1]);
  }


  epicsMutexMustLock(priv->lock);
  if(!priv->nextBuffer) {
    /* make the local buffer available to the read_wf function */
    priv->nextBuffer = buf;
    buf = NULL;
    priv->numBytes = priv->maxBytes;
  }
  epicsMutexUnlock(priv->lock);

  scanIoImmediate(priv->scan, priorityHigh);
}
```

```
epics@bienenwaagen:~/bb/BBB$ ps -ef | grep proc
bbb      1379      1  0 Jun05 ?        00:00:50 /usr/bin/procServ -q -c /epics/iocs/bbb
-i ^D^C^] -p /var/run/softioc-bbb.pid -n bbb --restrict --logfile=/var/log/softioc/bbb
/bbb.log --coresize= 4051 /epics/iocs/bbb/st.cmd
```

- To archive the incoming data archiver appliance is used

Bee-log (for Bettina)



BERLINER GARTEN

HONIG

Home Reports Metrics Storage Appliances Integration
Help

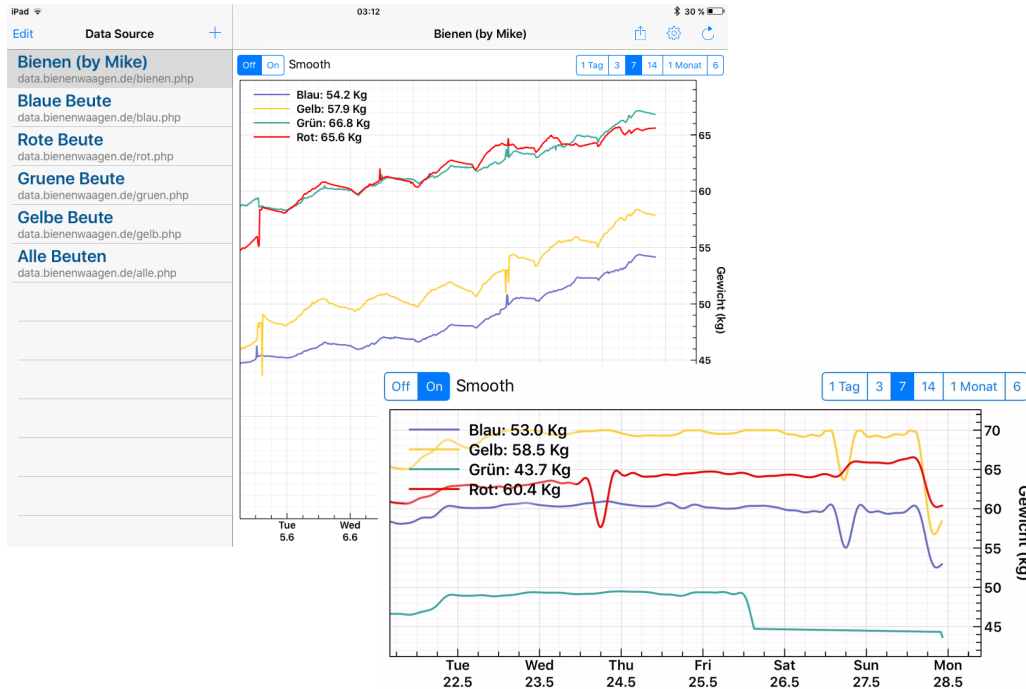
This is the EPICS archiver appliance management console for Bettinas beehive balances.
Please contact Heinz if you have any issues.

To check the status of or to archive some PV's, please type in some PV names here.

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Page 1 of 1

PV Name	Status	Appliance	Connected?	Monitored?	Sampling period	Last event	Details	Quick chart
BBB:Blau:Temp	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:27:41 +02:00		
BBB:Blau:Weight	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:27:41 +02:00		
BBB:Gelb:Temp	Being archived	appliance0	true	true	1.0	Jun/05/2018 21:54:42 +02:00		
BBB:Gelb:Weight	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:25:25 +02:00		
BBB:Gruen:Temp	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:23:51 +02:00		
BBB:Gruen:Weight	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:28:43 +02:00		
BBB:NN:Temp	Being archived	appliance0	false	true	1.0	Never		
BBB:NN:Weight	Being archived	appliance0	false	true	1.0	Never		
BBB:Rot:Temp	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:19:07 +02:00		
BBB:Rot:Weight	Being archived	appliance0	true	true	1.0	Jun/11/2018 15:28:51 +02:00		

- To visualize data on iPhone/iPad Daviz is used



App Store Preview

This app is only available on the App Store for iOS devices.

Screenshots iPhone iPad

Description

Daviz is a data visualisation tool for iOS. The App works both on iPhone and iPad. The macro language which is used by Daviz is very similar to the one you can find in Plot2

In the App you have to enter a data source which is just an URL. In the simplest case this can be a text file which provides data and formatting information (See documentation at <https://davizdoc.micw.org>)...

[more](#)

- data read from the archiver on demand by JSON like
 $\$url = "http://185.228.137.144:17668/retrieval/data/getData.json?pv=median_1800(BBB\%3AGelb\%3ATemp)\&from=\$old\&to=\$now";$
 $\$json = file_get_contents(\$url);$