Medicine dispenser

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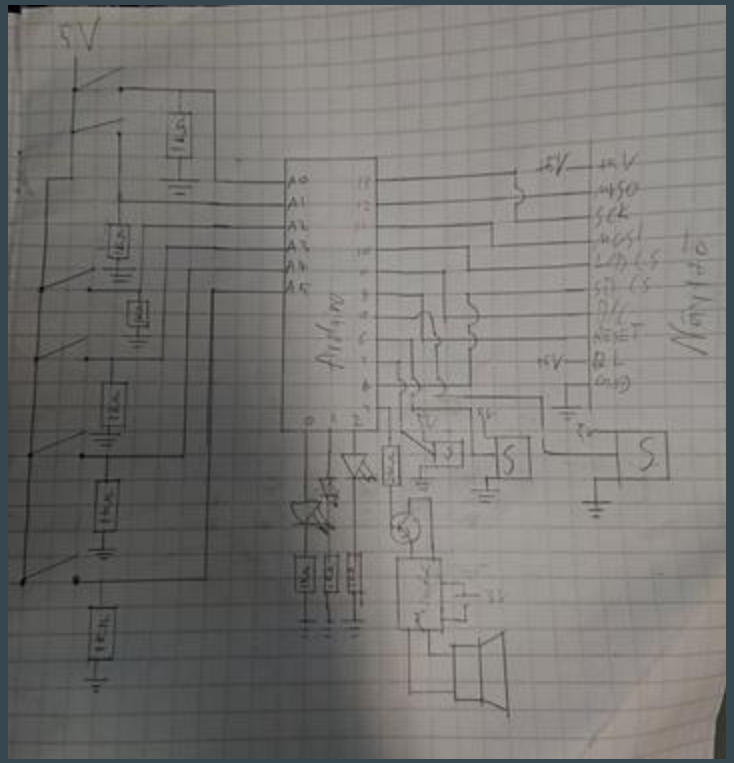
Project topic

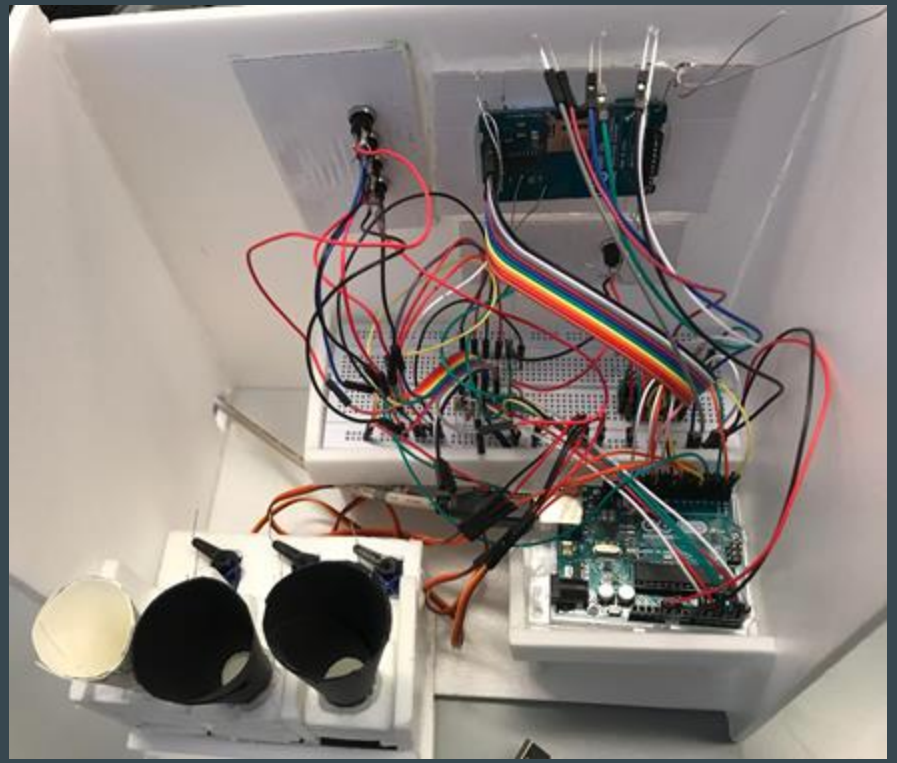
- Allows regular dosing of medicines at the right amount at the right time
- The aim of the project was to create the product only with its basic functionality. For example, the dosage is only given in tablets of a certain size and the device does not warn if a failure has occurred.
- Waterfall Model: specification, design, programming, integration, testing
- Basic functions: set clock, fill containers, add / removal alarm, dispensing.

Components

- Housing is made of insulating board (styrox)
- Arduino Uno R3
- Arduino Robot LCD 1.77” screen
- 6 x buttons
- 3 x Tower Pro SG92R
- 3 x LED
- Breadboard
- Musicbox
- Wires. A LOT.

Wiring





Clock

- Clock was made using MsTimer2
- To keep time we used kello() function that we call every 5 seconds to keep time.
- Not every second because if screen is drawing something and calls kello() function it fails to continue the main code
- This is also the place where we check should there be an alarm at that time. When alarm is triggered, container number and amount of tablets is put into annosteltava array and green LED is turned on.

```
sekunnit += 5;
if (sekunnit >= 60) {
  sekunnit = 0;
  //Tyhjennetään minuutit piirtämällä musta laatikko päälle
  naytto.noStroke();
  if (!kellossa) {
    //Jos ei olla isossa kelloa suoritetaan tämä
    naytto.rect(36, 0, 24, 16);
  } else {
    naytto.rect(72, 0, 44, 32);
  }
  kirjoitusVari;
  minuutit++;

  tarkistaHalyytys();

  if (minuutit >= 60) {
    minuutit = 0;
    //Tyhjennetään tunnit piirtämällä musta laatikko päälle
    naytto.noStroke();
    if (!kellossa) {
      //Jos ei olla isossa kelloa suoritetaan tämä
      naytto.rect(0, 0, 24, 16);
    } else {
      naytto.rect(0, 0, 44, 32);
    }
    kirjoitusVari;
    tunnit++;
    tarkistaHalyytys();
    if (tunnit >= 24) {
      tunnit = 0;
    }
  }
}
```

```
}
  }
    }
```

Filling a container

- Select which container to fill and how many pills to add
- Plan was to have a maximum of 99 pills for each container
- After adding pills through the screen, add that many to the selected container and it's ready for alarm
- If there are less than 3 pills remaining in a container, the YELLOW LED will turn on and the screen will notice to fill up the container
- If container is empty, RED LED will trigger on and warning will appear on screen to fill up the container

Checking status

- Is used to check each containers alarms and amount of pills

- Alarms can also be deleted to make more room

Adding an alarm

- User first selects which container to add the alarm to by using the four button on the side
- Then user selects the amount of pills for that alarm
- And finally at what time user wants the alarm to happen

```
do { //Asetetaan määrä kuinka paljon annetaan.
  luePinnit();

  if (jarrutus) { //Estetään nopea lukujen rullaaminen.
  } else if (OK > 800) {
    valmis = true;
    jarru = true;
  } else if (ylos > 800) {
    valiMaara++;
    if (valiMaara >= 99) {
      valiMaara = 0;
    }
    naytto.noStroke();
    naytto.rect(60, 30, 80, 26);
    kirjoitusVari;
    jarru = true;
  } else if (alas > 800) {
    valiMaara--;
    if (valiMaara < 0) {
      valiMaara = 99;
    }
    naytto.noStroke();
    naytto.rect(60, 30, 80, 26);
    kirjoitusVari;
    jarru = true;
  } else if (back > 800) {
    jarru = true;
    return;
  } else {
    jarru = false;
  }

  naytto.setTextSize(3);
  maaraKirjoitukseen(valiMaara);
  naytto.text(tulostus, 60, 30);

  delay(odotus);
} while (!valmis);
valmis = !valmis;
```

Dispensing

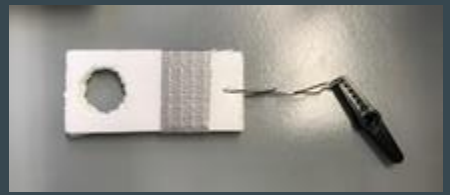
- The servo control works by giving desired servo an angle which it will take
- Annosteltava array is used to keep track how many tablets should be given next and from which container

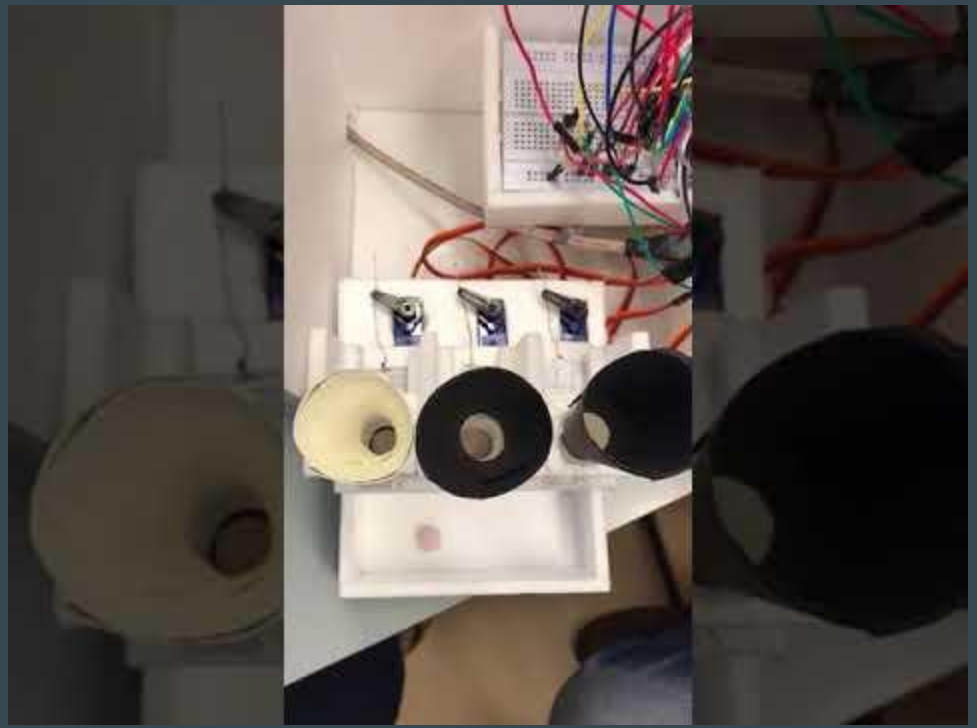
```
for (int i = 0; i < annosteltavaLkm; i++) {
  if (annosteltava[i][0] == 1) {
    for (int j = 0; j < annosteltava[i][1]; j++) {
      servo1.write(180);//Liikutetaan että lääke tippuu
      delay(500);
      servo1.write(70);//Liikutetaan takaisin alku tilanteesen.
      sailio1--;
      delay(1000);
    }
  } else if (annosteltava[i][0] == 2) {
    for (int j = 0; j < annosteltava[i][1]; j++) {
      servo2.write(180);//Liikutetaan että lääke tippuu
      delay(500);
      servo2.write(70);//Liikutetaan takaisin alku tilanteesen.
      sailio2--;
      delay(1000);
    }
  } else if (annosteltava[i][0] == 3) {
    for (int j = 0; j < annosteltava[i][1]; j++) {
      servo3.write(180);//Liikutetaan että lääke tippuu
      delay(500);
      servo3.write(70);//Liikutetaan takaisin alku tilanteesen.
      sailio3--;
      delay(1000);
    }
  }
  delay(500);
}
```

```
}
  delay(200);
  }
    }
```

Dispensing

- While tablet is inside the styrox container, servo moves, extends the styrox tray which causes tablet to fall.





Successes

- Screen
- Sound alarm
- Dispensing mechanism
- User interface

Failures

- Lack of SD card functionality
- Faulty button
- Reliability of tablet serving
- Sturdiness of struction materials

Overall experience

Questions?