FB6 Based Feeding Robot

Team 1

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Problem statement

Build a robot which would be able identify the location of a plant and dispense the fertilizer in Green House

Requirements specification

- Navigate a robot through green house
- Identify plant stem location (robot motion)
- Identify root location (arm motion)
- Dispense solid fertilizer (rotor motion)
- Stop dispensing on specified quantity (quantity control)
- Fertilizer storage level detecting
- Verification of correct operation
- Power management

Final systems

- Navigation using white-line following
- Identification of the plant location using red dots
- Retractable arm using DC motor and encoder
- Root location using Image processing
- Controlled dispensing using Archimedes screw mechanism
- Counting fertilizer grains using encoder
- Save an image of root after dispensing

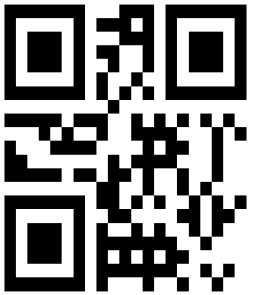
Navigation

- Ultrasonic
  - blind spot at less than 6 cm
- Infra-red
  - Different sensor giving different results
  - Different surfaces gives different result
  - Effect of ambient light
  - Ducts in the wall

- white-line following
  - Potentiometers available to adjust sensor

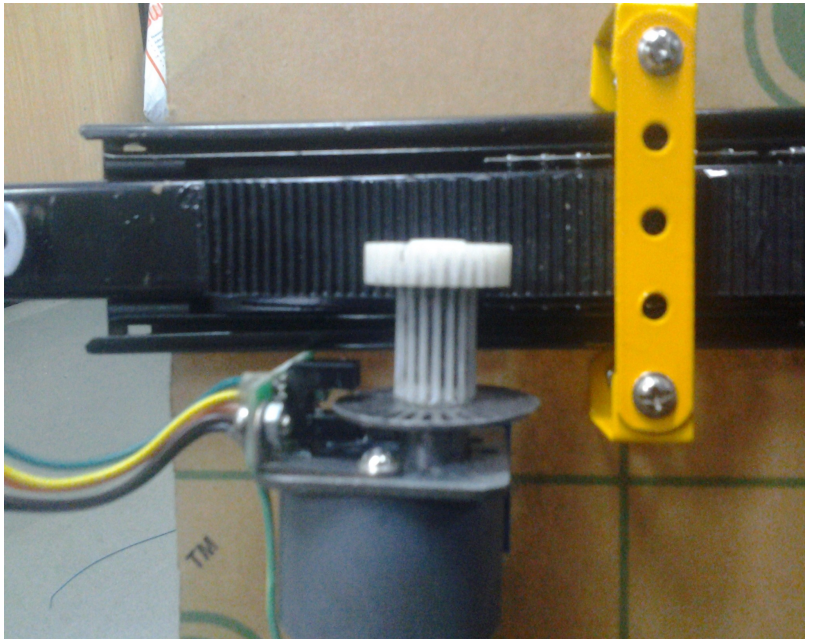
Identification of plant location

- Image processing to identify stem
  - Large number of samples required
  - Too much learning time
- Qr identification
  - Camera positioning
- Red dot identification
  - Effect of Ambient light
  - Back tracking



Retractable arm

- FB VI
  - GPIO Ports
  - PWM coding
  - Encoder counting
- Of the shelf components
  - L293D motor Driver
  - ATMEGA32
  - AVR-AVR incompatibility
  - FB VI api
  - Drawer slides for front and back movements

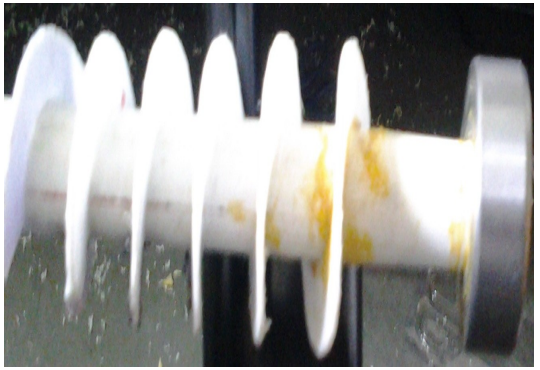


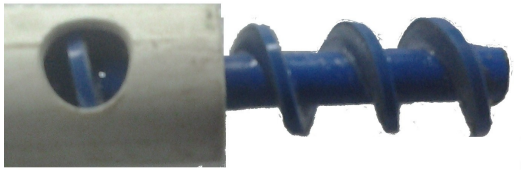
Root location

- Root orientation
- Camera positioning
- False identification
- Multiple methods for template matching

Dispensing

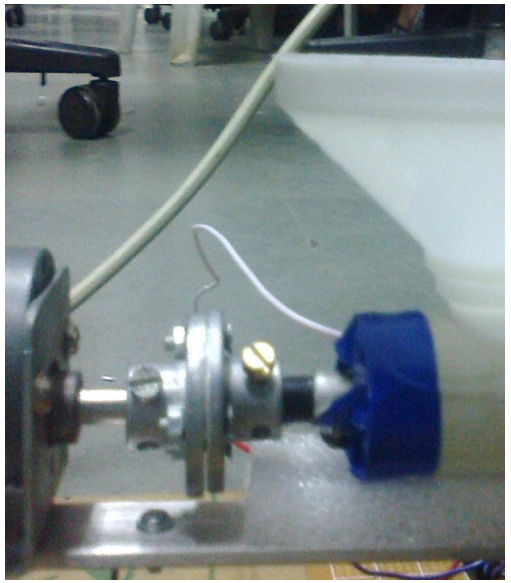
- Archimedes screw mechanism
  - Used pipe as axis
  - Disks made out of Paint can
    - Too big, not regular
  - Disks made of thick lamination sheets
    - Irregularity increased, low strength
  - Flexible water pipes wound on an axis
    - Not flexible enough on small axis, irregular inner space
  - Multiple layers of strips made of folder cover
    - Achieved required shape and size

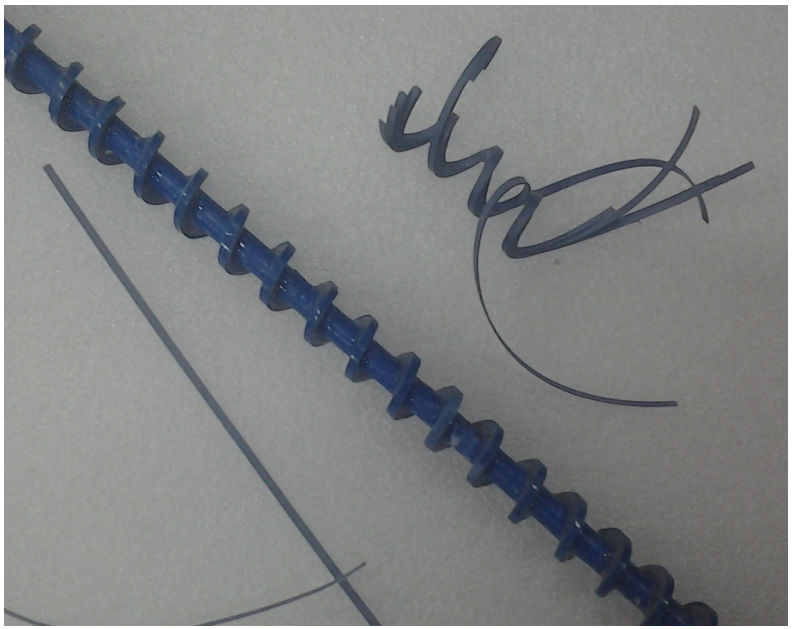




Dispensing

- Motor encoder
  - Counting
  - Availability of fertilizer





Future work

- Navigation
- Qr code identification
- Better learning algorithms for root detection
- Additional functionality like weeding etc.
- Liquid dispensing
- Power management

Thank You