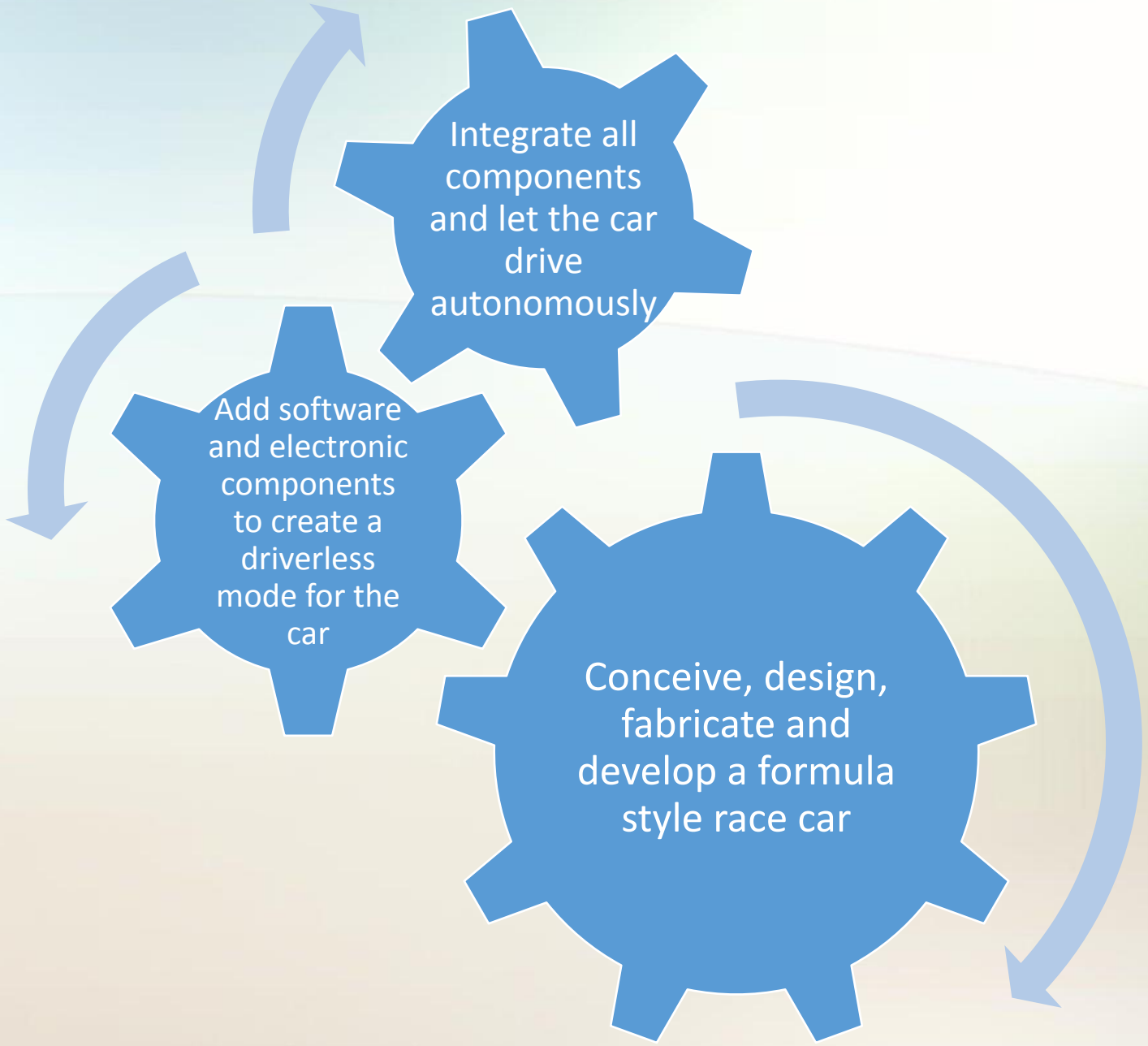
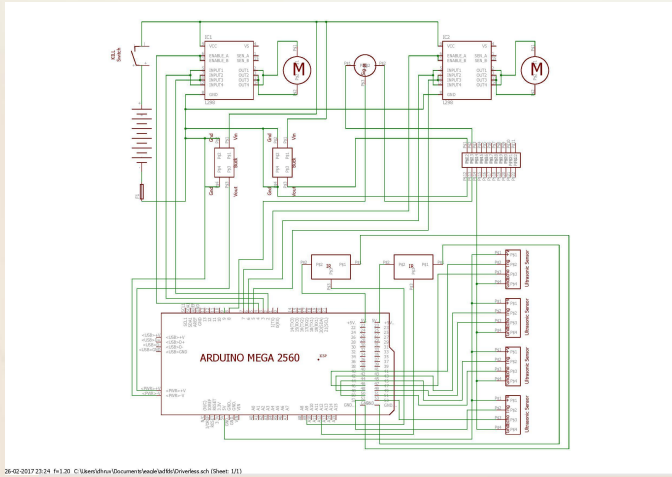
INTENT OF DRIVERLESS EVENT



DRIVERLESS PROTOTYPE

Components-

1. One servo
   -MG90
2. Two DC motors
3. Motor drivers
   - L298N
4. 12V Lead acid battery



Initial schematic design – including IR sensors

Prototype – Design and testing

DESIGN CONSIDERATIONS

Reliability

- Optimal position of sensors
- Choice of motors and actuators with respect to weight

Cost

- Selection of sensors and other components
- Minimal data training cost

Performance - Hardware and software

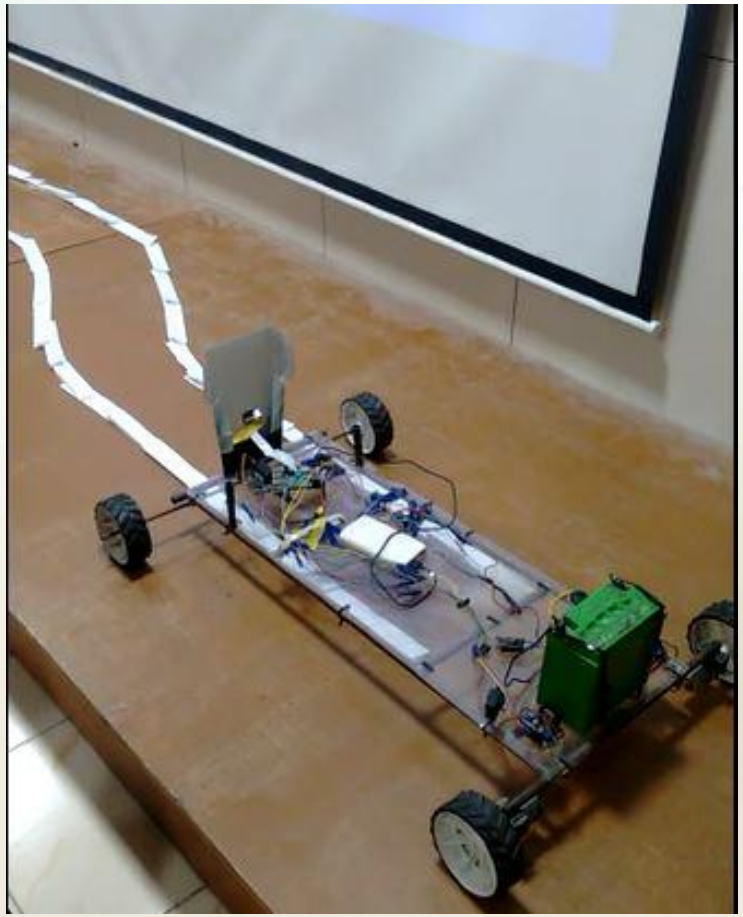
- Manageable wiring
- Efficient integration
- Efficient algorithms
- No delays, real time prediction

Prototype 1 – Driverless prototype using CV via hand-engineering

- Components
  - Raspberry Pi 3
  - Pi Camera
- Aim
  - Prototype to run between two white lanes
- Method
  - Implementation of Computer Vision techniques
    - Hough lines
    - Filters
    - Edge detection
    - Region of interest

Pi camera

Raspberry Pi 3



Prototype

Prototype 1 - Video

Test image

Smoothening

Region of interest

Correct lane detection after multiple iterations

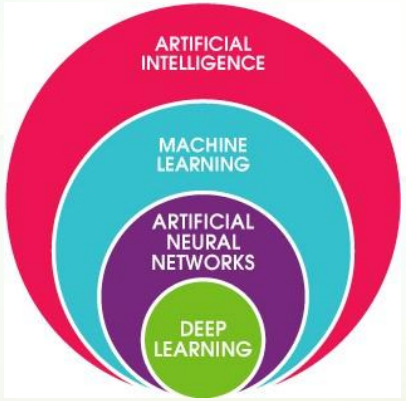
Gray scaling

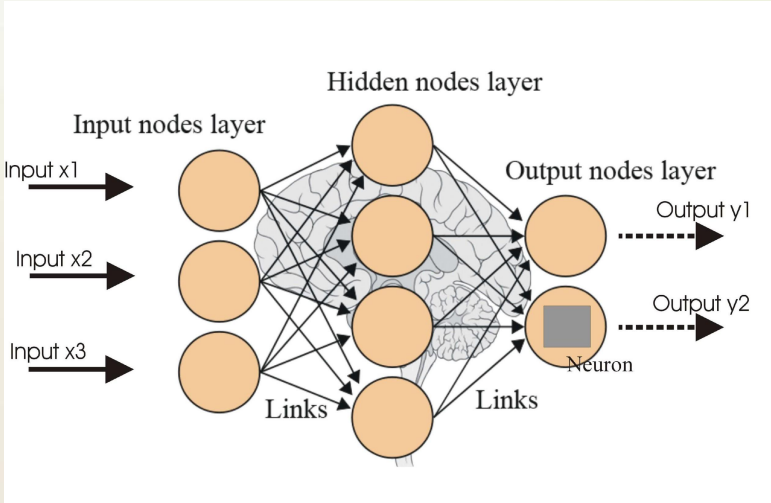
Edge detection

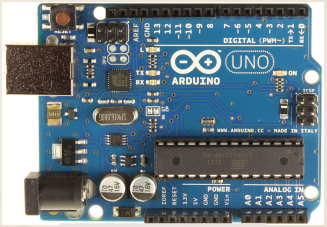
Incorrect lane detection

Prototype 2 – Driverless prototype using CV and ML

- Components
  - Arduino Uno
  - Logitech Camera
- Aim
  - Prototype to run between two white lanes
  - Prediction of steering angle
- Dataset
  - Input: images labeled with steering angle
  - Output: predicted steering angle
- Machine Learning
  - Artificial neural network with artificial neurons
  - Learning achieved by giving weight to neurons



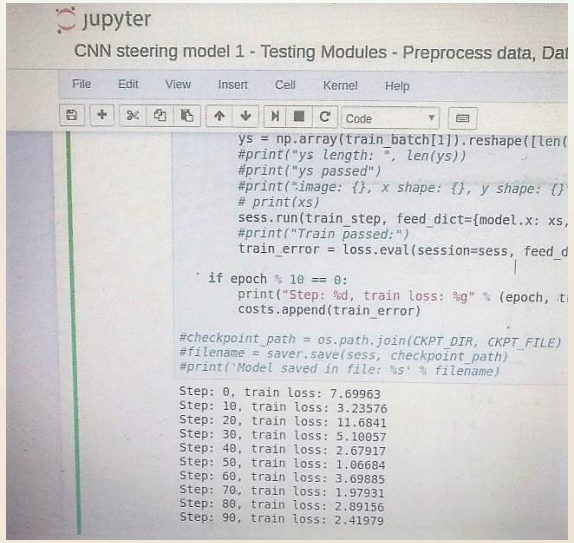


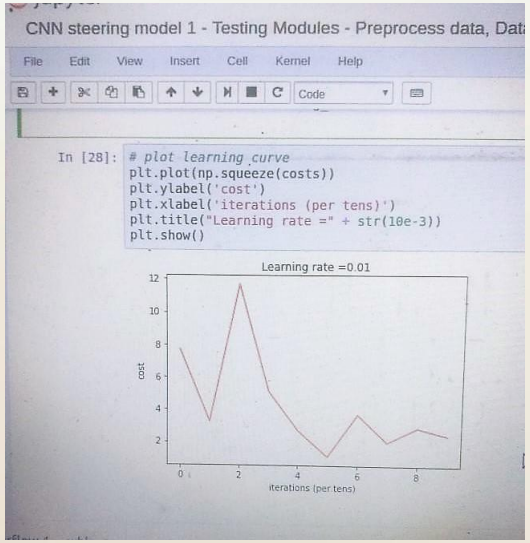


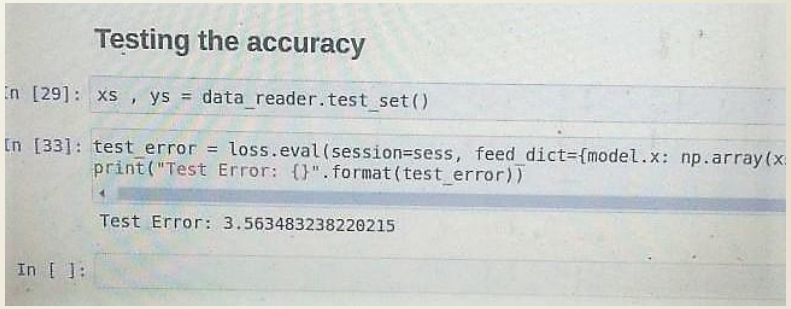
Arduino Uno

Logitech Webcam C270

Prototype 2 – data collection video

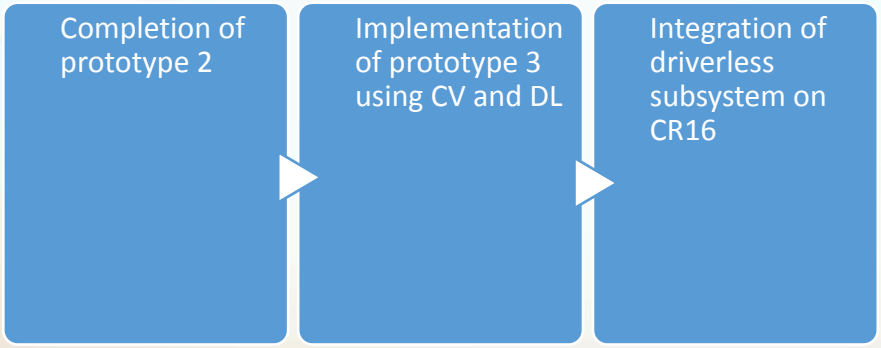






Machine learning algorithm – training and testing the accuracy of the model

FUTURE PLANS



Prototype 3 – Driverless prototype on a scale version of chassis using CV and DL

- Components
  - Arduino Uno
  - Logitech Camera
- Aim
  - Prototype to run between two lanes marked by cones
  - Prediction of steering angle
- Dataset
  - Input: images labeled with steering angle
  - Output: predicted steering angle
- Deep Learning
  - Supervised learning
  - Model (x,y)
    x : collection of features of data point
    y : label of data point
  - Gradient of cost