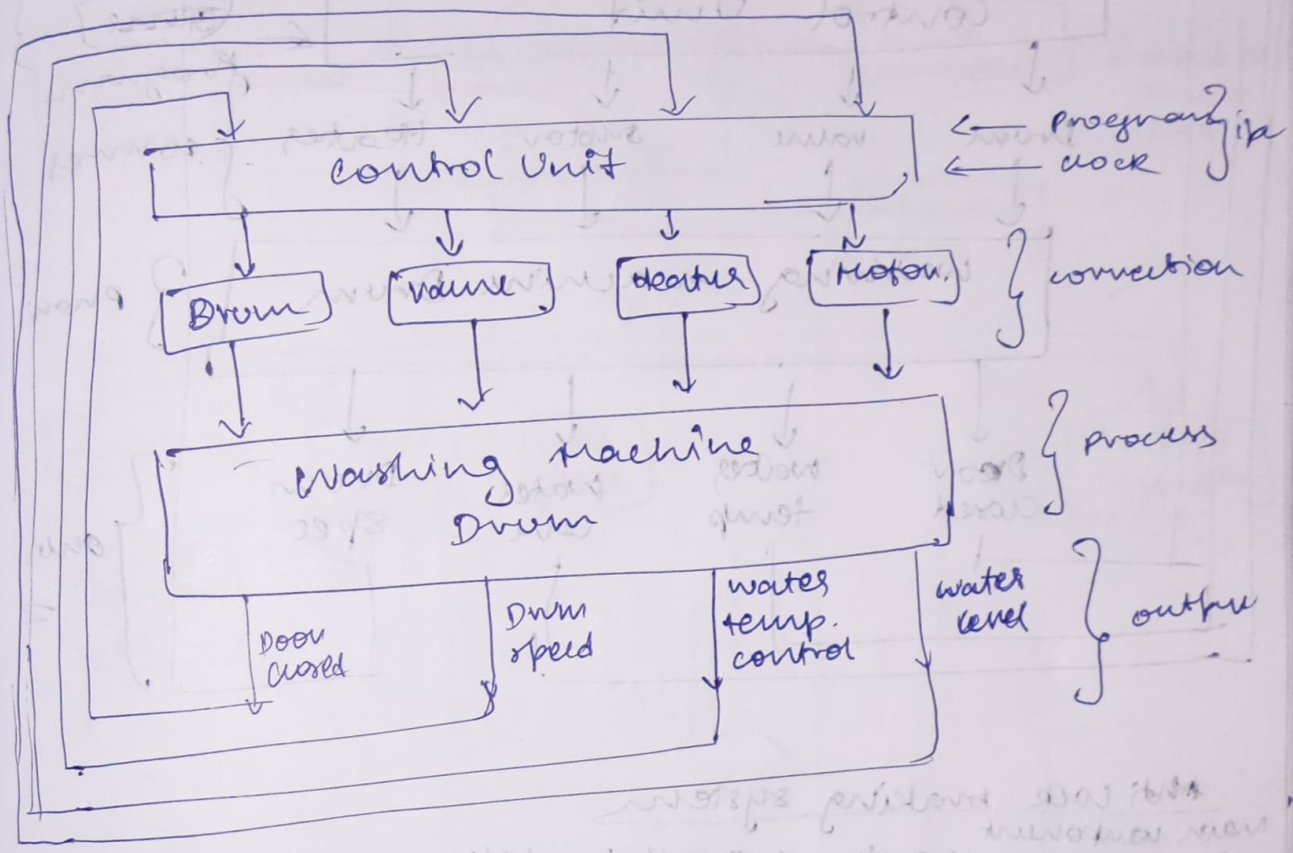
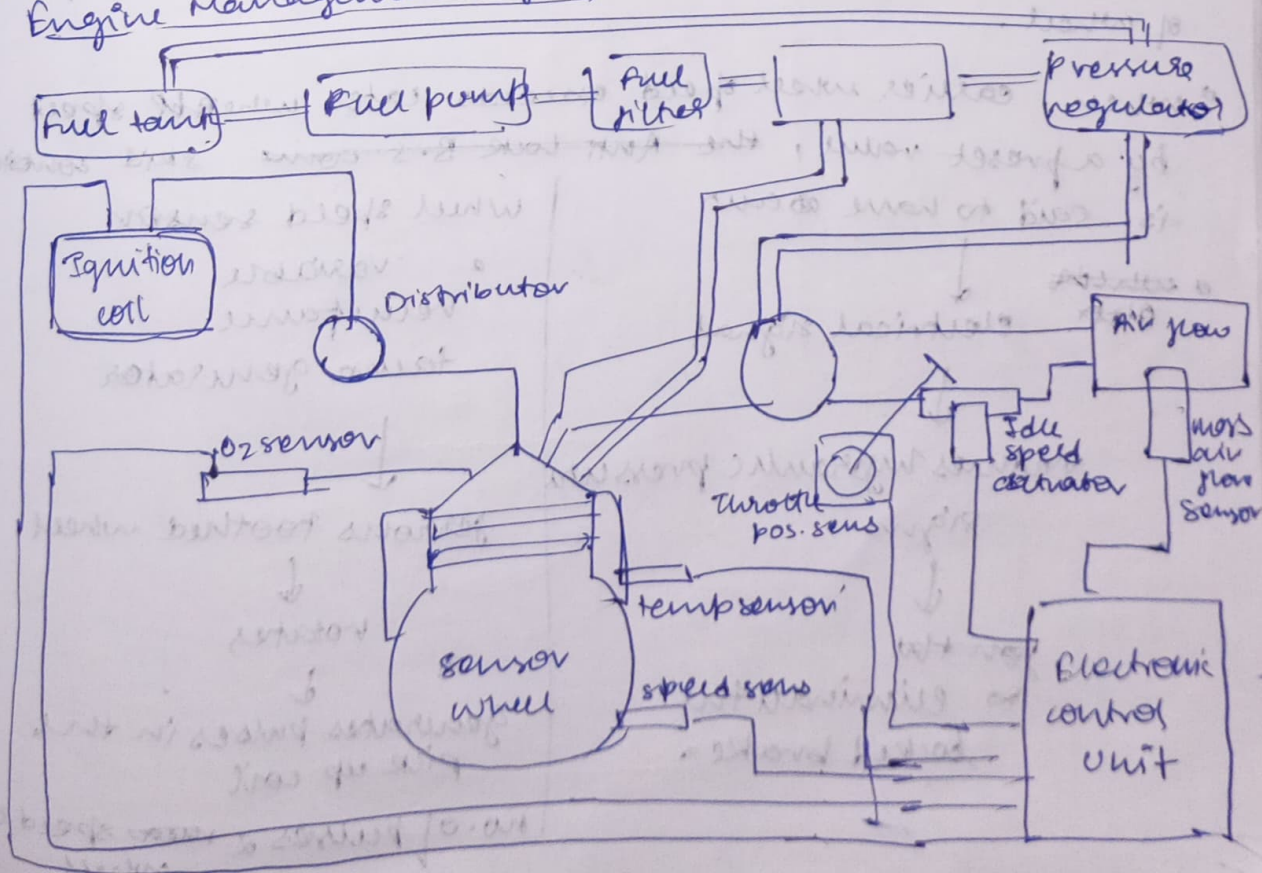
Washing Machine

- controller is a microprocessor
  - ↳ prewash cycle
  - ↳ main wash cycle
  - ↳ rinse part
  - ↳ final dry part

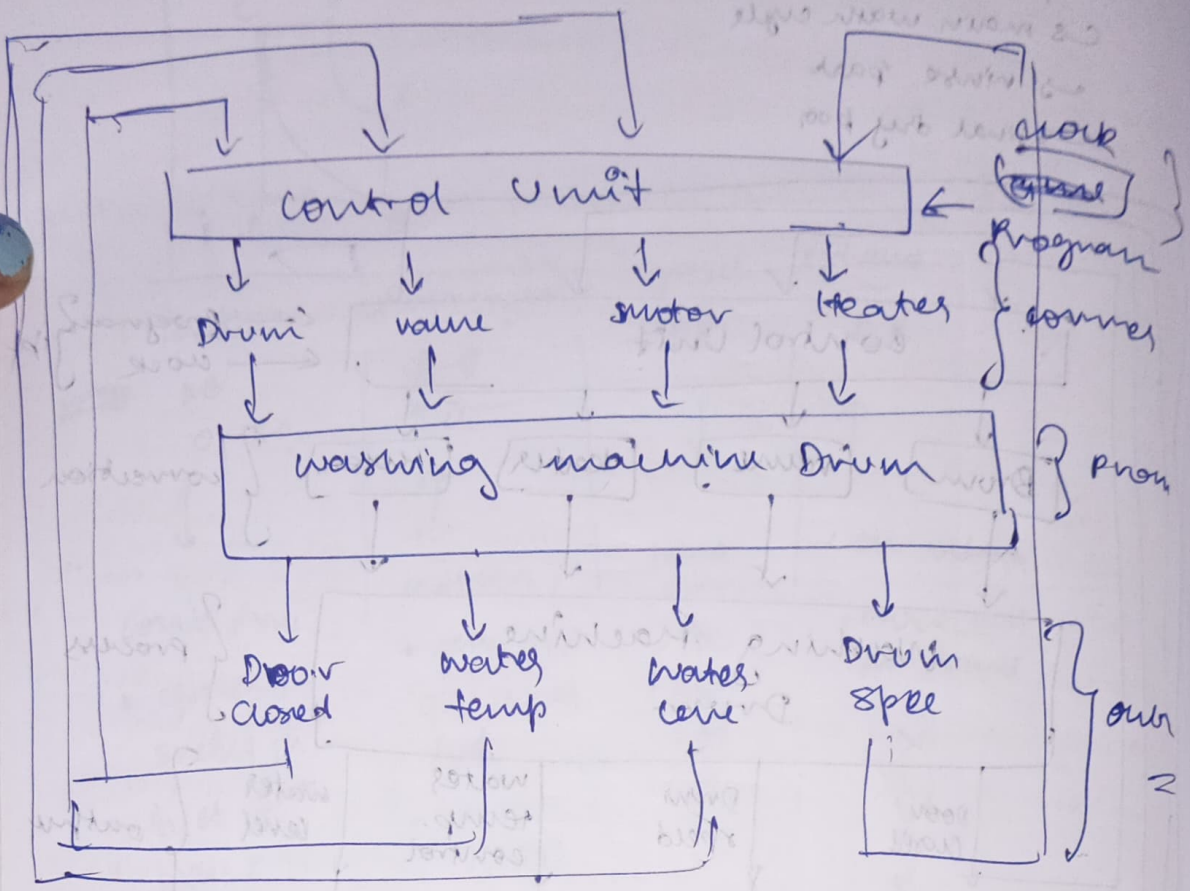


Engine Management system



Washing machine

- smaller and more compact



Anti lock braking system

main component

- 2 counter mechanism → alternately measures the speed of wheel.
- when carrier wheel speed exceeds rotor wheel speed by a preset value, skid condition is said to have occurs
- electrical signal
- reduces hydraulic pressure sign
- to eliminate the locked brake.

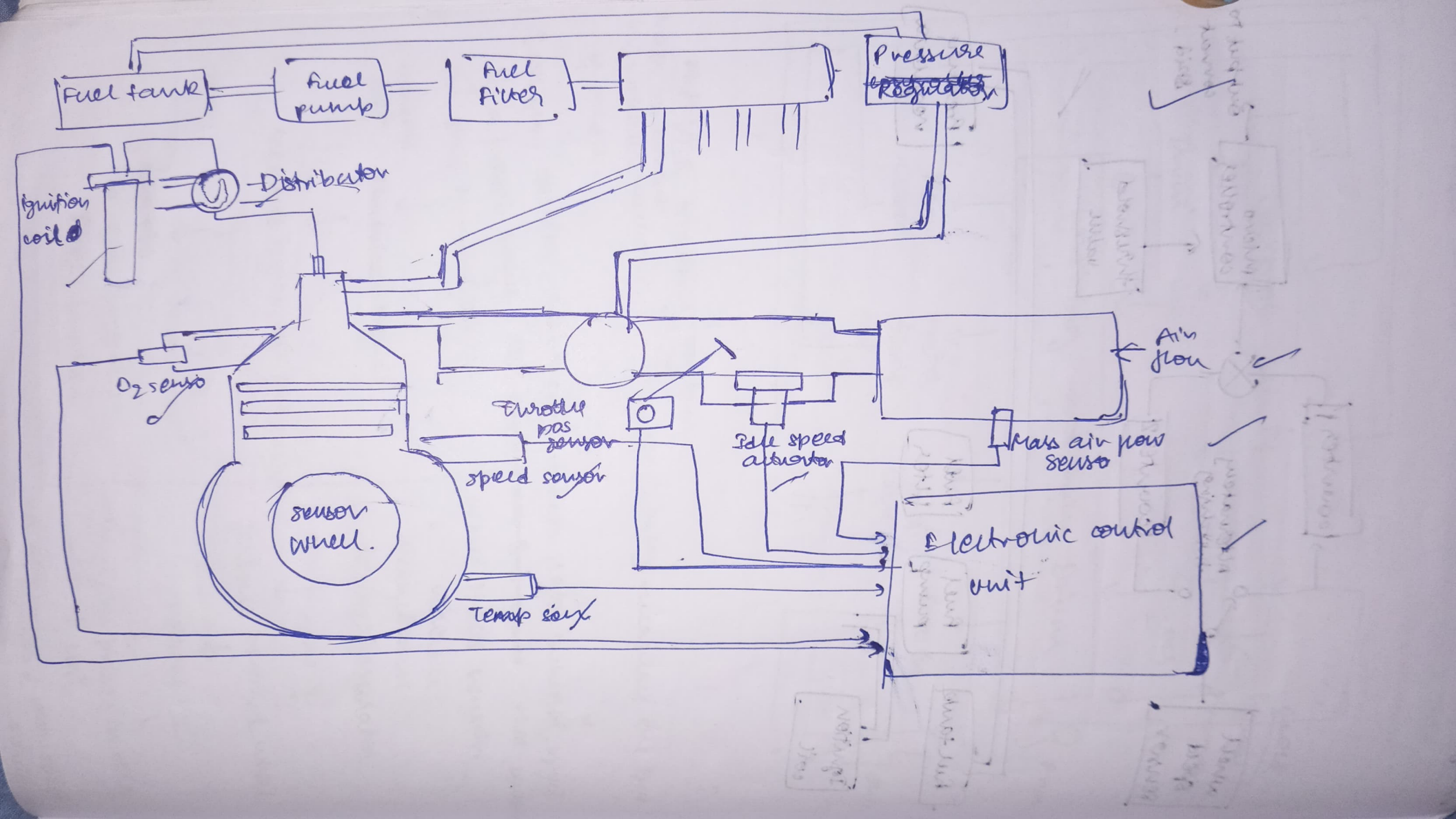
wheel speed sensor

- variable reluctance tacho generator
- ferrous toothed wheel.
- rotates
- generates pulses in the pick up coil

no. of pulses ∝ speed of wheel.

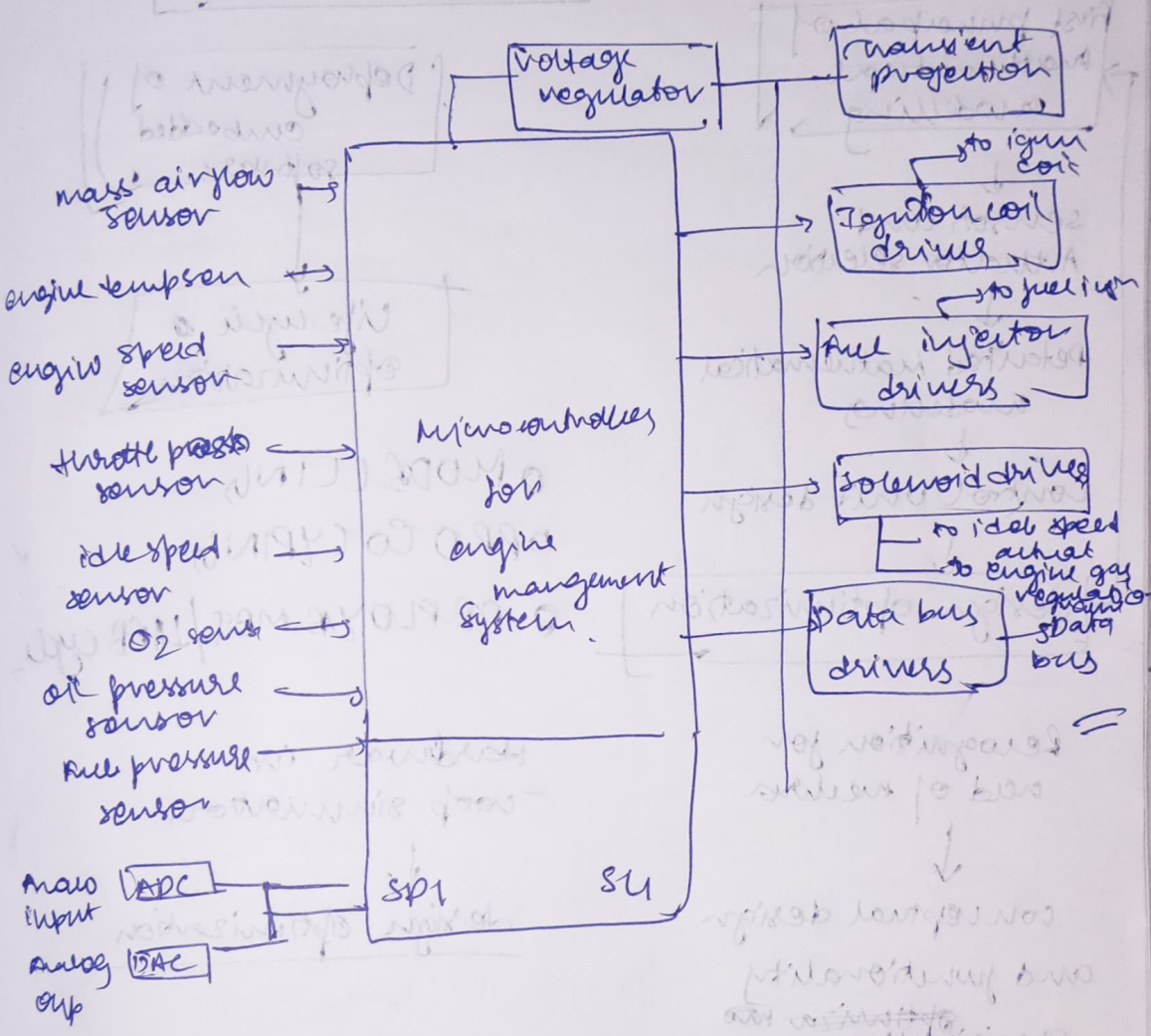
magnetic sensor > optical sensor → for mud water rail

→ counter


Fuel tank
Fuel pump
Fuel filter
Pressure regulator
Distributor
Ignition coil
O_2 sensor
Throttle pos sensor
Idle speed actuator
Air flow
Mass air flow sensor
speed sensor
sensor wheel
Temp sensor
Electronic control unit

EMS

- ignition and fuelling requirements of engine
- engine (4-stroke) → various cylinders whose pistons are connected to a common crankshaft
- all pistons have the power stroke at diff time, thus crankshaft has full power for rotation at all time
- power & speed are controlled by varying the ignition timing for the air-fuel mixture
- this is done via microprocessor.



Water level controller

Phases of Mechatronic system Design Process

Recognizing the need

↓

Conceptual design and functional specification

↓

First principal of mathematical modelling

↓

sensor and Actuator selection

↓

Detailed mathematical modelling

↓

Control unit design.

↓

design optimization

Hardware-in + coop ~~optimization~~ simulation

↓

Design optimization

Deployment of embedded software

↓

Life cycle optimization

- MODELLING
- PROTOTYPING
- DEPLOYMENT/LIFECYCLE

Recognition for need of mechatronics

↓

conceptual design and functionality specification

↓

First P Mat M

↓

Sens & Actuat selection

↓

Det M M

↓

Control unit design

Hardware in - coop simulation

↓

design optimization

Deployment of embedded software

↓

life cycle op

Design optimization