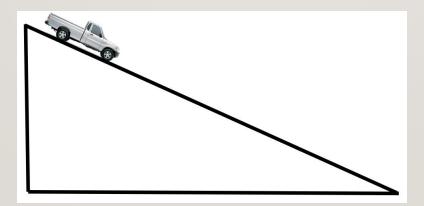
IOT PROJECT

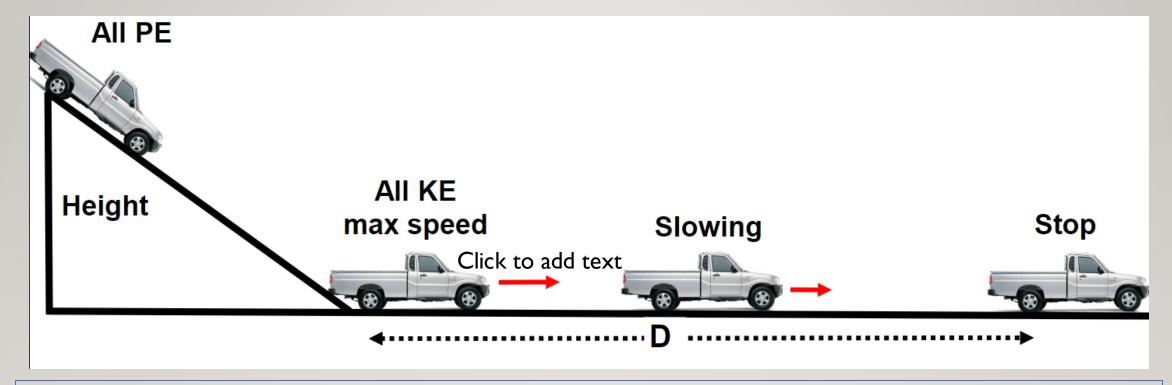
ROLLER COASTER

PROBLEM STATEMENT - CONSERVATION OF ENERGY

- In this experiment we will be proving conservation of energy theorem using roller coaster setup.
- Conservation of energy states that, when there is no external force on object then it's total mechanical energy (KE + PE) is conserved.
- We considered simple case which contains inclined plane and a car:



- If we release the car from top of the inclined plane, it starts moving freely downwards without any external force.
- At the top it has only potential energy stored in it and at the bottom most point it has only kinetic energy stored in it.



- At the top, total mechanical energy = PE + 0 = mgH
- At the bottom, total mechanical energy = $0 + KE = \frac{1}{2}mv^2$
- By conservation of energy theorem ,total energy is conserved thus $\Delta PE = \Delta KE$, which implies mgH = $\frac{1}{2}mv^2$

$$\rightarrow$$
 v = $\sqrt{2gH}$.

BLOCK DIAGRAM OF IOT BASED SETUP

Blynk(Wifi)

Gateways makes the data ready

modulates and demodulates data

to transmit to the cloud server

through internet. Generally it

for transmission.

Sensors

1. HR SC04 Ultrasonic sensor

Actuators

1. Gear motors

Sensors and actuators are directly connected to listed controllers

Controllers

- 1. L298N H-bridge
- 2. ESP32(2)
- 3. ESP8266
- 4. ESP32C-AM

Data from sensors are fed to blynk

Transmittion of **Gateways**

data takes place and gets stored in cloud server

Cloud server

Blynk server drive

Cloud server stores final data sent from IoT implementation setup.

User devices

Mobile

This is the main user device which allows user to see entire information about respective IoT setup and gives access to control it.

Sensors sense physical movements and convert into a data for analysis

Ultrasonic sensor: It calculates distance by sending waves which reflects on hitting object(car).

Actuators converts electrical energy to physical movements.

Gear motors: In our experiment we used gear motors to lift car up the inclined plane so as to make free fall.

Controllers: They control sensors and actuators by providing power to them. And also have ADC and DAC tools in

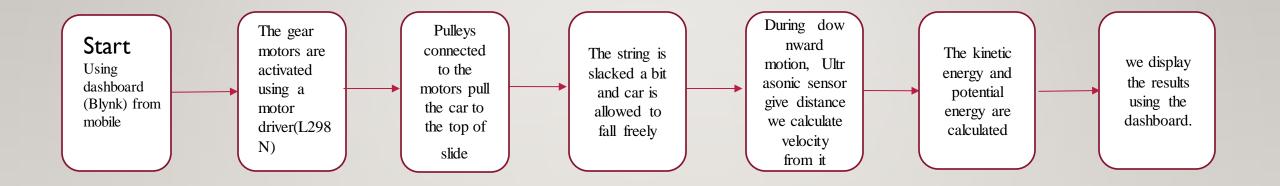
L298N H-bridge: Allows speed and direction control of two DC motors at the same time.

ESP32: We used this to supply power to ultrasonic sensor and to control it.

ESP8266: We used this to control gear motor through motor driver. ESP32CAM: We used this to

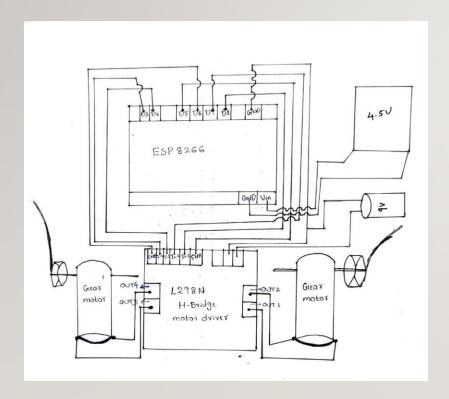
display movement of car

Flow of the project

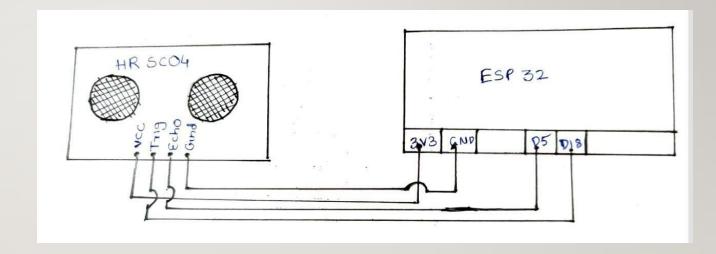


CIRCUIT DIAGRAM

Motors control setup to pull car upwards:

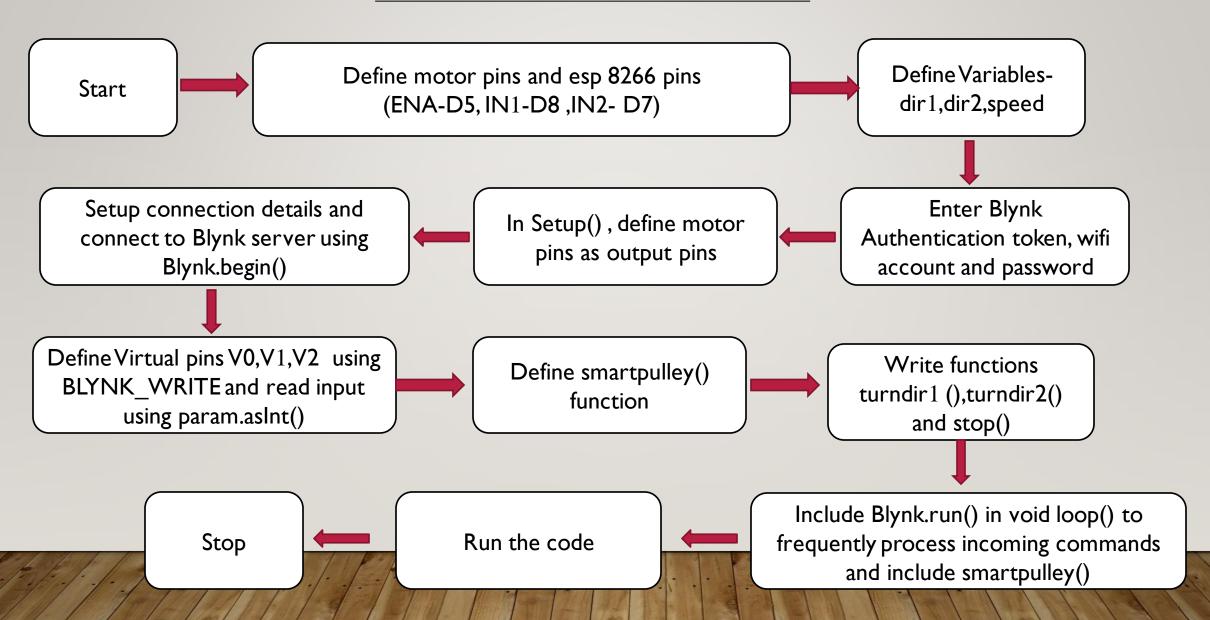


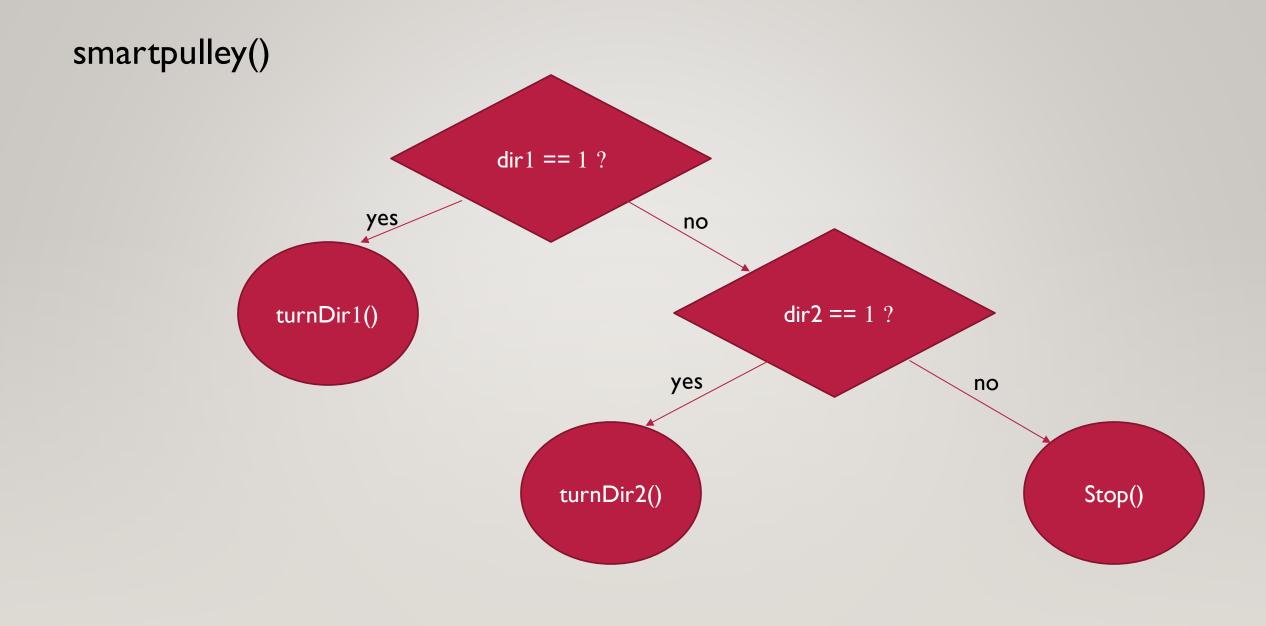
Ultrasonic sensor controlling:



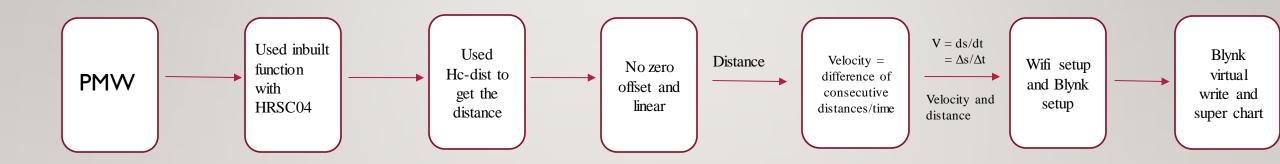
FLOW CHART OF THE CODE:

CONTROL MOTORS AND PULLEY SYSTEM





CODE FLOW FOR WORKING OF ULTRASONIC SENSOR

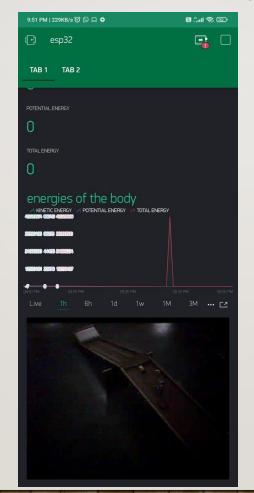


DASH BOARD: BLYNK

Dash board for controlling motor



Dashboard for displaying the conservation of energy



WORKING DEMO OF CONDUCTING AN ACTUAL EXPERIMENT REMOTELY

Working model:

• https://youtu.be/Yt2xrZpzqRg

Regarding the entire project:

• https://youtu.be/t6si9M4tafw