**Abstract**

We will be converting a standard manual sequential transmission into a semi-automatic transmission, using 2 Stepper motors.

**Introduction**

In this project we have converted a standard manual sequential transmission found in motorcycles and few sports cars, into a semi-automatic transmission. We will use 2 Stepper motors which will be controlled ULN2824. One motor is used to engage and disengage the clutch and the other motor is used to shift gears from 1 to 6. The change in gears is then shown using a common anode 7-segment display.

**Implementation**

The system was made using 8051 Microcontroller (AT89C51), ULN2824 which is used to control the 2 stepper motors. The ULN2824 has a 10k Ohm pull-up resistors. The system is controlled by the user using a 2 push button input.

The buttons are connected in such a way the when the button is activated, the input voltage at the input pin is GND.

The system works such that, when the user (driver) presses one the buttons then the clutch motor first engages the clutch by pulling a cable which is connected to the clutch lever. Then the gear motor will shift to the next gear with the same mechanism as used for the clutch, either up or down depending which button was used. The gear is engaged when the clutch is fully engaged, and once the shifting is done only then the clutch will be disengaged.

Clutch first moves in anticlockwise direction, waits till the gear motor is engaged then the moves in clockwise and get back to its normal position.

For upshift the motor moves in anticlockwise direction and moves back to its original position. For downshift the motor moves in clockwise direction and moves back to its original position.

To show the change in gear in the transmission we have added an additional 7-segment display. The gears only shift from N(0) to 6th gear.

**Results**

Diagram, schematic

Description automatically generated

**Applications and Future scope**

* It can be used in cars fitted with sequential manual transmission, which is very common in motorsports.
* It is used to reduce shifting time and helps racecar drivers to focus on acceleration and braking.
* If we are able to get engine rpm data then this system can be coded in such a way that the system can be fully automated. When the engine reaches a certain rpm it can shift automatically.

**Appendix**

ORG 0000H

MOV A,#66H

BACK:

JNB P1.4,GEARUP

JNB P1.5,GEARDOWN

MOV P2,A

MOV P3,A

SJMP BACK

CLUTCH:

ACALL ANTICLOCKWISE

ACALL DELAY

ACALL DELAY

ACALL DELAY

ACALL CLOCKWISE

ACALL DELAY

RET

GEARUP:

ACALL DISPNOU

ACALL CLUTCH

ACALL ANTICLOCKWISE

ACALL DELAY

ACALL DELAY

ACALL DELAY

ACALL CLOCKWISE

ACALL DELAY

RET

GEARDOWN:

ACALL DISPNOD

ACALL CLUTCH

ACALL CLOCKWISE

ACALL DELAY

ACALL DELAY

ACALL ANTICLOCKWISE

ACALL DELAY

RET

ANTICLOCKWISE:

RR A

ACALL DELAY

ACALL DELAY

SJMP BACK

CLOCKWISE:

RL A

ACALL DELAY

ACALL DELAY

SJMP BACK

MOV A,#00H

MOV P0,A

LOOP:

MOV R0,#0AH

MOV DPTR,#300H

DISPNOU:

CLR A

MOVC A,@A+DPTR

MOV P0,A

ACALL DELAY

ACALL DELAY

INC DPTR

DJNZ R0,DISPNOU

SJMP LOOP

DISPNOD:

CLR A

MOVC A,@A+DPTR

MOV P0,A

ACALL DELAY

ACALL DELAY

DEC DPTR

DJNZ R0,DISPNOD

SJMP LOOP

ORG 300H

DB 1111110b,0110000b,1101101b,1111001b,0110011b,1011011b,1011111b,1110000b,1111111b,1111011b

DELAY:

MOV R2,#255

H1: MOV R3,#255

H2: DJNZ R3,H2

DJNZ R2,H1

RET

END