

# **MECHATRONICS FINAL PROJECT**

**SUBMITTED BY:  
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# WHAT'S GOING ON?



# TANGIBLE TODDLER TEACHING AND MONITORING SYSTEM



# IDEA

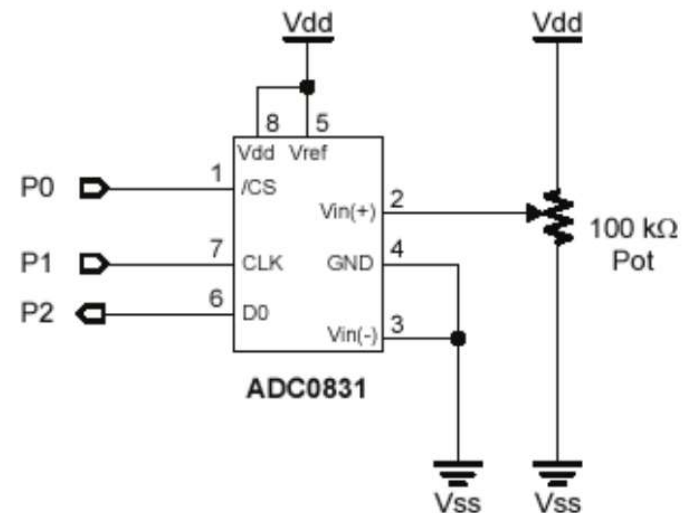
To develop a Mechanical System to help teach basic Alphabets to the kids.

# ALPHABET GURU:

- Puzzle solving game to facilitate the learning of Alphabets and associated Animals.
- By using three rotating pointers we can get input the word.
- The input will be seen on the LCD which is so calibrated to display correct input even when upside down.
- If the word matches with the name of an Animal the pointer on the wheel points to that animal.

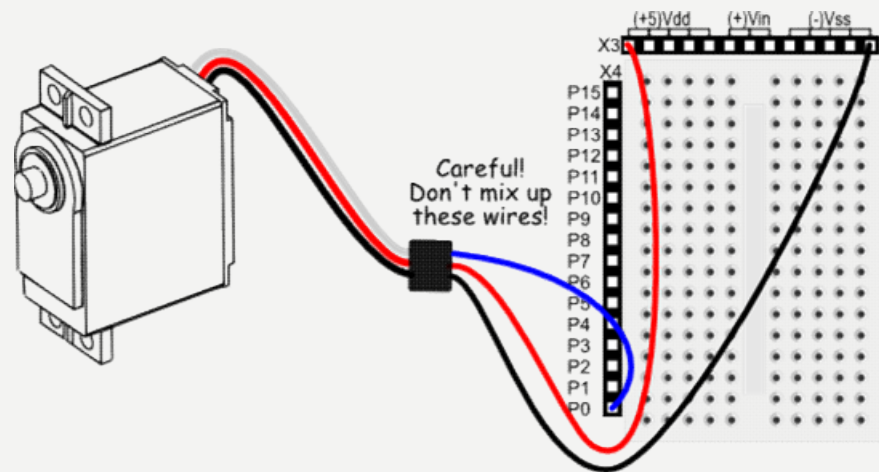
# CIRCUIT & CODE: PART 1 ADC

```
' {$STAMP BS2}
' {$PBASIC 2.5}
HIGH CS
LOW CS
LOW CLK
PULSOUT CLK, 210
SHIFTIN Datain3,CLK,MSBPOST,[ADC3\8]
IF (ADC3<32) THEN
  SEROUT TX, baud,[ $0] 'A
  Alpha3 = 0
ELSEIF (ADC3<64) THEN
  SEROUT TX, baud,[ $1] 'B
  Alpha3 = 1
ELSEIF (ADC3<96) THEN
  SEROUT TX, baud,[ $2] 'C
  Alpha3 = 2
ELSEIF (ADC3<128) THEN
  SEROUT TX, baud,[ $3] 'D
  Alpha3 = 3
ELSEIF (ADC3<160) THEN
  SEROUT TX, baud,[ $4] 'E
  Alpha3 = 4
ELSEIF (ADC3<192) THEN
  SEROUT TX, baud,[ $4F] 'O
  Alpha3 = 5
ELSEIF (ADC3<224) THEN
  SEROUT TX, baud,[ $5] 'R
  Alpha3 = 6
ELSEIF (ADC3<256) THEN
  SEROUT TX, baud,[ $6] 'T
  Alpha3 = 7
ENDIF
ENDIF
```



# PART 2 SERVO MOTOR:

```
' {$STAMP BS2}
' {$PBASIC 2.5}
gotoCOD:
  FOR i = 1 TO 200
    PULSOUT servoPoint, 193
    PAUSE 20
  NEXT
  RETURN
```





# PART 3 LCD DISPLAY

```
' {$STAMP BS2}
' {$PBASIC 2.5}
Reset:
  HIGH TX                      ' setup serial output pin
  PAUSE 100                    ' allow LCD to initialize

  SEROUT TX, baud, [$19, $0C]  ' cursor on, clear display

  'A
  SEROUT TX, baud, [$F8,$00,$11,$11,$1F,$11,$11,$0A,$04]

  'B
  SEROUT TX, baud, [$F9,$00,$0F,$11,$11,$0F,$11,$11,$0F]

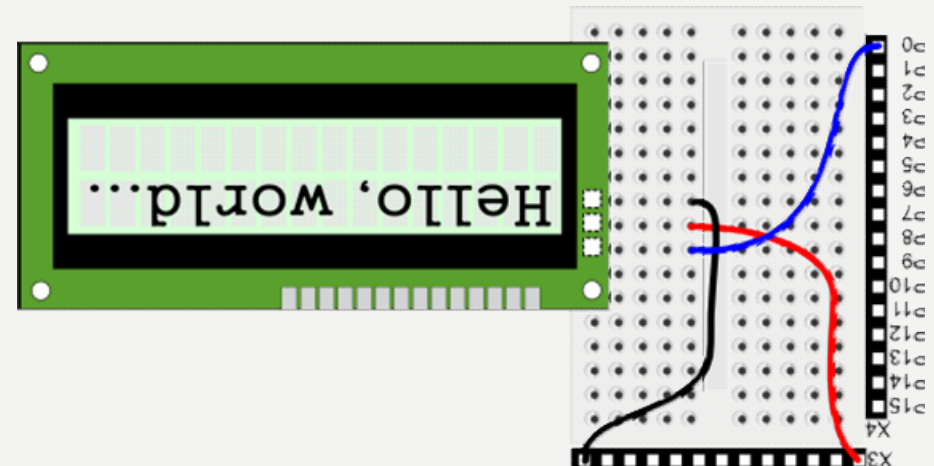
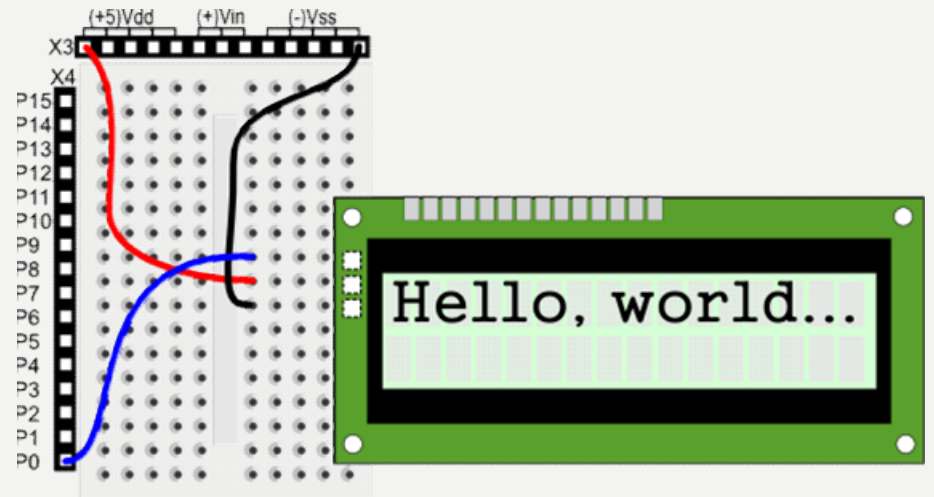
  'C
  SEROUT TX, baud, [$FA,$00,$0E,$11,$01,$01,$01,$11,$0E]

  'D
  SEROUT TX, baud, [$FB,$00,$0F,$11,$11,$11,$11,$11,$0F]

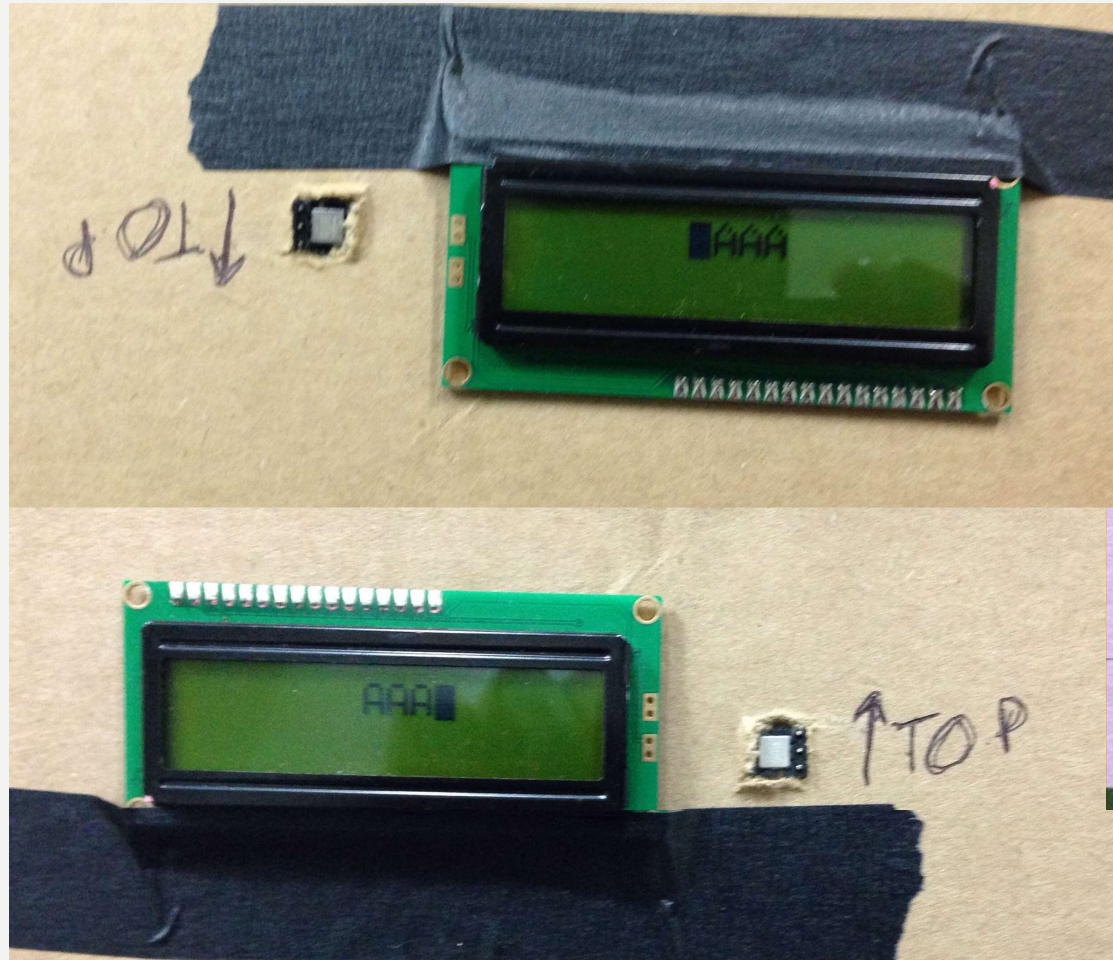
  'E
  SEROUT TX, bread, [$FC,$00,$1F,$01,$01,$1F,$01,$01,$1F]

  'R
  SEROUT TX, baud, [$FD,$00,$11,$09,$05,$0F,$11,$11,$0F]

  'T
  SEROUT TX, baud, [$FE,$00,$04,$04,$04,$04,$04,$04,$1F]
```



# PART 3 LCD DISPLAY



# LULLABY:

- Generates a lullaby by using piezo buzzers.
- Along with lullaby an LED also lights up as a night lamp.
- The color of the LED can be changed by using the potentiometer on R1 of the 555 timer.

# CODE AND SPECS:

```
' {$STAMP BS2}
' {$PBASIC 2.5}

IF(IN8 = 1) THEN
  nightLamp = nightLamp ^ 1
ENDIF

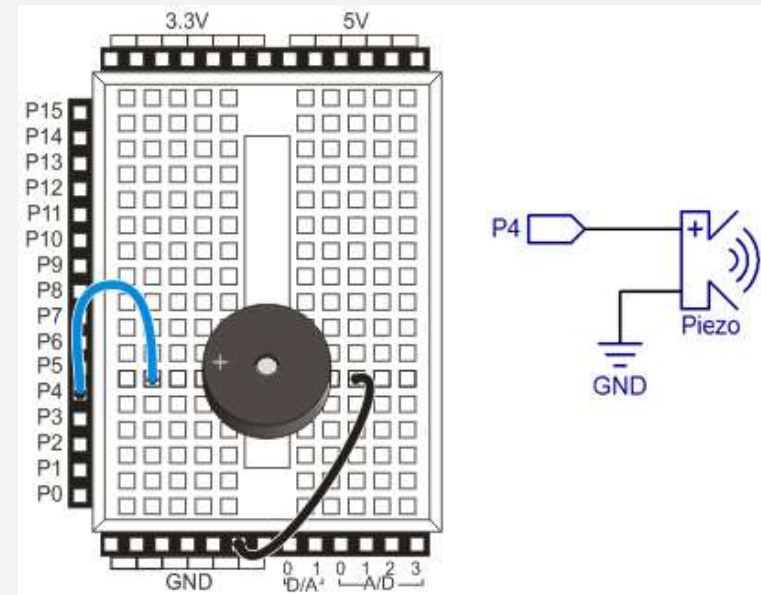
IF(nightLamp = 1) THEN
  HIGH Enable555
  DO UNTIL noteLetter = "Q"
    READ Notes + index, noteLetter

    LOOKDOWN noteLetter, [ "C", "d", "D", "e", "E",
                          "F", "g", "G", "a", "A",
                          "b", "B", "R", "Q" ], offset

    LOOKUP offset,
      [ 4186, 4435, 4699, 4978, 5274,
        5588, 5920, 6272, 6645, 7040,
        7459, 7902, 0, 0 ], noteFreq

    READ Octaves + index, noteOctave
    noteOctave = 8 - noteOctave
    noteFreq = noteFreq / (DCD noteOctave)

    READ Durations + index, noteDuration
    noteDuration = 1000 / noteDuration
```



# FEEDING: DETERMINING THE CORRECT TEMPERATURE OF MILK

- Warm milk is considered good for infants.
- Coupled a temperature sensor with two LED's.
- Blue LED will glow when it's too cold, i.e. less the 34 degrees Celsius.
- Red LED lights up in case the milk is too hot i.e. above 39 degrees Celsius.

# CODES:

## Read Temperature

```
Read_DS1620:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [RdTmp] ' give command to read temp
SHIFTIN DQ, Clock, LSBPRE, [tempIn\9] ' read it in
LOW Reset ' release the DS1620

#IF _Testing #THEN
tempIn = %11111111 ' -0.5 C
#ENDIF

tempIn.BYTE1 = -sign ' extend sign bit
tC = tempIn * 5 ' convert to tenths
IF (tC.BIT15 = 0) THEN ' temp C is positive
tF = tC * / $01CC + 320 ' convert to F
ELSE ' temp C is negative
tF = 320 - ((ABS tC) * / $01CC) ' convert to F
ENDIF
RETURN
```

## Setting Temperature Thresholds

```
Write_DS1620_HiT:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [WrHi] ' give command to write Hi Thresh temp
SHIFTOUT DQ, Clock, LSBFIRST, [$039\9] ' give Hi Thresh temp
LOW Reset ' release the DS1620
RETURN

Write_DS1620_LoT:
HIGH Reset ' alert the DS1620
SHIFTOUT DQ, Clock, LSBFIRST, [WrLo] ' give command to write Lo Thresh temp
SHIFTOUT DQ, Clock, LSBFIRST, [$036\9] ' give Lo Thresh temp
LOW Reset ' release the DS1620
RETURN
```



# INSPIRATION

Hole in the Wall: Dr. Sugata Mitra.



# MARKETING STRATEGY

- Potential Markets: Government in Developing Nations

## Strategy:

- The kit evolves along with the students.
- Learning is facilitated by doing.
- In the present day world it can replace the GI Joe's and the Barbie's.



# COST

Component	Cost/Piece in USD	Quantity	Cost	Cost for Mass production
Basic Stamp 2	99.95	1	99.95	99.95
Potentiometer	0.3	3	0.9	0.9-
ADC	1.3	3	3.9	3.9
Standard servo	15	1	15	15
Bicolor LED	1.5	1	1.5	1.5
555timer	0.5	1	0.5	0.5
LCD display	5	1	5	5
Accelerometer	3	1	3	3
Resistor pack	10	1	10	10-
Wire spool	5	3	15	15-
Battery	1.2	1	1.2	1.2
Total cost	\$142.75		\$155.95	~\$125

# IF WE HAD MORE TIME, AND.. PINS

- ABC:Automatic Barrier Constructor

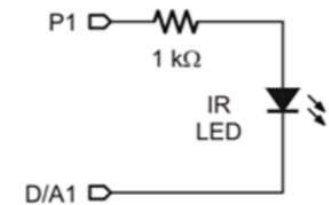
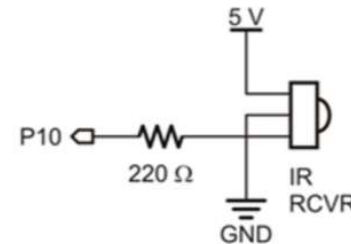
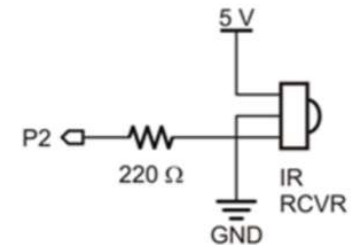
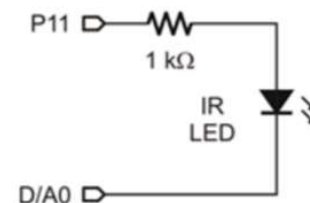
```
' {$STAMP BS2}
' {$PBASIC 2.5}

IR_detect1 VAR Bit
servo PIN 14
GATE VAR Bit
prevGATE VAR Bit

LOW 7

LOOP1:
  prevGATE = GATE
  'PAUSE 50
  FREQOUT 7, 1, 38500
  IR_detect = IN8
  IF IR_detect = 0 THEN
    GATE = GATE ^ 1
  END

  IF (GATE = 1 AND prevGATE = 0) THEN
    FOR i = 1 TO 1000
      PULSOUT servo, 600
    NEXT
    PAUSE 5000
  ELSEIF (GATE = 1 AND prevGATE = 0) THEN
    FOR i = 1 TO 1000
      PULSOUT servo, 900
    NEXT
    PAUSE 5000
  ENDIF
  GOTC LOOP1
```



# IMPROVEMENTS:

- Using all the alphabets, in the English Language.
- Better integration of the circuitry.
- Increasing the number of words that can be learnt.
- Making the system more robust.
- Coding can be optimized for better efficiency.
- Use of EEPROM to save memory.
- Displaying pictures on the LCD.

ANY  
QUESTIONS  
?

A horizontal string of nine colorful paper flags is displayed against a white background. Each flag is a different color and has a single letter written on it in a black, hand-drawn font. The flags are held in place by small wooden clothespins. The sequence of letters from left to right is T, H, A, N, K, Y, O, U. The colors of the flags are orange, light orange, blue, red, yellow, pink, light blue, and yellow.

THANK YOU