CYCLOPE

AE341 DESIGN PROJECT REPORT

SUBMITTED BY:

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MATHEW K JOSHY

M K ARUN

In partial fulfilment of the requirements for the award of the degree of

Bachelor of Technology in Applied Electronics & Instrumentation Engineering

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

KOCHI, KERALA, INDIA

A.P.J ABDUL KALAM UNIVERSITY THIRUVANANTHAPURAM, KERALA, INDIA

JANUARY 2021

RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

KOCHI, KERALA, INDIA

BONAFIDE CERTIFICATE

This is to certify that the Design project report entitled"**CYCLOPE**" submitted by **ARJUN M B, MATHEW K JOSHY** and **M K ARUN**, in partial fulfilment of the requirements for the award of degree of Bachelor of Technology in Applied Electronics & Instrumentation Engineering is a bonafide record of the work carried out under our guidance and supervision at Rajagiri School of Engineering & Technology, Kochi, under A.P.J Abdul Kalam University, Thiruvananthapuram during the academic year2020-21.

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RAJAGIRI SCHOOL OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF APPLIED ELECTRONICS & INSTRUMENTATION

Institute Vision

To evolve into a premier technological and research institution, moulding eminent professionals with creative minds, innovative ideas and sound practical skill, and to shape a future where technology works for the enrichment of mankind.

Institute Mission

To impart state-of-the-art knowledge to individuals in various technological disciplines and to inculcate in them a high degree of social consciousness and human values, thereby enabling them to face the challenges of life with courage and conviction.

Department Vision

To evolve into a centre of academic excellence, developing professionals in the field of electronics and instrumentation to excel in academia and industry.

Department Mission

Facilitate comprehensive knowledge transfer with latest theoretical and practical concepts, developing good relationship with industrial, academic and research institutions thereby moulding competent professionals with social commitment.

Program Educational Objectives (PEOs)

• PEO 1: Graduates will possess engineering skills, sound knowledge and professional attitude, in electronics and instrumentation to become competent engineers.

• PEO 2: Graduates will have confidence to design and develop instrument systems and to take up engineering challenges.

• PEO 3: Graduates will possess commendable leadership qualities, will maintain the attitude to learn new things and will be capable to adapt themselves to industrial scenario.

Program Outcomes (POs)

Engineering Graduates will be able to:

• PO 1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

• PO 2. Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

• PO 3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

• PO 4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

• PO 5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

• PO 6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

• PO 7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and nee for sustainable development.

• PO 8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

• PO 9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

• PO 10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being

able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

• PO 11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

• PO 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

• PSO 1: Students of the program will have sound technical skills in electronics and instrumentation.

• PSO 2: Students of the program will be capable of developing instrument systems and methods complying with standards.

• PSO 3: Students of the program will be able to learn new concepts, exhibit leadership qualities and adapt to changing industrial scenarios.

Design Project Outcomes (DPOs)

- DPO 1: We were able to work as a team and coordinate our efforts to produce satisfactory results.
- DPO 2: We improved our communication and technical writing skills.

- DPO 3: We referred to project reports published by the University Of Michigan which helped us to improve our project.

- DPO 4: We learned the usage of CNC machining on plywood and use of power tools.

- DPO 5: We learned to use various software's such as Adobe eagle Tinkercad, Sketchup, Fusion 360 and Proteus, Flutter.

- DPO 6: We designed a equipment that allows users to ride bicycles within the comfort of their home and measure distance, speed and calories burned in the process.

ACKNOWLEDGMENT

This seminar report has been possible only due to support and help from various people. This report would not be complete unless their contributions are acknowledged.

First of all, we would like to thank Rev. Dr. Jose Kuriedath CMI, Director, Rajagiri School of Engineering & Technology, Kochi and Prof.(Dr.) P.S. Sreejith, Principal, Rajagiri School of Engineering & Technology, Kochi for giving us the opportunity to do our work.

We would like to thank Dr. Hari C V, Head of the Department of Applied Electronics and Instrumentation Engineering for supporting us in our endeavours. We would like to thank the teachers in charge for the subject AE341 Design project Ms. Liza Annie Joseph and Mr. Krishna Kumar K P, Department of Applied Electronics and Instrumentation for their support and encouragement throughout the project.

We wish to express our sincere gratitude towards our Guide Dr.Poornima.S Assistant professor, Department of Applied Electronics and Instrumentation for her guidance and support throughout the project. We would also like to thank the faculties that have helped us along the way. We would also take this opportunity to remember the support and encouragement of our families and friends. Above all we thank God Almighty for giving us the courage and blessings to complete our work.

ABSTRACT

Riding a bicycle regularly is one of the best ways to reduce the risk of health problems. But unfortunately, cycling is affected by many parameters, like weather conditions, confined spaces for people living in urban areas (flats and villas). Also, Indian roads are not cyclist-friendly. Hence our idea is to make an equipment which allows you to place your bicycle on it and ride it keeping it in your room. But unlike a gym-cycle, the cycle is not mounted onto the equipment, therefore providing the user with a free-riding experience.

We also plan to integrate this with an app that allows you to connect to other riders online, and compete with them. The app also shows the distance, speed, and calories burnt during the process.

Exercise is being highly neglected nowadays and cycling is one of the most fun and best ways to get in shape. Cycling is an aerobic activity, which means that your heart, blood vessels, and lungs all get a workout. You will breathe deeper, perspire, and experience increased body temperature, which will improve your overall fitness level. It is easy as cycling does not require high levels of physical skill. Most people know how to ride a bike and, once you learn, you don't forget.

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Chapter 1

INTRODUCTION

The main objective of our design project is to design and construct a tachometer that can be used to calculate the rpm of a cycle and convert the rpm into speed. The focus of application of this device was upon a product called cyclope that is an equipment that can be used to place and ride a bicycle upon it, similar to riding on road, however cyclope has rotating rollers that convert the rotation of wheels to rotation of rollers making the bicycle relatively motionless. The data obtained by the tachometer is transmitted to an app that processes and display the time spent on riding cycle, calories burned and speed of cycling.

The components used in the making of the tachometer are an Arduino uno board, IR sensor and receiver, HC05 Bluetooth module and a potentiometer of 10k ohm value.

1.1 OBJECTIVE

Now a days people can't go outside for cycling due to weather and most of the people doesn't have place for cycling .If we decide to go out to the road for cycling the roads in Kerala are not cyclist friendly .So people tends to go to the gym for cycling in the cycling machine, but it doesn't give the experience of cycling on road. Our project is to overcome this problem but at the same time retaining the features provided in the gym cycles. During this project we developed an equipment that can be used for freely riding bicycle without constraints of gym cycle and we focused in the design and implement a device that can measure the rpm of bicycle wheel which can be easily interfaced with a custom smartphone application to display the rpm, speed, and time of riding the bicycle in real-time and display the calories burned by the user during the process. (Refer [4])

Chapter 2

METHODOLOGY

This chapter discusses the methodology of our project. The entire project can be divided into 4 blocks they are sensing, analysing, transmitting and processing.

2.1 BLOCK DIAGRAM

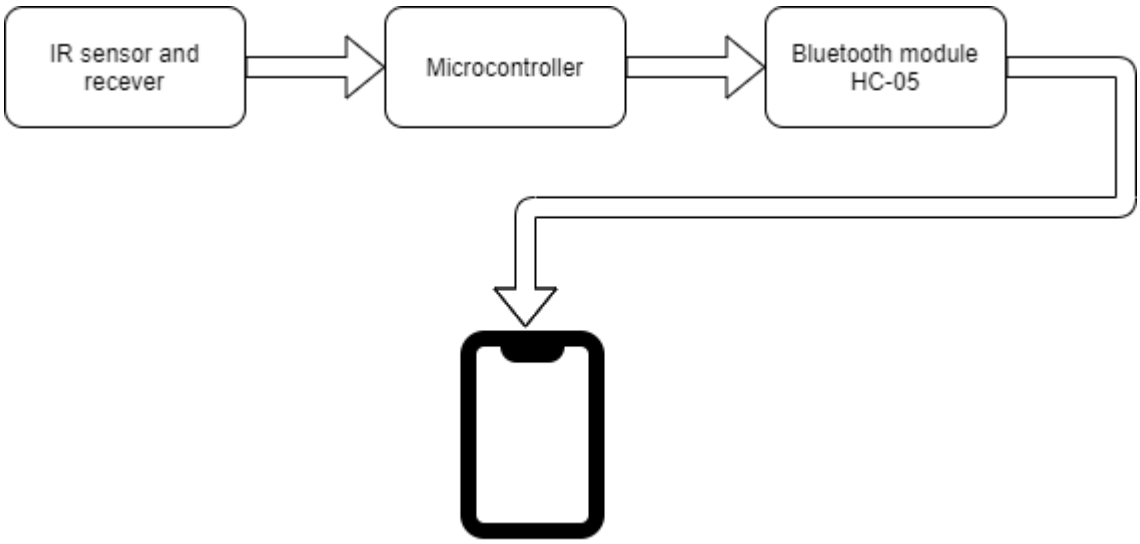


Figure 2. 1

The IR sensor module consist an IR transmitter, IR receiver, LM358 and variable resister. The LED emits light in the infrared frequency. The light get by the aluminium strip place in the spokes of the cycle wheel this light is received by the IR receiver and a small current is produced in the senor module. The LM358 Opamp is used as comparator which compares the threshold voltage and the photodiode series resister voltage.

If the photodiode resister voltage drop is greater than the threshold voltage an output is produced in the form of a pulse. This pulse is given as the clock to the microcontroller at each pulse the count is increased and the rpm is found which is then given to the HC-

05 Bluetooth module (Refer [1] & [2]) .This data is then transferred to the app. The data transferred from the Bluetooth module is used to find the distance, velocity, calories burn.

2.2 GENERAL WORKING

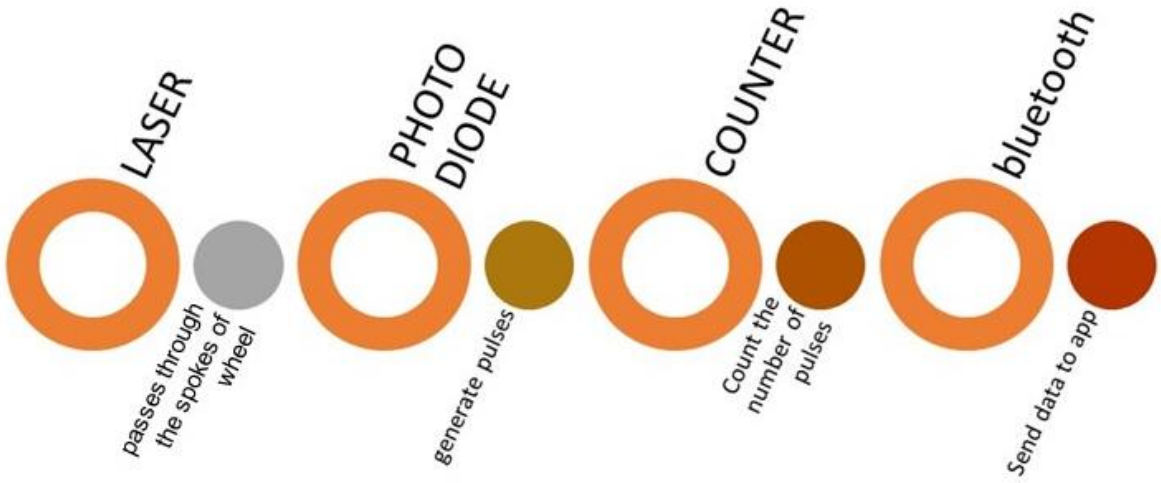


Figure 2. 2

- First step is to detect the pulses for that we use light signal that is passed through the spokes of wheel when the wheel is rotating the signal is made into pulses.
- The pluses are detected by a photodiode and the output is given as a clock input to a counter which counts the number of pulses.
- This data is sent to the mobile application and is processed to find the speed, distance and calories.

Chapter 3

HARDWARE

3.1 COMPONENTS REQUIRED

SI NO	Components	Quantity
1	IR Module	1
2	Potentiometer	1
3	Arduino Uno	1
4	Bluetooth module (HC-05)	1

Table 3. 1

3.2 CIRCUIT DIAGRAM

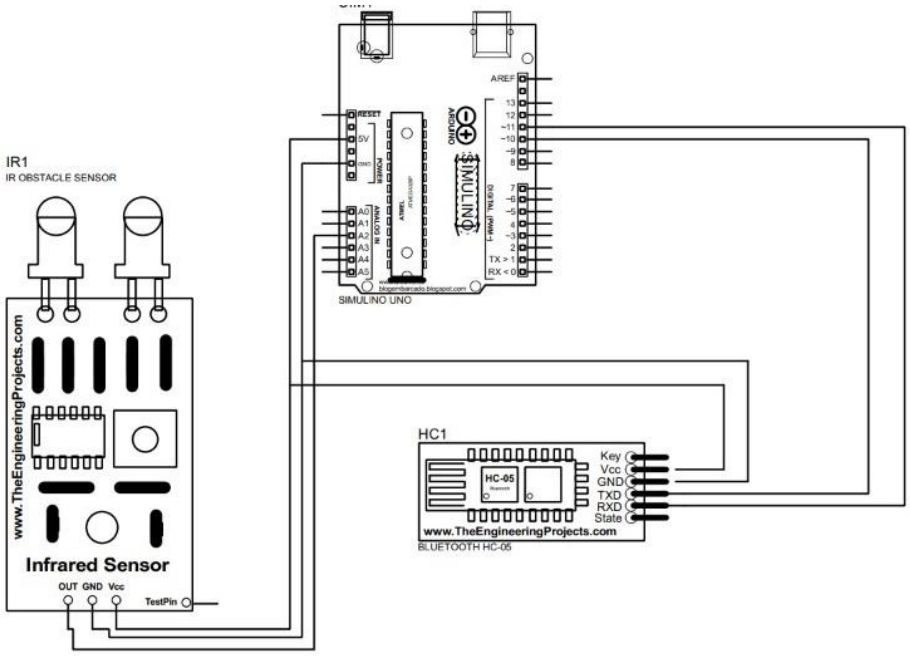


Figure 3. 1

3.3 COMPONENT STUDY

3.3.1 IR Sensor Module

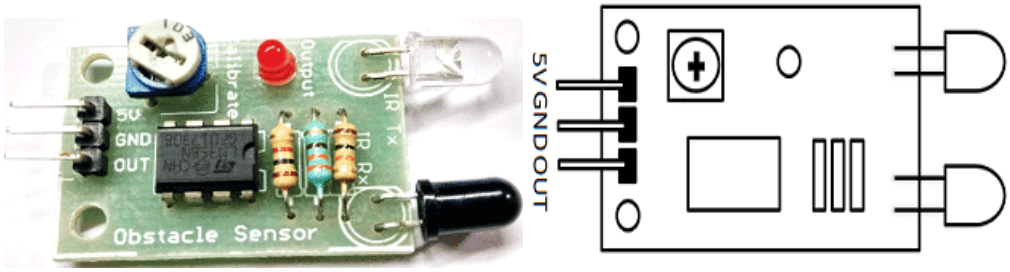


Figure 3. 2

The IR sensor module consists mainly of the IR Transmitter and Receiver, Opamp, Variable Resistor (Trimmer pot), output LED in brief.

IR LED Transmitter

IR LED emits light, in the range of Infrared frequency. IR light is invisible to us as its wavelength (700nm – 1mm) is much higher than the visible light range. IR LEDs have light emitting angle of approx. 20-60 degree and range of approx. few centimetres to several feet's, it depends upon the type of IR transmitter and the manufacturer. Some transmitters have the range in kilometres. IR LED white or transparent in colour, so it can give out amount of maximum light.

Photodiode Receiver

Photodiode acts as the IR receiver as its conducts when light falls on it. Photodiode is a semiconductor which has a P-N junction, operated in Reverse Bias, means it start conducting the current in reverse direction when Light falls on it, and the amount of current flow is proportional to the amount of Light. This property makes it useful for IR detection. Photodiode looks like a LED, with a black colour coating on its outer side, Black colour absorbs the highest amount of light.

LM358 Opamp

LM358 is an Operational Amplifier (Op-Amp) is used as voltage comparator in the IR sensor. The comparator will compare the threshold voltage set using the preset (pin2) and the photodiode's series resistor voltage (pin3).

Photodiode's series resistor voltage drop > Threshold voltage = Opamp output is High

Photodiode's series resistor voltage drop < Threshold voltage = Opamp output is Low

When Opamp's output is **high** the LED at the Opamp output terminal **turns ON** (Indicating the detection of Object).

Variable Resistor

The variable resistor used here is a preset. It is used to calibrate the distance range at which object should be detected.

3.3.2 Potentiometer

Figure 3. 3

Potentiometers also known as POT, are nothing but variable resistors. They can provide a variable resistance by simply varying the knob on top of its head.

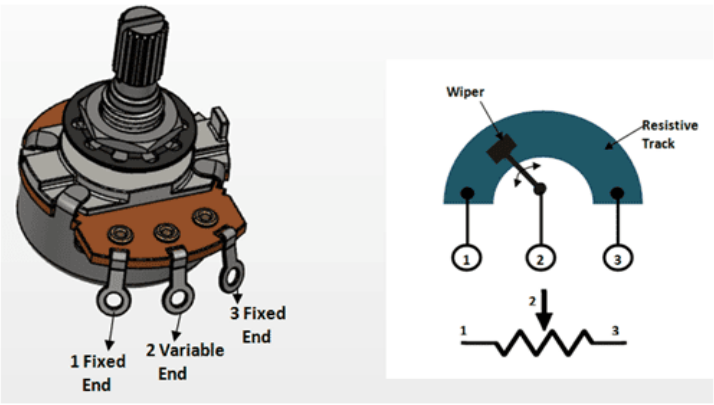


Figure 3. 4

The diagram shows the parts present inside a potentiometer. We have a resistive track whose complete resistance will be equal to the rated resistance value of the POT.

As the symbol suggests a potentiometer is nothing but a resistor with one variable end. Let us assume a 10k potentiometer, here if we measure the resistance between terminal 1 and terminal 3 we will get a value of 10k because both the terminals are fixed ends of the potentiometer. Now, let us place the wiper exactly at 25% from terminal 1 as shown above and if we measure the resistance between 1 and 2 we will get 25% of 10k which is 2.5K and measuring across terminal 2 and 3 will give a resistance of 7.5K.

So the terminals 1 and 2 or terminals 2 and 3 can be used to obtain the variable resistance and the knob can be used to vary the resistance and set the required value.

3.3.3 Arduino

Figure 3. 5

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and Software. It consists of a circuit board, which can be programmed (referred to as

a microcontroller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. (Refer [3])

The key features are:

- Arduino boards are able to read analogue or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to Learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the microcontroller into a more accessible package.

3.3.4 Bluetooth Module

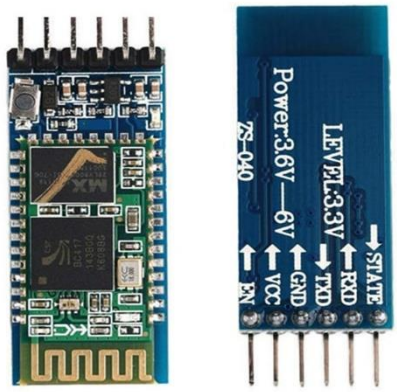


Figure 3. 6

HC-05 module is an easy to use **Bluetooth SPP (Serial Port Protocol) module**, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless

communication. This serial port Bluetooth module is fully qualified **Bluetooth V2.0+EDR (Enhanced Data Rate)** 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses **CSR Blue core 04**-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

Pin Configuration

Pin Number	Pin Name	Description
1	Enable / Key	This pin is used to toggle between Data Mode (set low) and AT command mode (set high). By default it is in Data mode
2	Vcc	Powers the module. Connect to +5V Supply voltage
3	Ground	Ground pin of module, connect to system ground
4	TX – Transmitter	Transmits Serial Data. Everything received via Bluetooth will be given out by this pin as serial data
5	RX – Receiver	Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth
6	State	The state pin is connected to on board LED, it can be used as a feedback to check if Bluetooth is working properly.
7	LED	Indicates the status of Module • Blink once in 2 sec: Module has entered Command Mode • Repeated Blinking: Waiting for connection in Data Mode • Blink twice in 1 sec: Connection successful in Data Mode
8	Button	Used to control the Key/Enable pin to toggle between Data and command Mode

Table 3. 2

Chapter 4

SOFTWARE

4.1 Software Requirements

The software used during the course of completion of our main project:

4.1.1 Proteus 10

The Proteus Design Suite is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards. We use this for simulation of the circuit.

4.1.2 SKETCHUP

SketchUp is a 3D modelling computer program for a wide range of drawing applications such as architectural, interior design, landscape architecture, civil and mechanical engineering, film and video game design. We used Sketchup for creating a 3d cad model of cyclope.

Chapter 5

RESULT

During this project we developed an equipment that can be used for freely riding bicycle without constraints of gym cycle and we focused in the design and implement a device that can measure the rpm of bicycle wheel which can be easily interfaced with a custom smartphone application to display the rpm, speed, and time of riding the bicycle in real-time and display the calories burned by the user during the process.

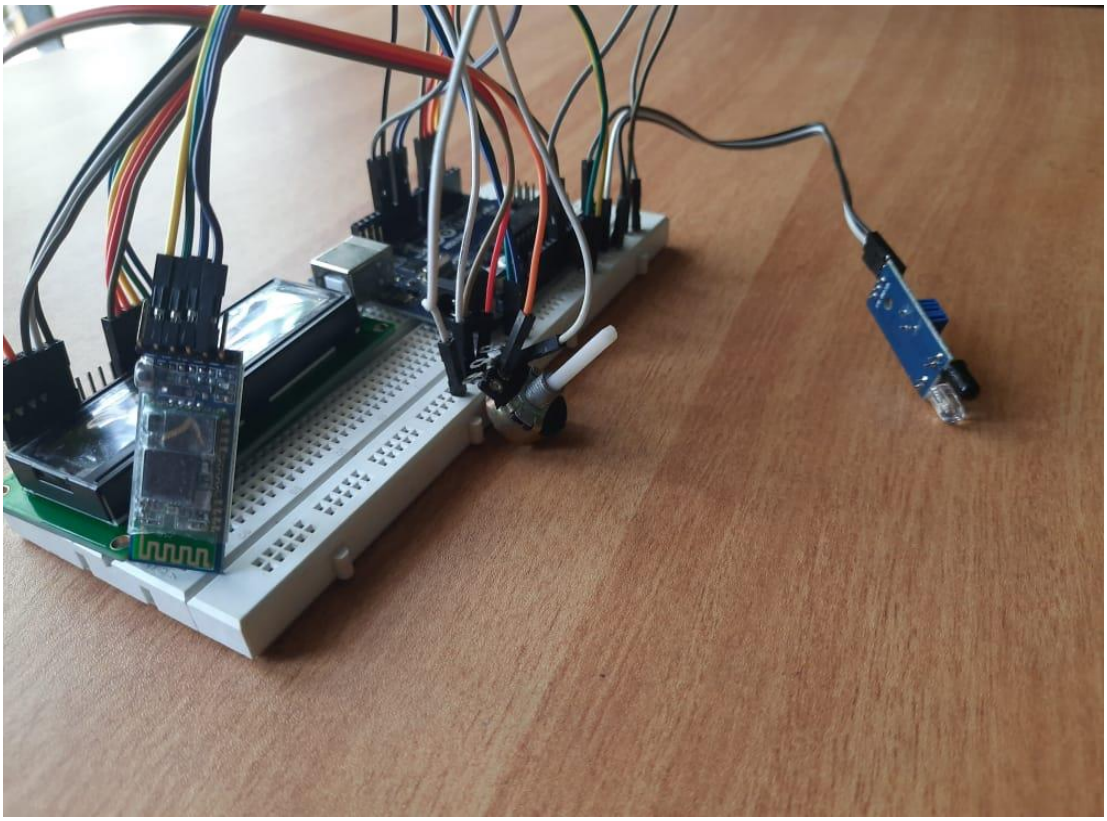


Figure 5. 1

Chapter 6

CONCLUSION

By the end of the design project we were able to develop a tachometer that can measure rpm within range 0-1500 and that was successfully paired with a custom smartphone application over Bluetooth and the rpm was processed into speed, distance and calories burned by the bicycle rider.

The equipment cyclope that was developed can be used by people in urban areas who cannot access cycling tracks or do not have enough area to cycle. It could also be used to cycle during the time of natural conditions that affect during cycling.

During this process we also learned the usage of CNC machining on plywood, 3D designing in Fusion360, and use of power tools. It also helped us to read, understand and take advantage of the research papers available to us.

6.1 USES

- Can be used to cycle with in the rooms of house.
- The tachometer can be used to measure the rpm of rotating object without actual contact as it uses IR light for measurement.
- Can easily adjust the sensitivity and resolution of tachometer depending on application.
- App converts the rpm along with time to find the speed of cycle, distance cycled and energy burned during the process.

PROJECT ACHIEVEMENTS

- With the device and equipment developed during the design project we were able to win the following competitions
    - "Upscale" a national level idea pitching competition conducted by KSUM and IEEE PIE Kerala section (1st prize).
    - "Mock shark tank" event conducted as the part of "Global Skill Summit" by IEEE Delhi section (1st prize).
    - AISYWLC '20 conducted by IEEE Delhi section (finalist).
    - Opportunity for KSUM pre-incubation.

REFERENCES

[1] Sriharsha Kumar, Ch. Venkatesh, K. V. Durga Prasad, S. Balaji – "Digital Tachometer using Arduino", International Journal of Trend in Scientific Research and Development (IJTSRD) Vol: 3 , Issue: 3 Mar-Apr 2019.

[2] Varnika Dwivedi, Ravindra Parab, Satyendra Sharma-"Design of a Portable Contact-less Tachometer using Infrared Sensor for Laboratory Application", International Research Journal of Engineering and Technology (IRJET) , Vol: 06 Issue: 06 , June 2019 .

[3] AT89C2051 MicrocontrollerDatasheet,www.atmel.com/images/doc0368.pdf.

[4] Evan Christensen, Aaron Greeenbaum, LaDante Riley, Stephen Woolverton," Stationary Bicycle Trainer", University Of Michigan, 4/20/2010.

Mapping of Design Project Outcomes

The following mapping shows the mapping of different PO and PSO to the design project outcome.

The mapping specifications are as follows

1 – Low

2-Medium

3- High

CO – PO and CO – PSO mapping

DPO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	__	__	__	__	__	__	__	__	3	__	2	__	__	__	__
2	__	__	__	__	__	__	__	__	2	__	__	__	__	__	__
3	3	2	__	__	__	__	__	__	__	__	__	__	__	__	3
4	__	2	__	__	3	__	__	__	__	___	2	2	2	1	__
5	__	__	__	__	1	__	__	__	__	__	__	__	__	__	1
6	__	__	__	__	__	2	__	__	__	__	__	__	__	__	1

Justification

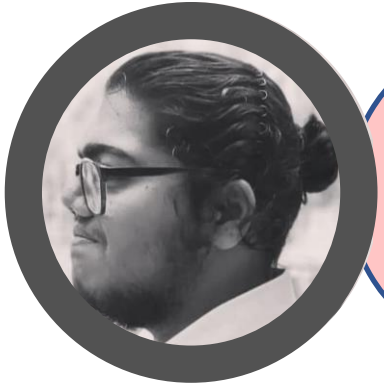
Mapping	Justification
DPO1-PO9	Proper work division and knowledge of strengths and weaknesses of team members resulted in better coordination.
DPO1-PO11	Submission of work on time and team members taking responsibility for their parts improved work efficiency.
DPO2-PO9	Proper communication within the team and with the teachers in charge.
DPO3-PO1	We were able to apply the knowledge of mathematics, science, engineering fundamentals to a great extent.
DPO3-PO2	We did a proper literature survey and combined the knowledge gained by the individuals.

DPO3-PSO3	We learn that we can use IR sensor instead of laser.
DPO4-PO2	We use the skills acquired from STEAG and other online platform to solve the problem.
DPO4-PO5	Software's like Fusion 360 Proteus, Sketchup.
DPO4-PO11	Through the project we were able to combine the knowledge of Various individuals into a common goal.
DPO4-PO12	We learnt that the various topics studied are helpful to study and approach most of the basic electronic circuits.
DPO4-PSO1	We were able to develop practical skills and knowledge of electronics by doing the project.
DP04-PSO2	We were able to design the prototype using the standard parts available complying to the standards of the industry.
DPO5-PO5	We used modern software tools available to simulate the circuits and design the electronic circuit.
DPO5-PSO3	The new software tools learnt will prove useful in future ventures.
DPO6-PO6	The project was done abiding to the COVID-19 protocols set by the authorities.
DPO6-PSO3	By analysing the problems faced by people in society we were able to design a solution with the help of the modern tools available.


//CYCLOPE
re-defining cycling experiences

OUR TEAM

MATHEW K JOSHY



M K ARUN

ARJUN M B

Project guide: Dr. Poornima S,
Assistant Professor, DAEI

PROBLEM

Riding your bicycle regularly is one of the best ways to reduce your risk of health problems

But unfortunately…

- weather conditions 
- Confined spaces 
- Indian roads 
- Reported 16 accidents/hour 

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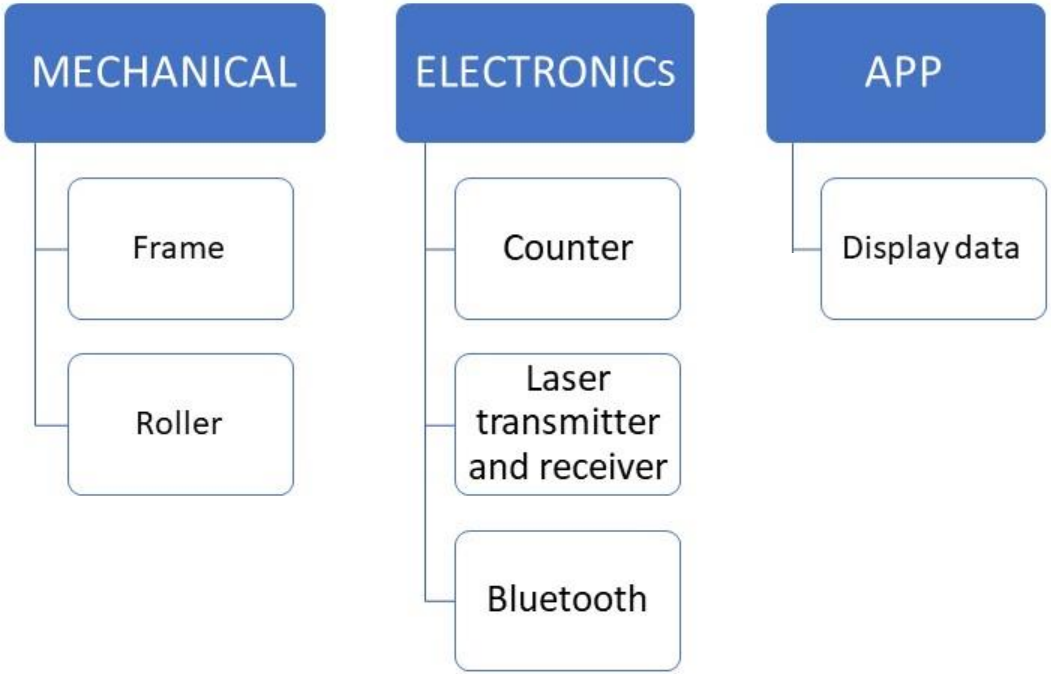
re-defining cycling experiences

CAD IMAGE

TECHNICAL ASPECTS



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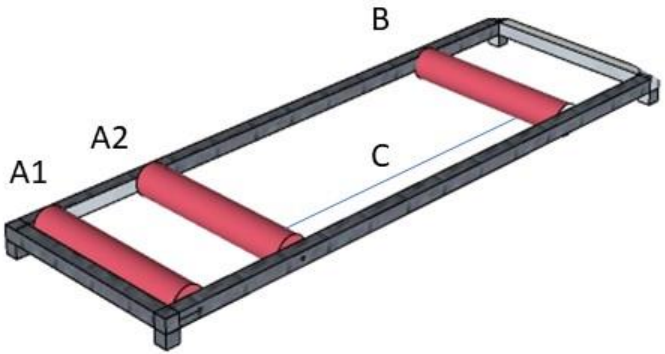
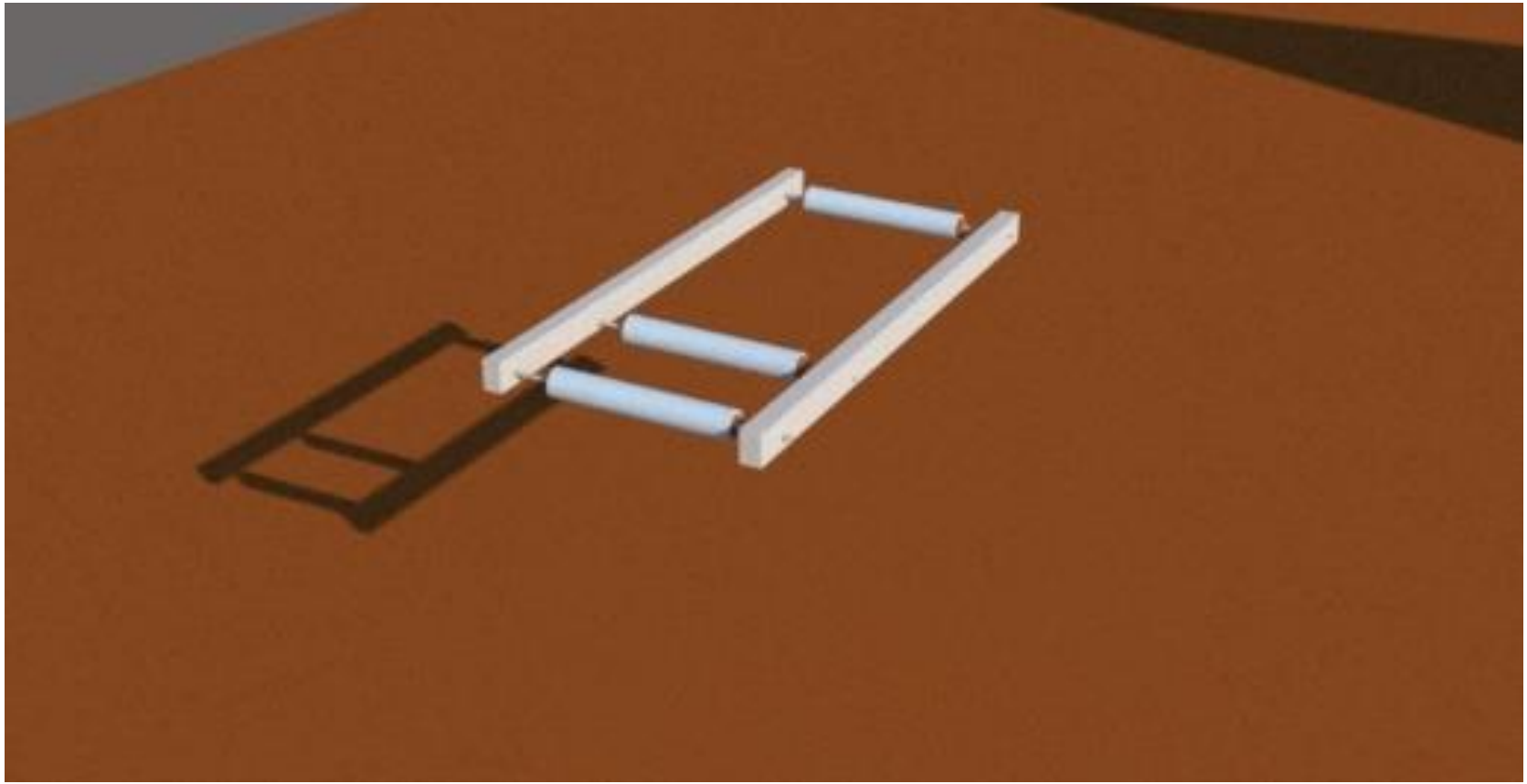
MECHANICAL DESIGN

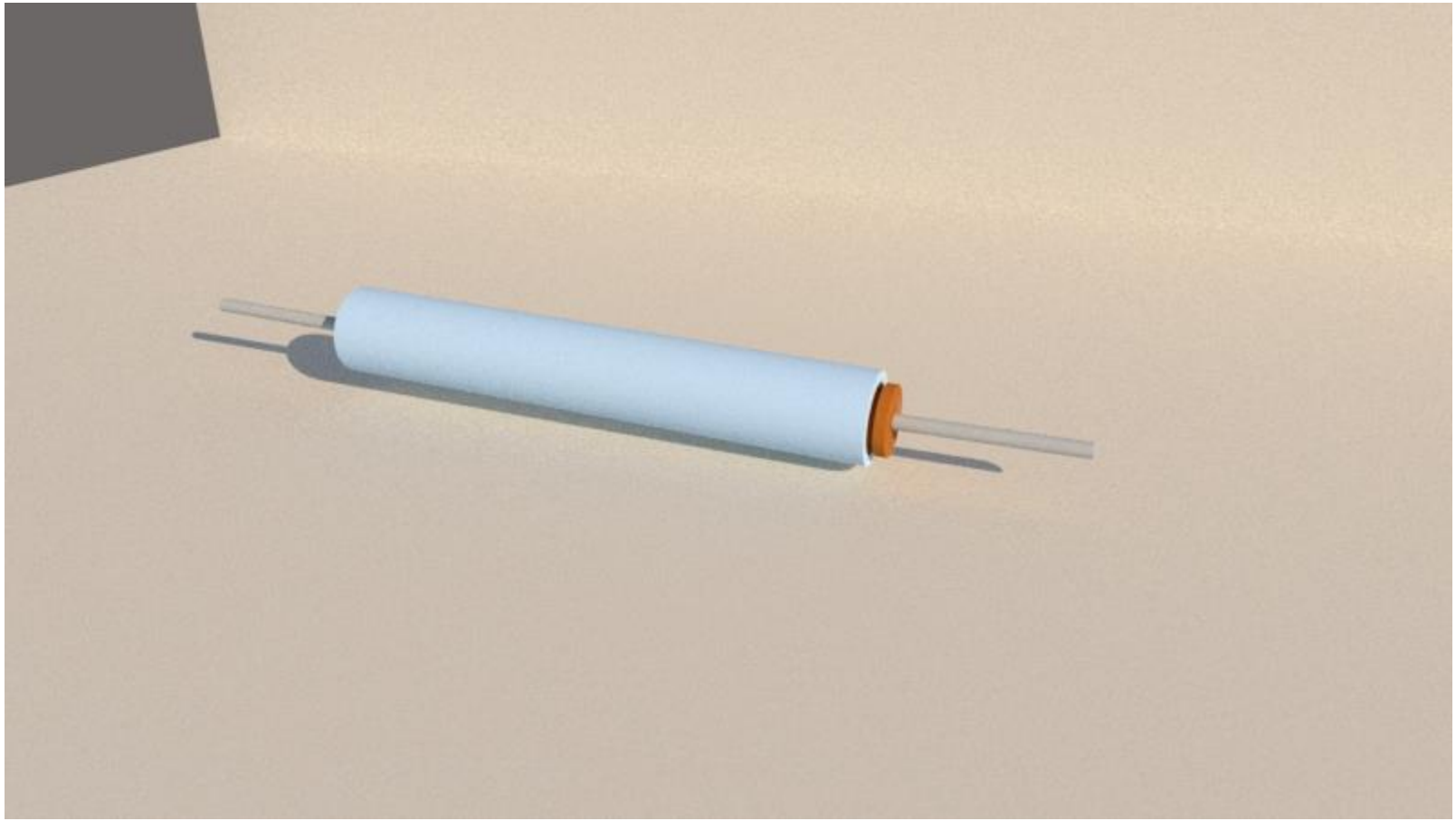
MECHANICAL



- This is the part where your cycle is placed
- The rear wheel of cycle is place between the rollers A1 and A2 and the front wheel is placed on the roller B
- C is a small belt-drive connecting A2 and B making sure the rear and front wheel of cycle are rotating synchronously

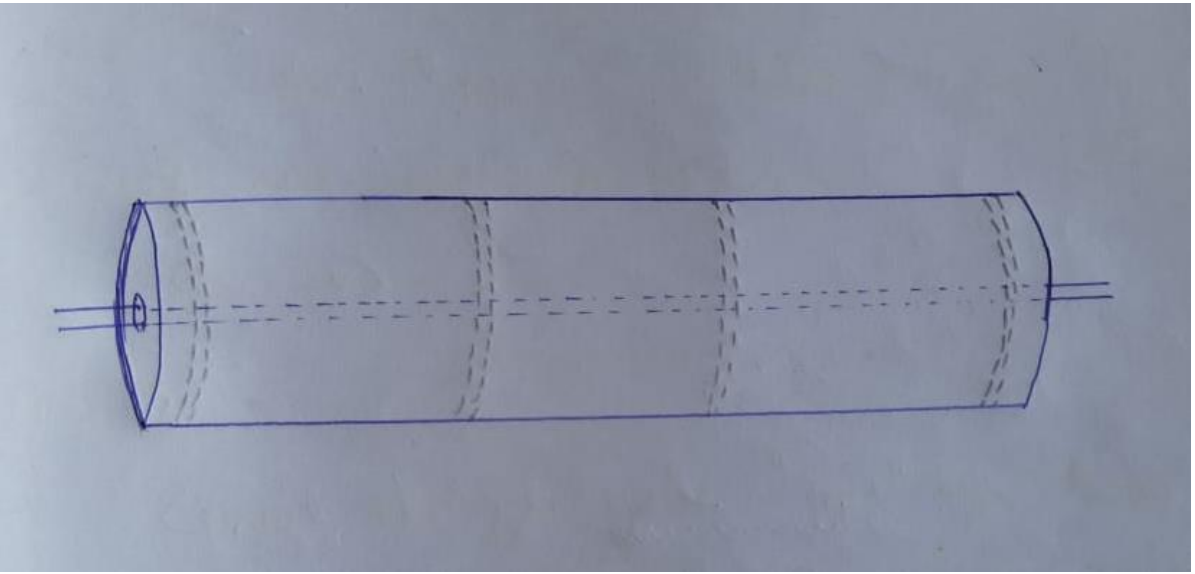


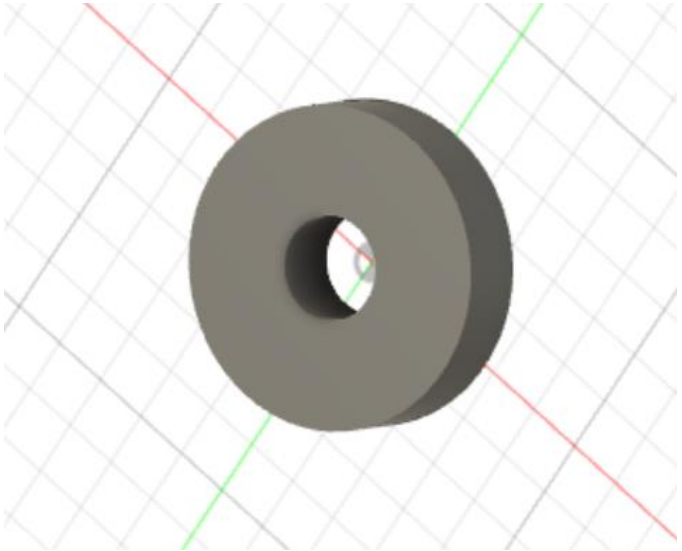
DESIGNED IN SKETCH-UP



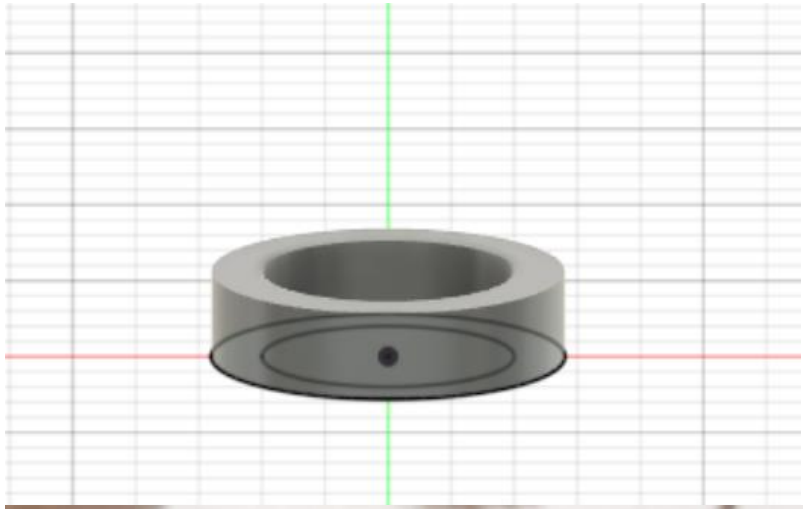
DESIGNED IN SKETCH-UP

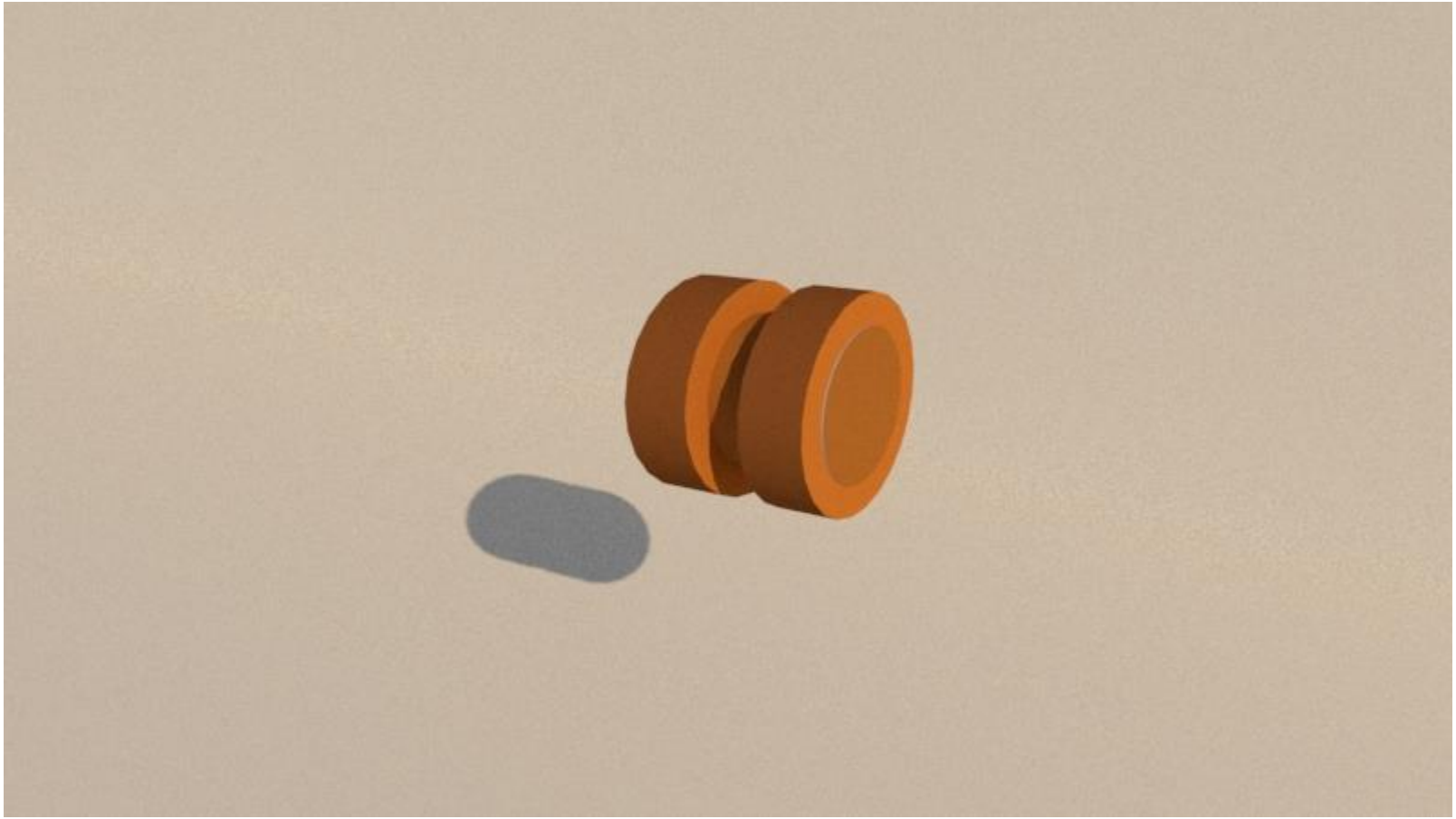
TRANSFER OF LOAD FROM PVC TO SHAFT





Basic Bearing No.	Nominal Bearing Dimensions						Preferred Shoulder Diameters							
	d		D		B,C		$r_{(min)}$		$da_{(min)}$		$da_{(max)}$		$Da_{(max)}$	
	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
624	4	0.1575	13	0.5118	5	0.1968	0.2	0.007	5.6	0.220	6.2	0.244	11.4	0.449
625	5	0.1969	16	0.6299	5	0.1968	0.3	0.012	7.0	0.276	7.6	0.299	14.0	0.551
626	6	0.2362	19	0.7480	6	0.2362	0.3	0.012	8.0	0.315	9.5	0.374	17.0	0.669
627	7	0.2756	22	0.8661	7	0.2756	0.3	0.012	9.0	0.354	12.2	0.480	20.0	0.787
628	8	0.3149	24	0.9448	8	0.3149	0.3	0.012	10.0	0.394	12.1	0.476	17.0	0.669
629	9	0.3543	26	1.0236	8	0.3149	0.3	0.012	11.5	0.453	--	--	14.0	0.945
6200	10	0.3937	30	1.1811	9	0.3543	0.6	0.024	12.7	0.500	16.0	0.630	26.0	1.024
6201	12	0.4724	32	1.2598	10	0.3937	0.6	0.024	14.7	0.578	17.0	0.670	28.0	1.102
6202	15	0.5906	35	1.3780	11	0.4331	0.6	0.024	17.9	0.703	20.0	0.787	31.0	1.220
6203	17	0.6693	40	1.5748	12	0.4724	0.6	0.024	20.0	0.787	23.5	0.926	36.0	1.417
6204	20	0.7874	47	1.8504	14	0.5512	1.0	0.039	24.6	0.969	28.0	1.102	42.0	1.654
6205	25	0.9843	52	2.0470	15	0.5906	1.0	0.039	30.0	1.181	32.0	1.260	47.0	1.850
6206	30	1.1811	62	2.4409	16	0.6299	1.0	0.039	35.0	1.378	39.0	1.535	57.0	2.244
6207	35	1.3780	72	2.8346	17	0.6693	1.1	0.043	41.0	1.614	45.0	1.772	65.5	2.579
6208	40	1.5748	80	3.1496	18	0.7087	1.1	0.043	46.0	1.811	51.0	2.008	73.5	2.894
6209	45	1.7717	85	3.3465	19	0.7480	1.1	0.043	51.0	2.008	55.5	2.185	78.5	3.091
6210	50	1.9685	90	3.5433	20	0.7874	1.1	0.043	56.0	2.205	60.0	2.362	83.5	3.287
6211	55	2.1654	100	3.9370	21	0.8268	1.5	0.059	62.0	2.441	67.0	2.638	92.0	3.622
6212	60	2.3622	110	4.3307	22	0.8661	1.5	0.059	68.0	2.677	75.0	2.953	102.0	4.016
6213	65	2.5591	120	4.7244	23	0.9055	1.5	0.059	73.0	2.874	80.5	3.169	112.0	4.409
6214	70	2.7559	125	4.9213	24	0.9449	1.5	0.059	78.0	3.071	85.0	3.346	117.0	4.606
6215	75	2.9528	130	5.1181	25	0.9843	1.5	0.059	83.0	3.268	90.5	3.563	122.0	4.803
6216	80	3.1496	140	5.5118	26	1.0236	2.0	0.0787	89.0	3.504	95.5	3.760	131.0	5.157
6217	85	3.3465	150	5.9055	28	1.1024	2.0	0.0787	94.0	3.701	103.0	4.055	141.0	5.551
6218	90	3.5433	160	6.2992	30	1.1811	2.0	0.0787	99.0	3.898	109.0	4.291	151.0	5.945
6219	95	3.7402	170	6.6929	32	1.2598	2.1	0.0827	106.0	4.173	116.0	4.567	159.0	6.260
6220	100	3.9370	180	7.0866	34	1.3386	2.1	0.0827	111.0	4.370	122.0	4.803	169.0	6.654
6221	105	4.1399	190	7.4803	36	1.4173	2.1	0.0827	116.0	4.567	125.0	4.921	179.0	7.047
6222	110	4.3307	200	7.8740	38	1.4961	2.1	0.0827	121.0	4.764	132.0	5.197	189.0	7.441





DESIGNED IN SKETCH-UP

Autodesk Fusion 360 (Education License)

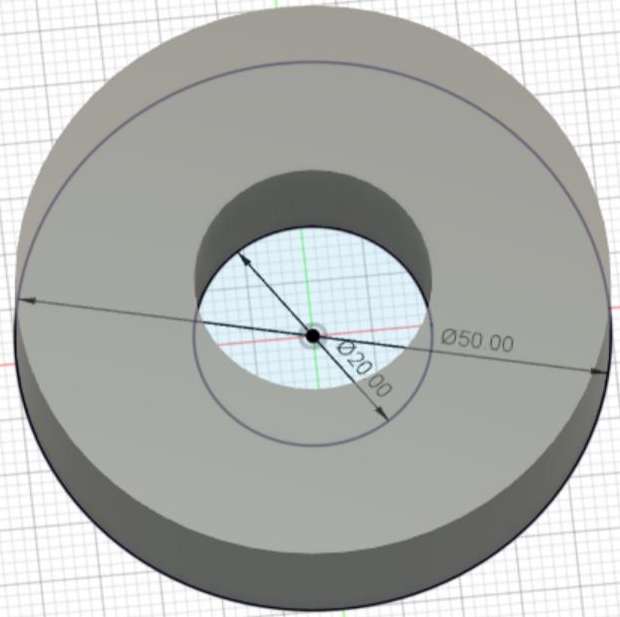
inner ring v3* | outer ring v2* | roller design v2 v2*

SOLID | SURFACE | SHEET METAL | TOOLS

DESIGN | CREATE | MODIFY | ASSEMBLE | CONSTRUCT | INSPECT | INSERT | SELECT

BROWSER

- inner ring v3
  - Document Settings
  - Named Views
  - Origin
  - Bodies
  - Sketches



COMMENTS

DESIGNED IN FUSION360

Links

ENG 17:31 09-11-2020

Autodesk Fusion 360 (Education License)

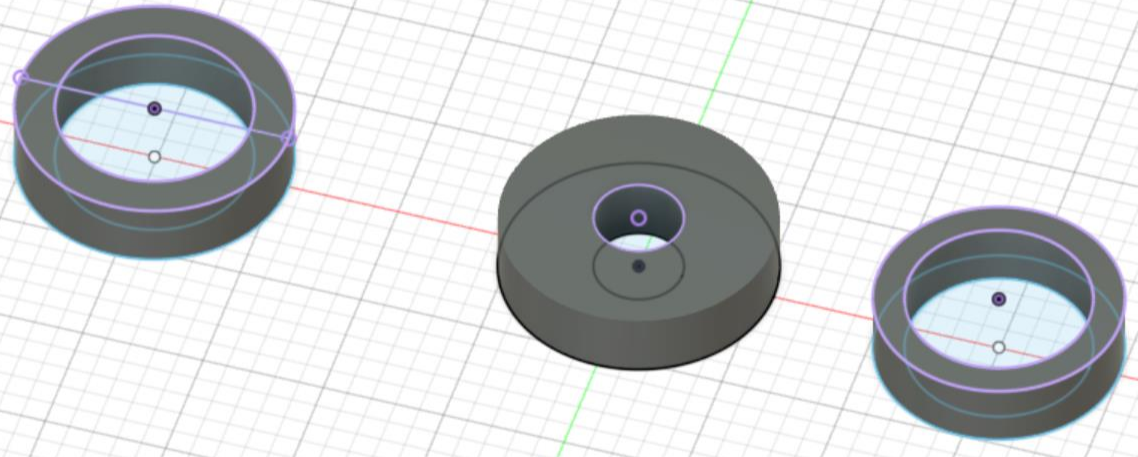
inner ring v3* | outer ring v2* | roller design v2 v2*

DESIGN | SOLID | SURFACE | SHEET METAL | TOOLS

CREATE | MODIFY | ASSEMBLE | CONSTRUCT | INSPECT | INSERT | SELECT

BROWSER

- roller design v2 v2
  - Document Settings
  - Named Views
  - Origin
  - Bodies
  - Sketches



COMMENTS

DESIGNED IN FUSION360

Links

ENG 17:31 09-11-2020

Autodesk Fusion 360 (Education License)

inner ring v3* | outer ring v2* | roller design v2 v2*

SOLID | SURFACE | SHEET METAL | TOOLS

DESIGN | CREATE | MODIFY | ASSEMBLE | CONSTRUCT | INSPECT | INSERT | SELECT

BROWSER

- outer ring v2
  - Document Settings
  - Named Views
  - Origin
  - Bodies
  - Sketches

DESIGNED IN FUSION360

Sketch2

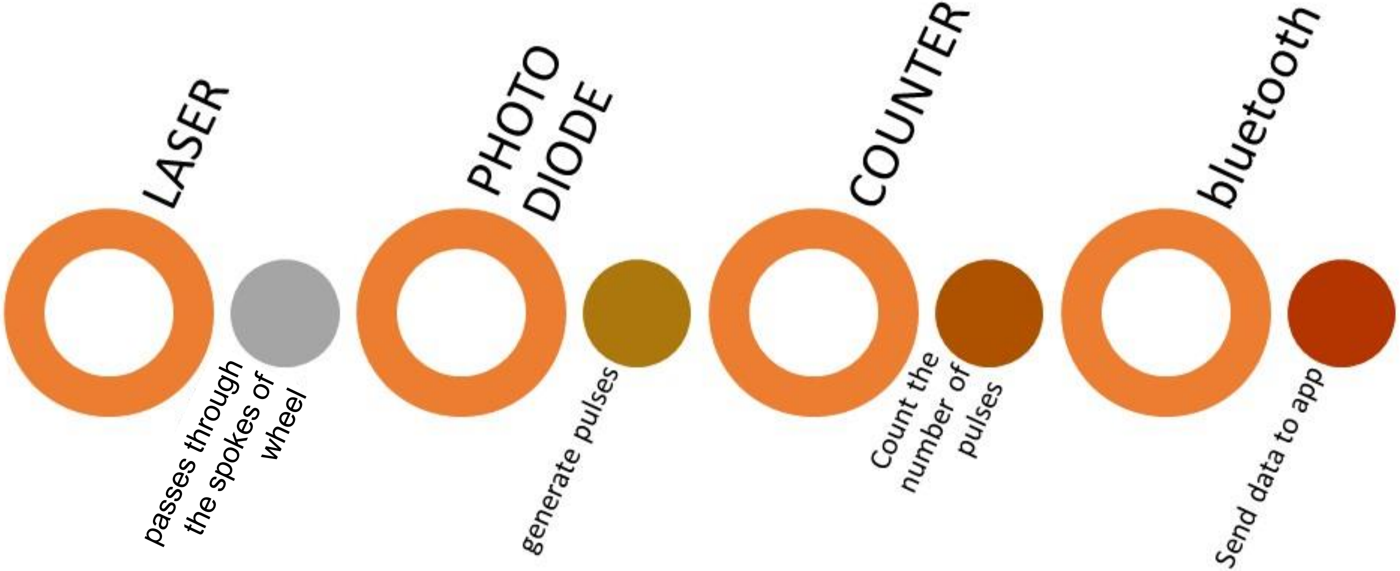
COMMENTS

Links

ENG 17:31 09-11-2020

ELECTRONICS

ELECTRONICS



New Project - Proteus 8 Professional - Schematic Capture

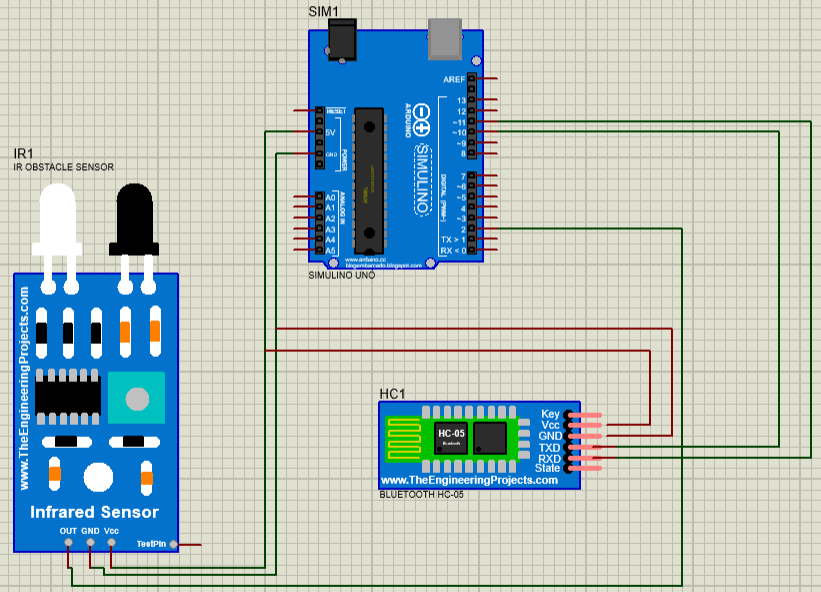
File Edit View Tool Design Graph Debug Library Template System Help

Base Design

Schematic Capture

DEVICES

BLUETOOTH HC-05
IR OBSTACLE SENSOR
SIMULINO UNO



No Messages

Root sheet 1

+5500.0

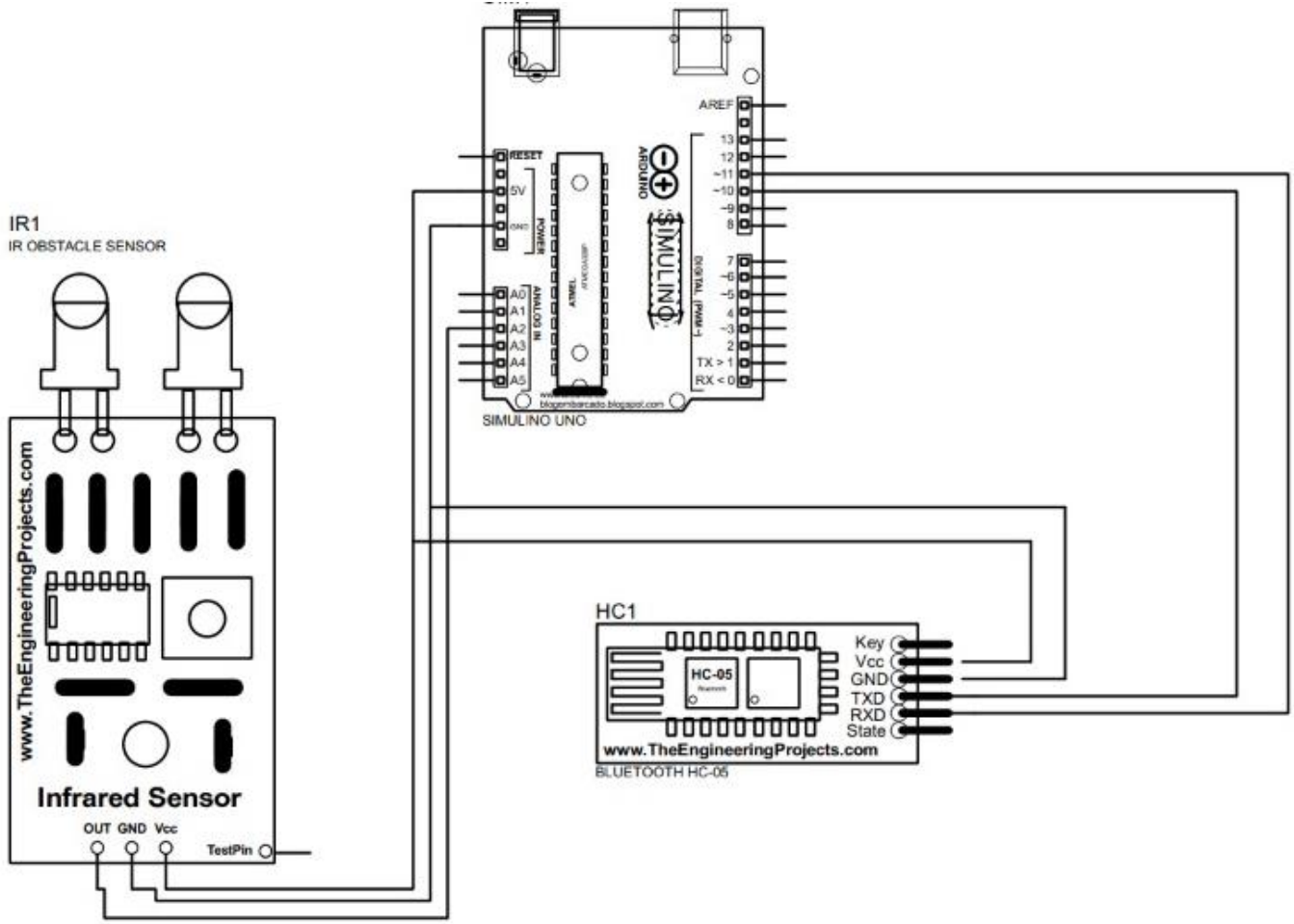
+100.0

Links

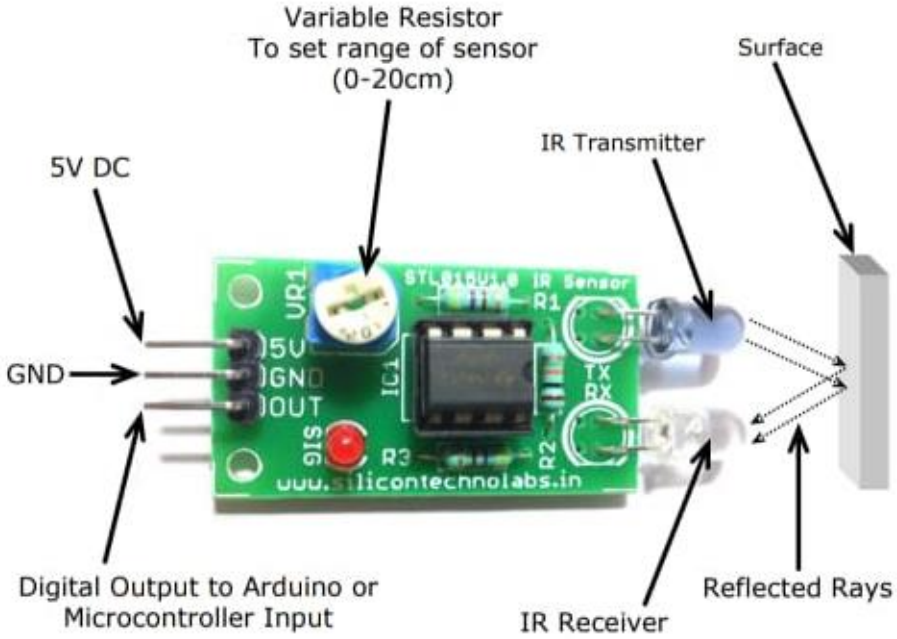
ENG

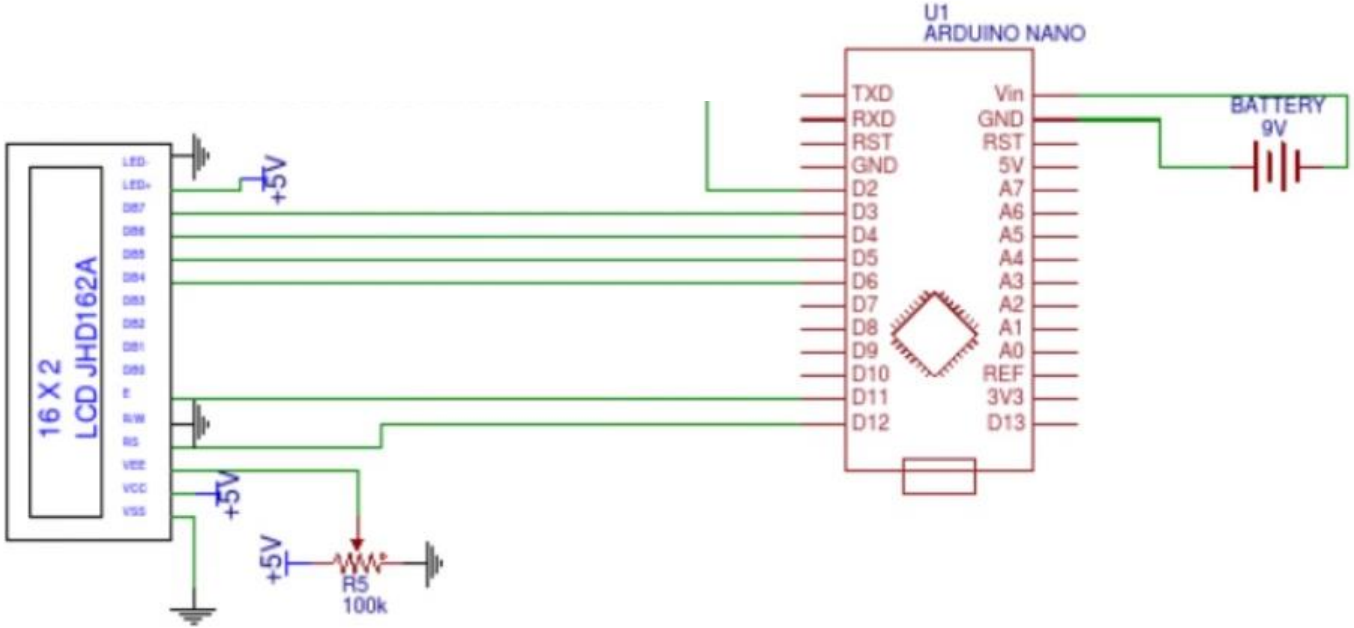
12:46

10-11-2020

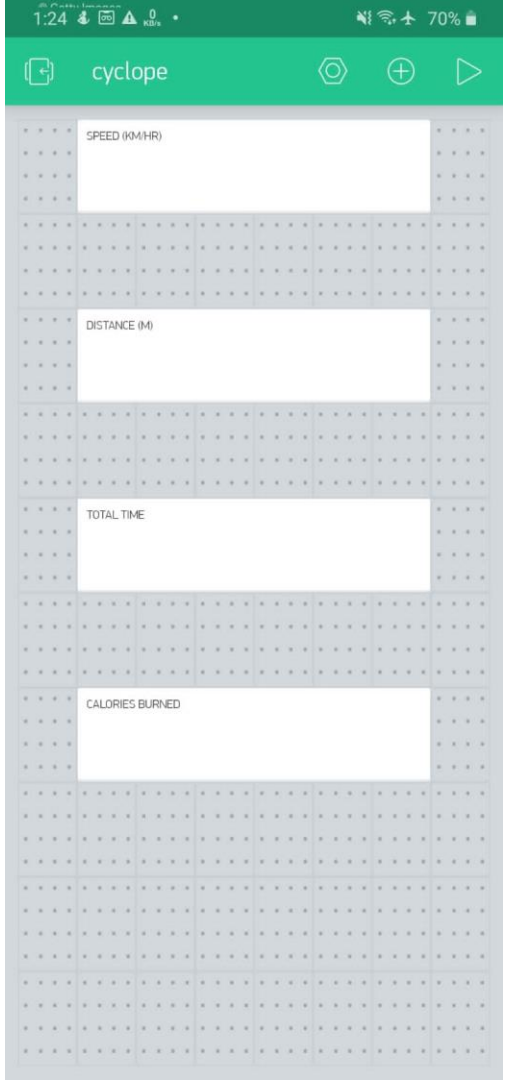

IR1
IR OBSTACLE SENSOR
www.TheEngineeringProjects.com
Infrared Sensor
OUT GND Vcc
TestPin
SIMULINO UNO
RESET
5V
GND
POWER
ANALOG IN
A0
A1
A2
A3
A4
A5
AREF
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX > 1
RX < 0
DIGITAL (PWM~)
ARDUINO
SIMULINO
blogembarcado.blogspot.com
HC1
HC-05
Key
Vcc
GND
TXD
RXD
State
www.TheEngineeringProjects.com
BLUETOOTH HC-05

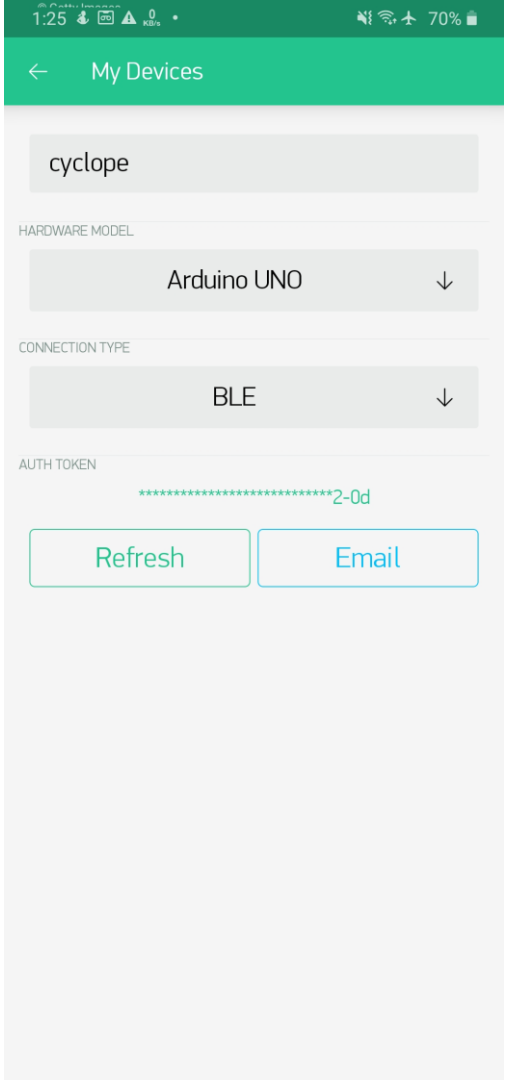
IR SENSOR

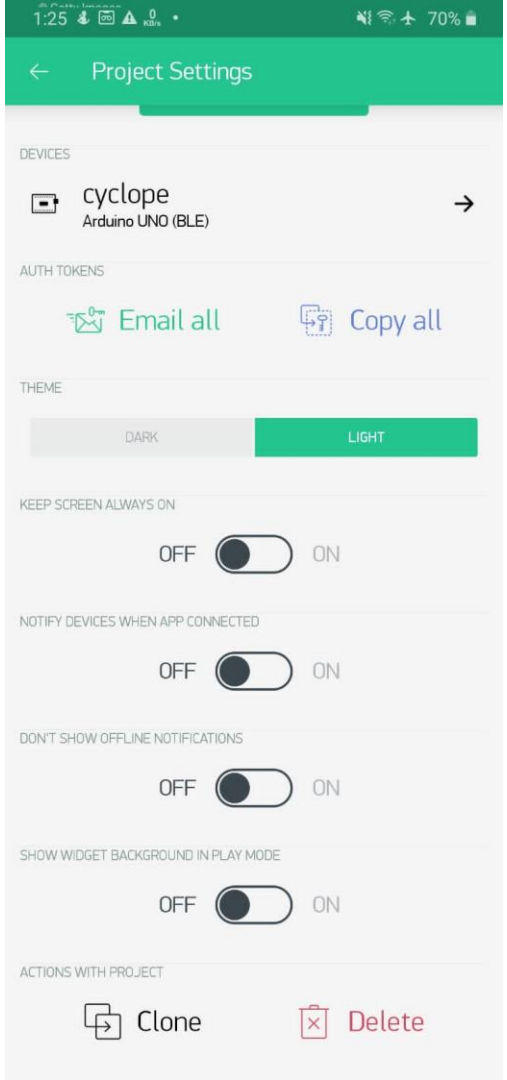

Variable Resistor
To set range of sensor
(0-20cm)
Surface
IR Transmitter
5V DC
GND
Digital Output to Arduino or
Microcontroller Input
IR Receiver
Reflected Rays
VR1
IC1
R1
R2
R3
TX
RX
5V
GND
OUT
SIG
IR Sensor

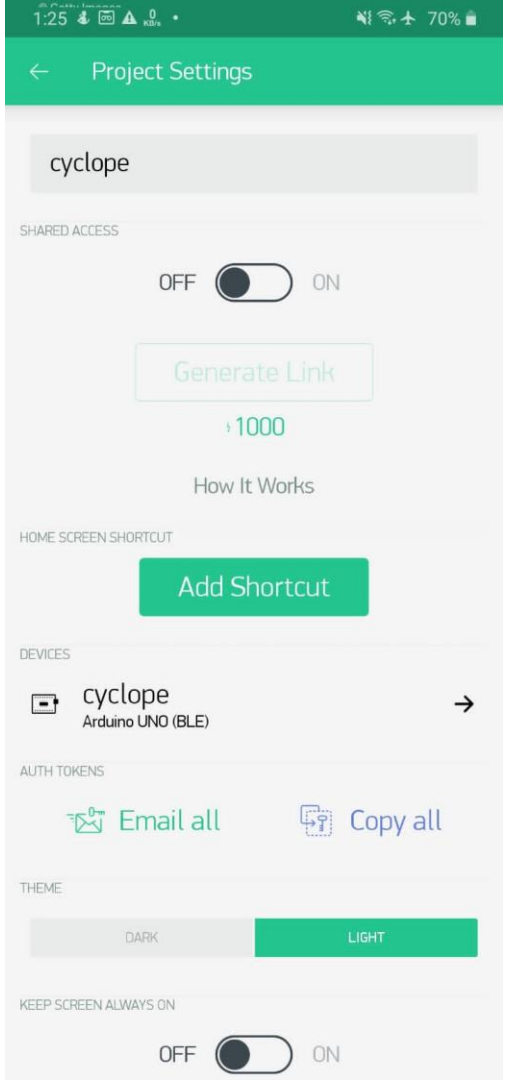

U1
ARDUINO NANO
TXD
RXD
RST
GND
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
Vin
GND
RST
5V
A7
A6
A5
A4
A3
A2
A1
A0
REF
3V3
D13
BATTERY
9V
16 X 2
LCD JHD162A
+5V
+5V
+5V
R5
100k

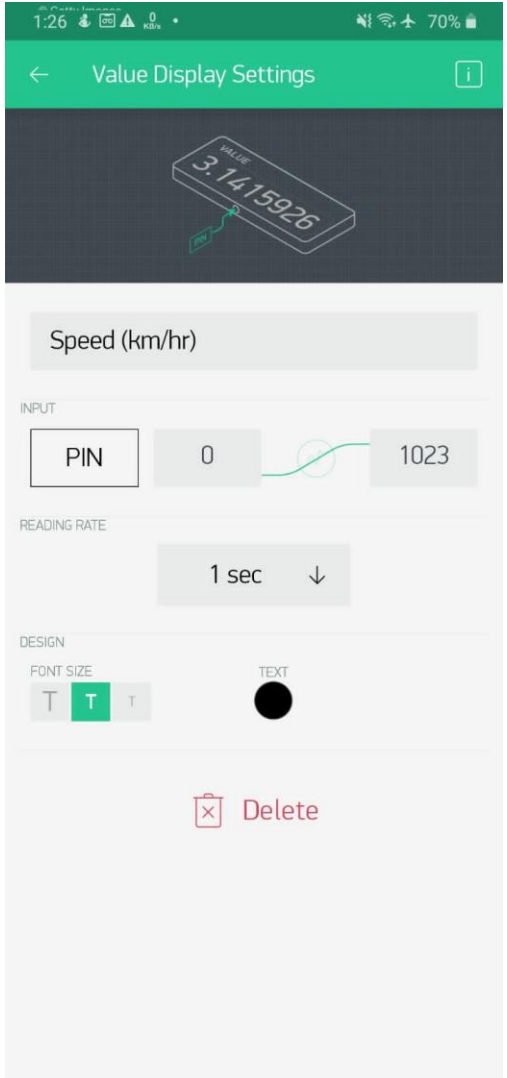
APP


1:24
70%
cyclope
SPEED (KM/HR)
DISTANCE (M)
TOTAL TIME
CALORIES BURNED


1:25
70%
My Devices
cyclope
HARDWARE MODEL
Arduino UNO
CONNECTION TYPE
BLE
AUTH TOKEN
**********2-0d
Refresh
Email


1:25
70%
Project Settings
DEVICES
cyclope
Arduino UNO (BLE)
AUTH TOKENS
Email all
Copy all
THEME
DARK
LIGHT
KEEP SCREEN ALWAYS ON
OFF
ON
NOTIFY DEVICES WHEN APP CONNECTED
OFF
ON
DON'T SHOW OFFLINE NOTIFICATIONS
OFF
ON
SHOW WIDGET BACKGROUND IN PLAY MODE
OFF
ON
ACTIONS WITH PROJECT
Clone
Delete


1:25
70%
Project Settings
cyclope
SHARED ACCESS
OFF
ON
Generate Link
1000
How It Works
HOME SCREEN SHORTCUT
Add Shortcut
DEVICES
cyclope
Arduino UNO (BLE)
AUTH TOKENS
Email all
Copy all
THEME
DARK
LIGHT
KEEP SCREEN ALWAYS ON
OFF
ON


1:26
70%
Value Display Settings
VALUE
3.1415926
PIN
Speed (km/hr)
INPUT
PIN
0
1023
READING RATE
1 sec
DESIGN
FONT SIZE
TEXT
Delete

REFERENCES

- A. Sriharsha Kumar, Ch. Venkatesh, K. V. Durga Prasad, S. Balaji – “Digital Tachometer using Arduino”, International Journal of Trend in Scientific Research and Development (IJTSRD) Volume: 3 | Issue: 3 Mar-Apr 2019

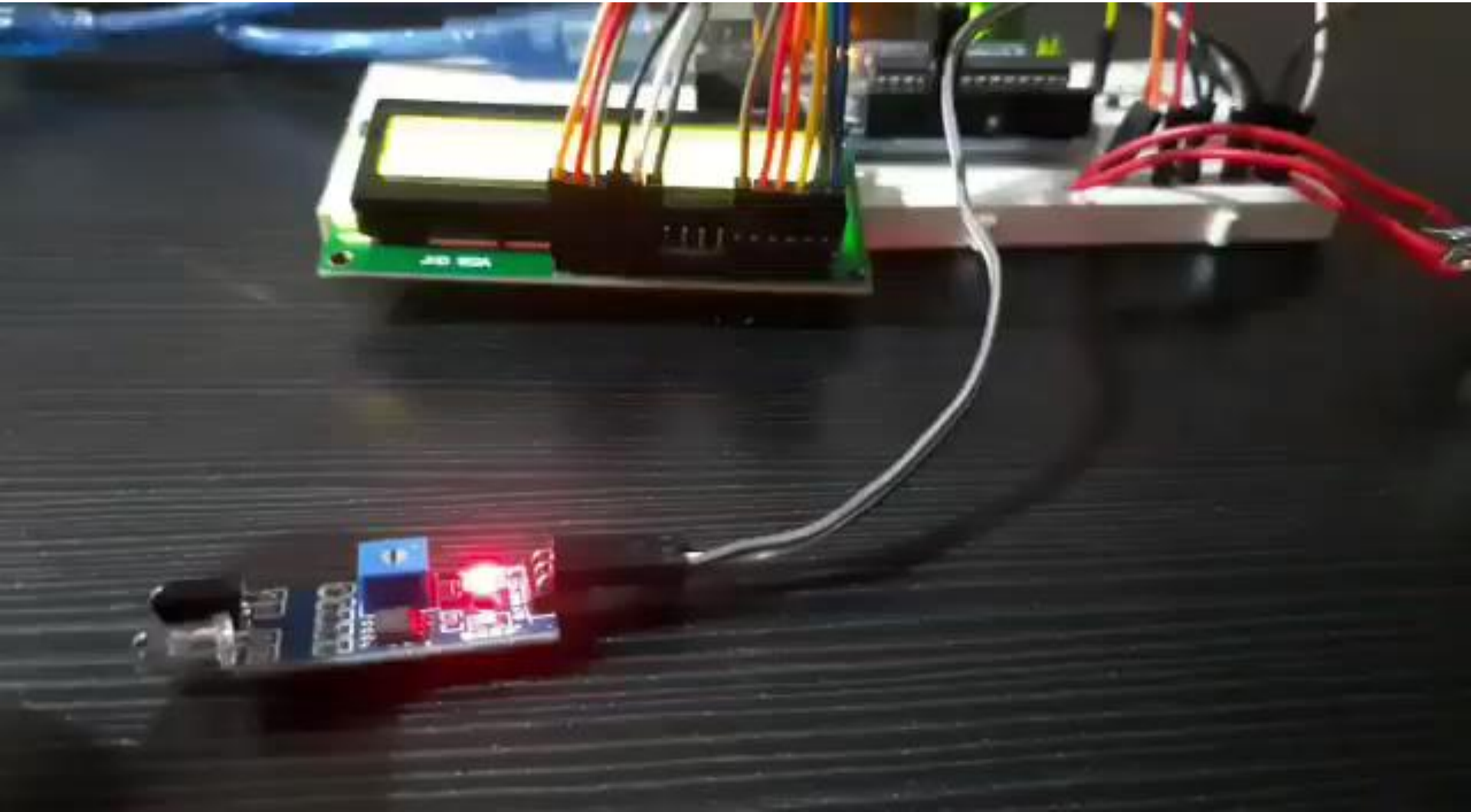
- Varnika Dwivedi, Ravindra Parab, Satyendra Sharma-“Design of a Portable Contact-less Tachometer using Infrared Sensor for Laboratory Application”, International Research Journal of Engineering and Technology (IRJET) ,Volume: 06 Issue: 06 | June 2019

- AT89C2051 Microcontroller Datasheet, www.atmel.com/images/doc0368.pdf

- Evan Christensen, Aaron Greeenbaum, LaDante Riley, Stephen Woolverton,” Stationary Bicycle Trainer”, University Of Michigan, 4/20/2010

DATE	PROGRESS UPDATE	COMMENTS
15-Sept-2020	Started working on CAD model	
	Started working on block diagram	
16-Sept-2020	Basic block diagram compleated	
21-Sept-2020	CAD model compleated	
	Started working on project abstract	
22-Sept-2020	Abstract submitted	
24-Sept-2020	Project provitionally approved by Mr.Krishna Kumar.K.P	
28-Sept-2020	Guide assigned as Dr.Poornima.S, Assistant Professor,DAEI	
	First meeting with guide	Project explained, components explained
	Fully approved by guide	
30-Sept-2020	Contact with guide	Advices for bluetooth interfacing
		Microcontroller changed from 8051 to ATmega328p
18- Oct-2020	Brought components	
	Bearings(16mm ID), Steel pipes (21/2 x 11/2 16G), screw(1/4 in)	
18-Oct-2020	Contact with guide	Corrections for references format (to IEEE format)
19-Oct-2020	Abstract presentation	
	Started working on making mechanical part	
21-Oct-2020	Completion of roller	
24-Oct-2020	Started with flutter for app development, and arduino programming	
28- Oct-2020	Brought electronics components	
7-Nov-2020	Started with electronics design	

10- Nov-2020	Final presentation of project	
11-Nov-2020	Started assembling electronics	
15-Nov-2020	Completed electronics side of our project	
16-Nov	Completed coding for arduino	




Thank You