DESIGNING RFID IMPLANTS

HOW FLIPPING THE BIRD OPENS DOORS FOR ME

WHAT AM I TALKING ABOUT?

THERE WILL BE NO GORY IMAGES



TARGET AUDIENCE?

WHO AM I?

MIANA WINDALL

SHE/HER

COMPUTER NERD BY DAY

BIOHACKER BY NIGHT



10 RFID,
8 MAGNET,
2 AESTHETIC,
6 MEDICAL



xSIID NFC Implant

LET'S GET STARTED



WHAT IS RFID?

KEY TERMINOLOGY

RFID RADIO FREQUENCY IDENTIFICATION

LF LOW FREQUENCY (125KHz / 132KHz)

HF HIGH FREQUENCY (13.56MHz)

NFC STANDARDIZED SUBSET OF HF RFID

TAG PASSIVE RFID TRANSPONDER

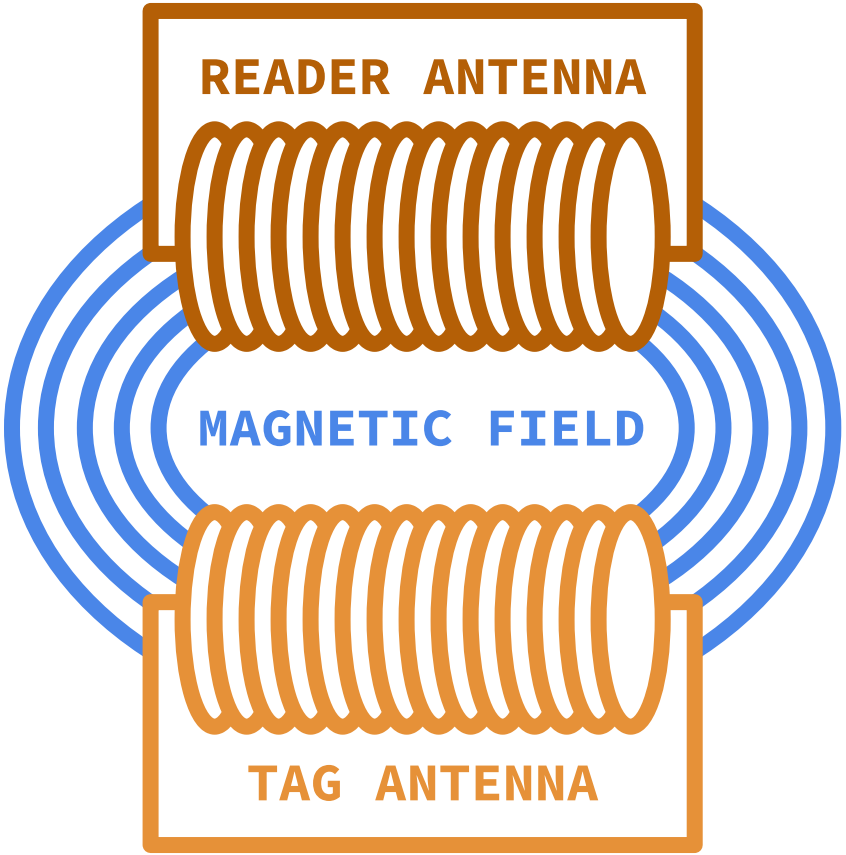
READER ACTIVE DEVICE TALKING TO TAG

FIELD THE EM FIELD OF A READER & TAG

HOW DOES IT WORK?

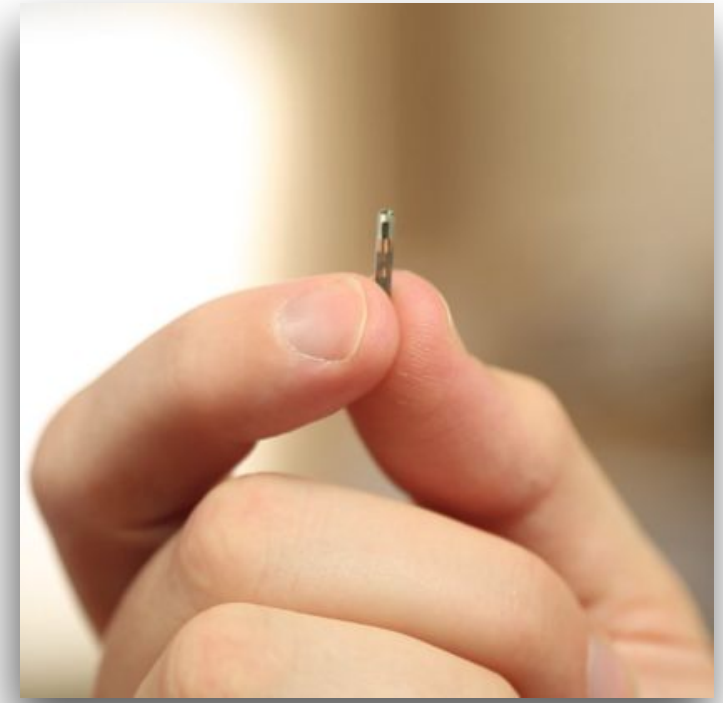


HOW DOES IT WORK?

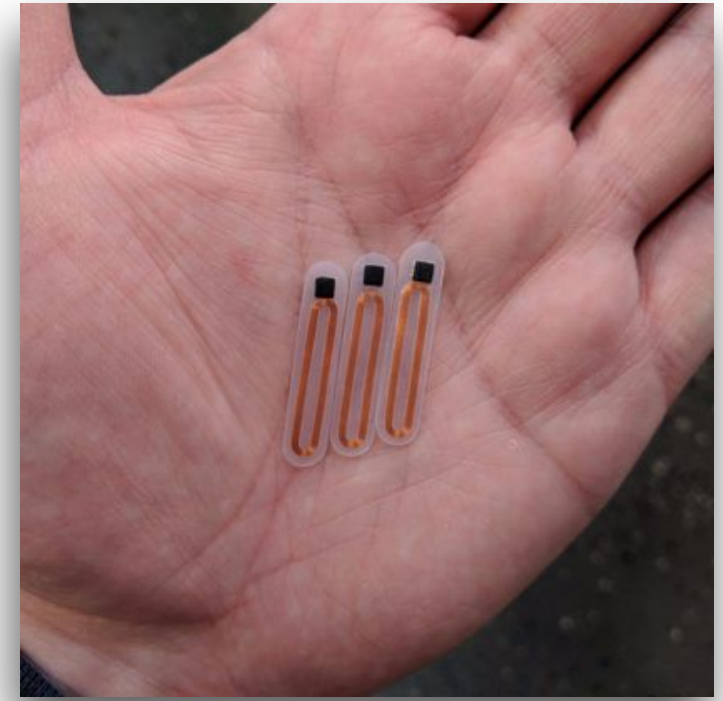


WHAT DO I MEAN BY IMPLANT?

SO WHAT IS AN IMPLANT?



SO WHAT IS AN IMPLANT?



SO WHAT IS AN IMPLANT?



X-RAY BY CASEY BORDERS

SO WHAT IS AN IMPLANT?



X-RAY BY CASEY BORDERS

JUST RFID?

MAGNETS

OTHER INDUCTIVE POWER TECH

SILICONE

TRIDIUM

MEDICATION

ETC


TITAN SENSING MAGNET IMPLANTS



XGLO TRIDIUM IMPLANT – PHOTO BY ALYX WIJERS


POST INSTALL SILICONE POWER BUTTON SUBDERMAL

JUST RFID?

MAGNETS

OTHER INDUCTIVE POWER TECH

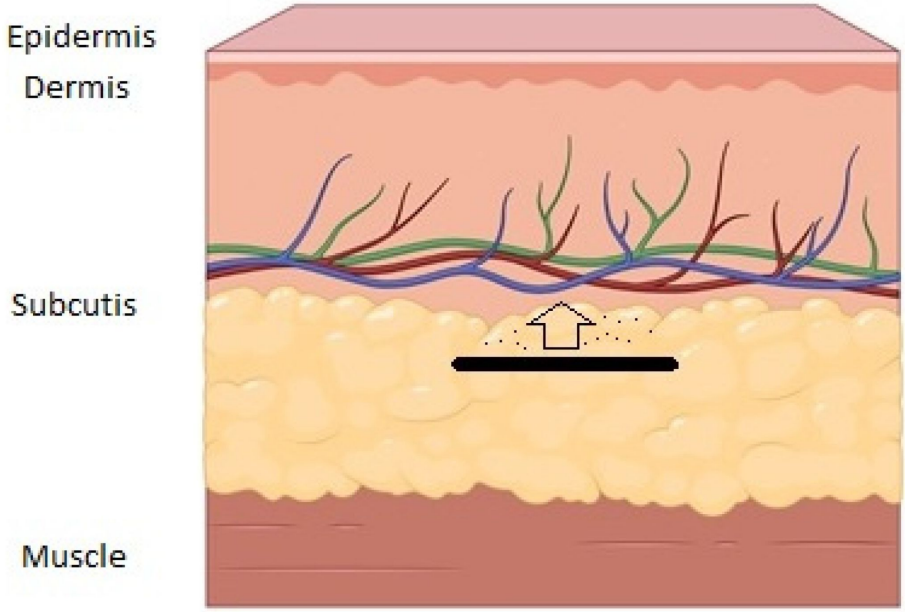
SILICONE

TRIDIUM

MEDICAL

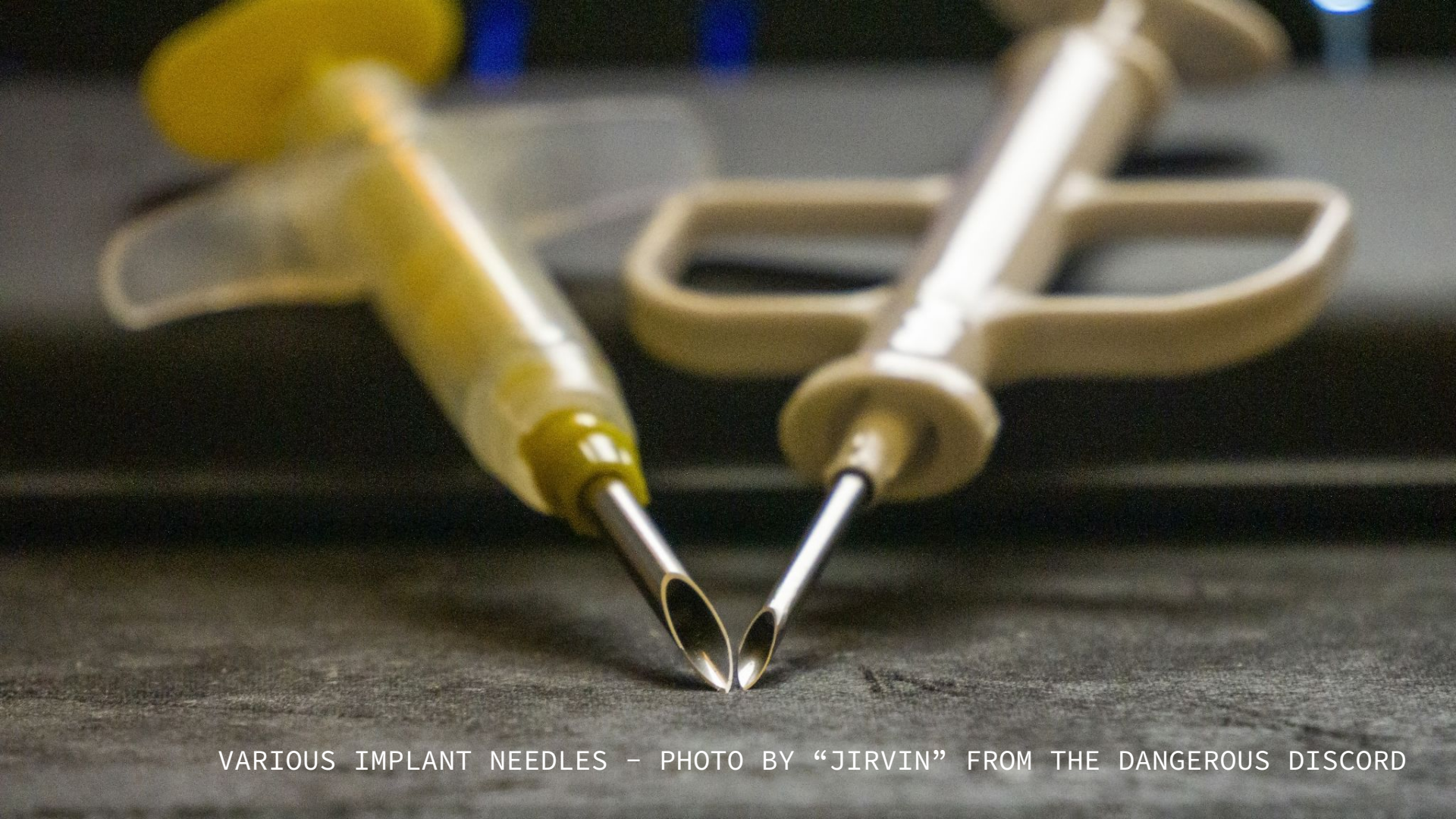
ETC

GETTING IMPLANTED!



CONTENT WARNING: NEEDLES





VARIOUS IMPLANT NEEDLES – PHOTO BY “JIRVIN” FROM THE DANGEROUS DISCORD



PRE INSTALL SILICONE SUBDERMAL – PHOTO BY NICK “TCPRST” DRAFFEN

DISADVANTAGES?



DISADVANTAGES?



DISADVANTAGES?



DISADVANTAGES?



ADVANTAGES?



ADVANTAGES?





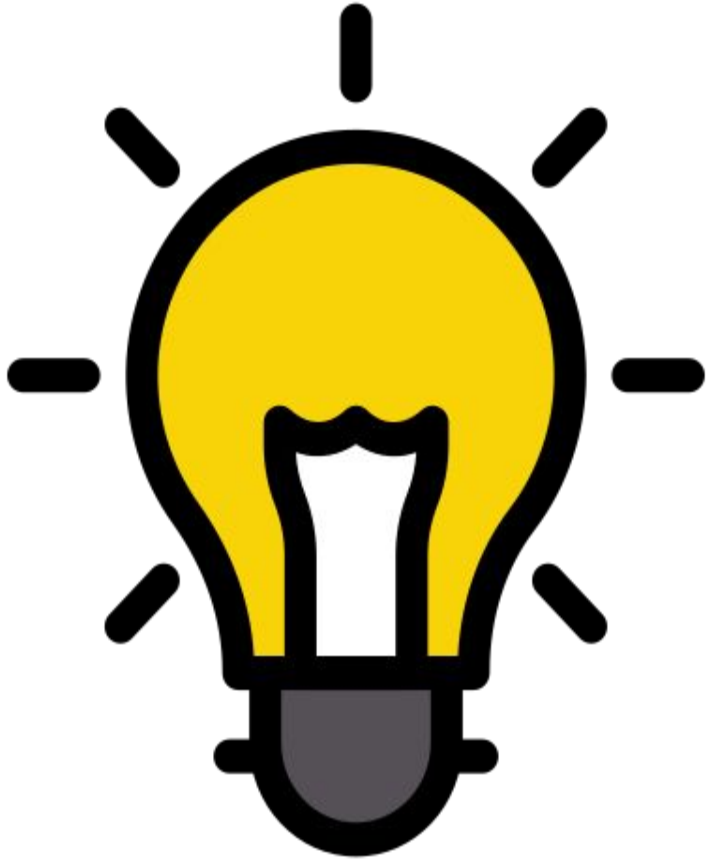
ADVANTAGES?



DESIGNING MY OWN RFID IMPLANT

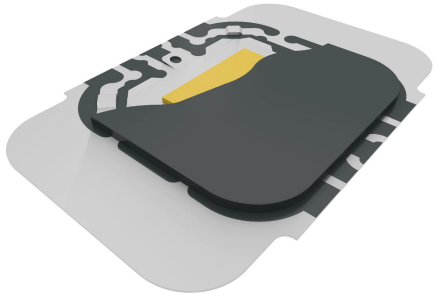
WHY?

WHAT INSPIRED ME TO DO THIS?



KEY ELEMENTS OF RFID TRANSPONDERS

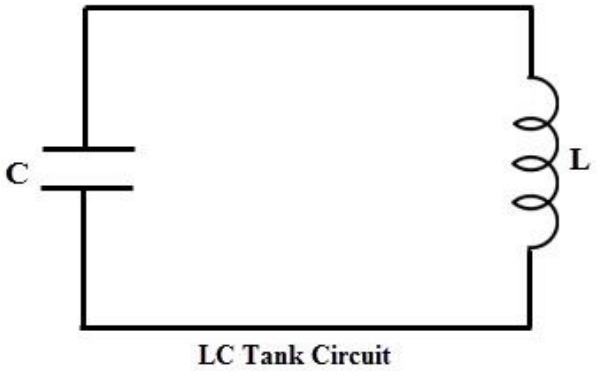
CHIP



ANTENNA



HOW DO THEY WORK TOGETHER?



LC Tank Circuit

SOURCING THE PARTS

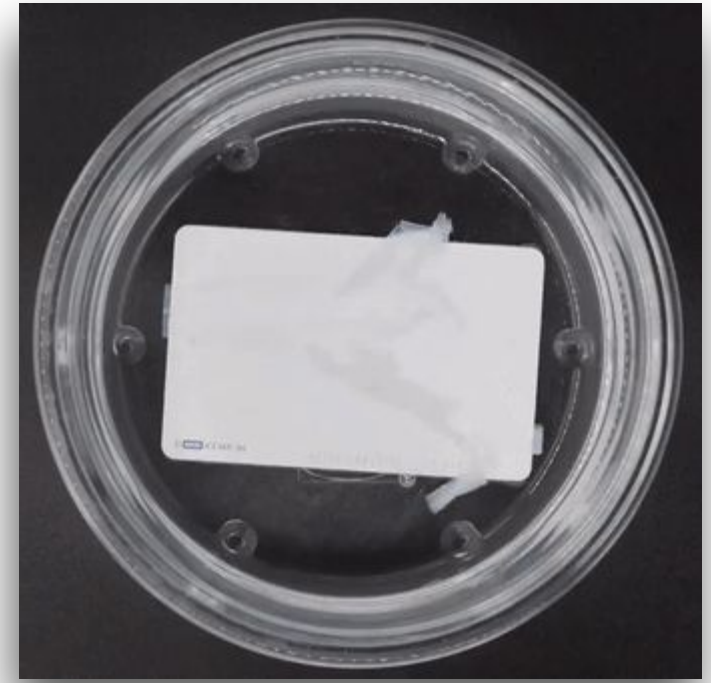
PROPRIETARY CHIPS

ARE A PAIN IN THE ASS



CHIP EXTRACTION

“I’M MELTING”



VIDEO BY NICK “TCPRST” DRAFFEN
doitfor.science/melting

DATA GATHERING

MEASURING THE CHIP CHARACTERISTICS



PHOTO BY NICK “TCPRST” DRAFFEN

AFTER ALL THAT...
I FOUND THE DATASHEET...

DESIGNING THE IMPLANT

DOING THE MATH

LC Resonant Frequency Calculator

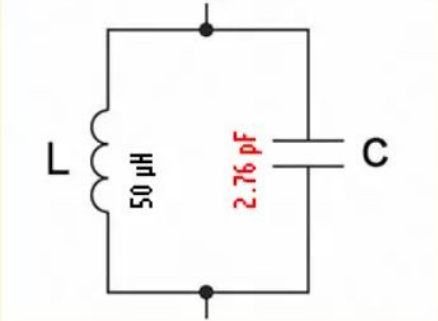
Inductance, **L**	50	µH
Capacitance, **C**	?	pF
Resonant Frequency, **f**	13.56	MHz

Calculate

Reset

Results

Capacitance (C) = **2.755185727 pF**



DOING THE MATH

```
All units are in millimeters

Is the inductor round[0] or square[1]?
1
You selected square.

Enter the width[a0] of the NFC antenna:
23

Enter the height[b0] of the NFC antenna:
4.6

Enter the track thickness[t] of the NFC antenna:
0.03556

Enter the track width[w] of the NFC antenna:
0.1

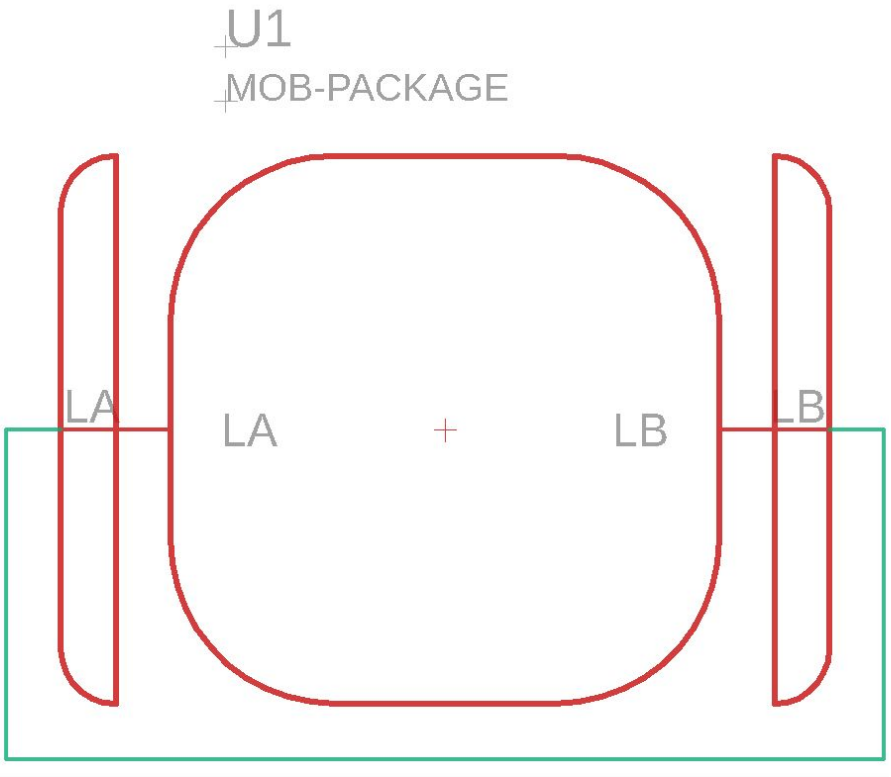
Enter the track spacing[g] of the NFC antenna:
0.1

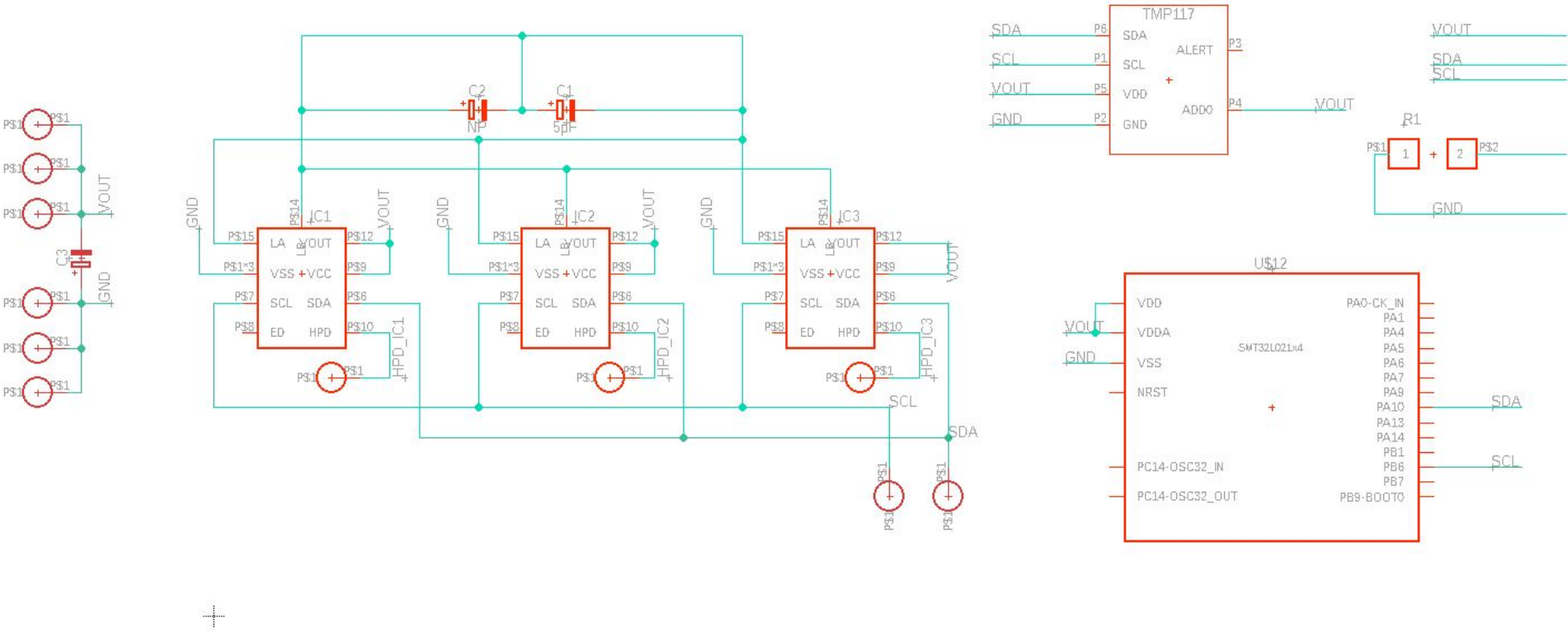
Enter the number of turns[Na] of the NFC antenna:
14

The inductance of the coil is:
3.234µH
```

AUTOMATING THIS IS THE DREAM...

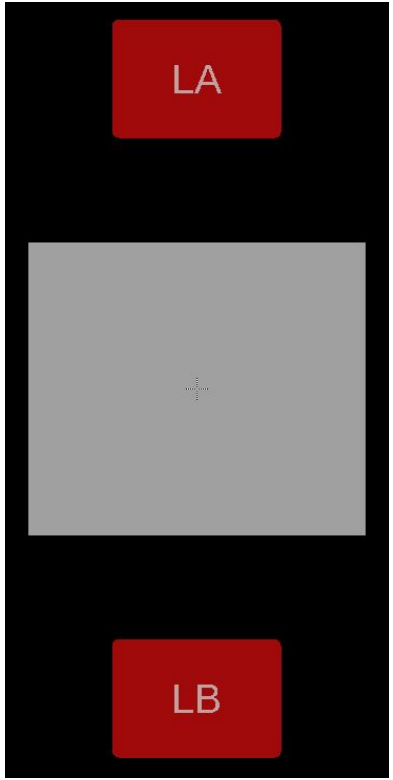
CIRCUIT SCHEMATIC



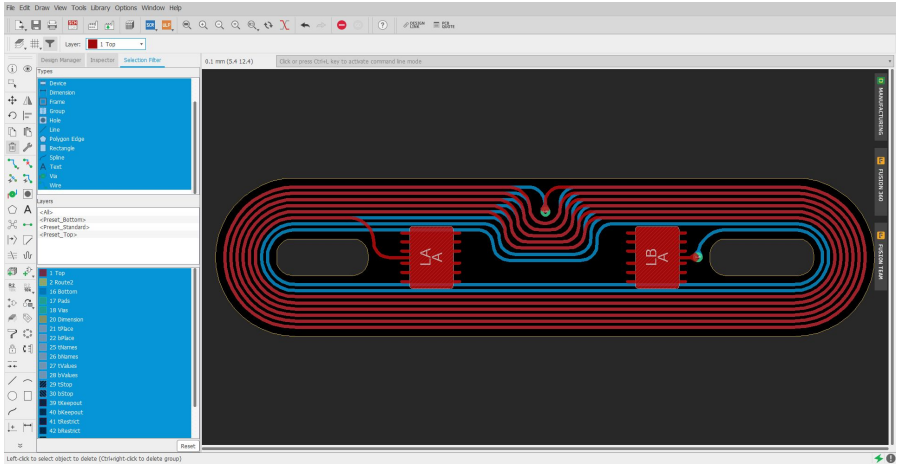


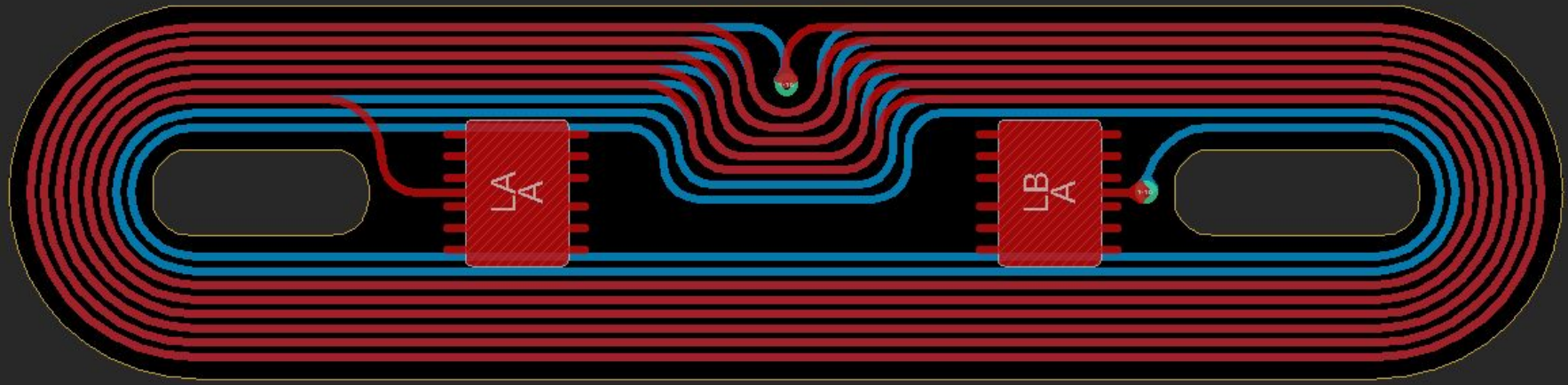
LITAF FLEX LIGHT PROTOTYPE SCHEMATIC

FOOTPRINT DESIGN



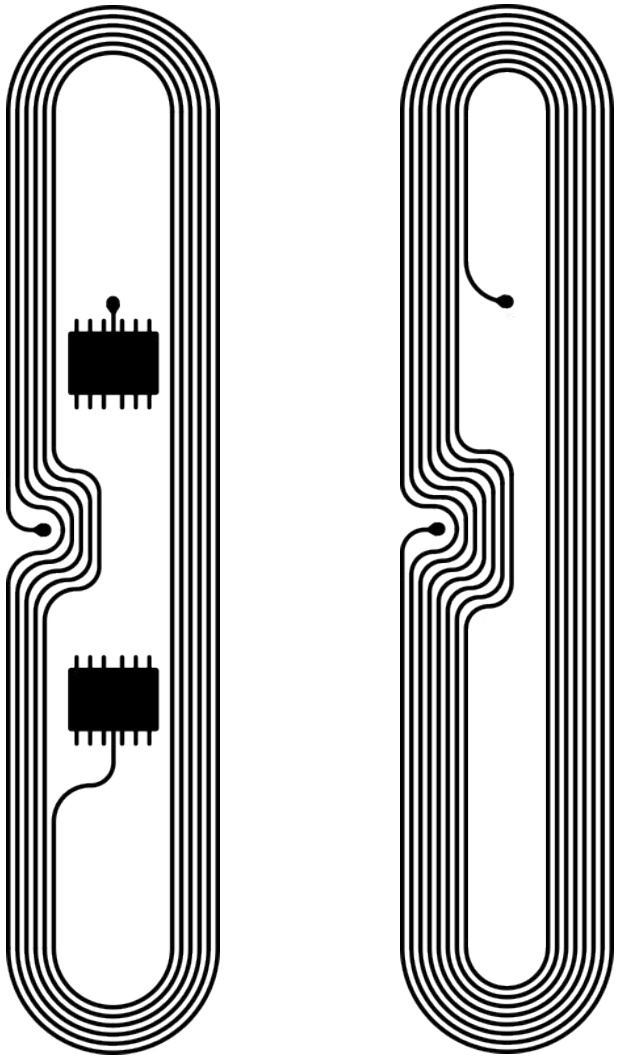
PCB LAYOUT


File Edit Draw View Tools Library Options Window Help
Layer: 1 Top
Design Manager
Inspector
Selection Filter
Types
Device
Dimension
Frame
Group
Hole
Line
Polygon Edge
Rectangle
Spline
Text
Via
Wire
Layers
<All>
<Preset_Bottom>
<Preset_Standard>
<Preset_Top>
1 Top
2 Route2
16 Bottom
17 Pads
18 Vias
20 Dimension
21 tPlace
22 bPlace
25 tNames
26 bNames
27 tValues
28 bValues
29 tStop
30 bStop
39 tKeepout
40 bKeepout
41 tRestrict
42 bRestrict
Reset
0.1 mm (5.4 12.4)
Click or press Ctrl+L key to activate command line mode
LA
LB
MANUFACTURING
FUSION 360
FUSION TEAM
Left-click to select object to delete (Ctrl+right-click to delete group)



FLEXCLASS IMPLANT PCB LAYOUT

MANUFACTURING



MANUFACTURING

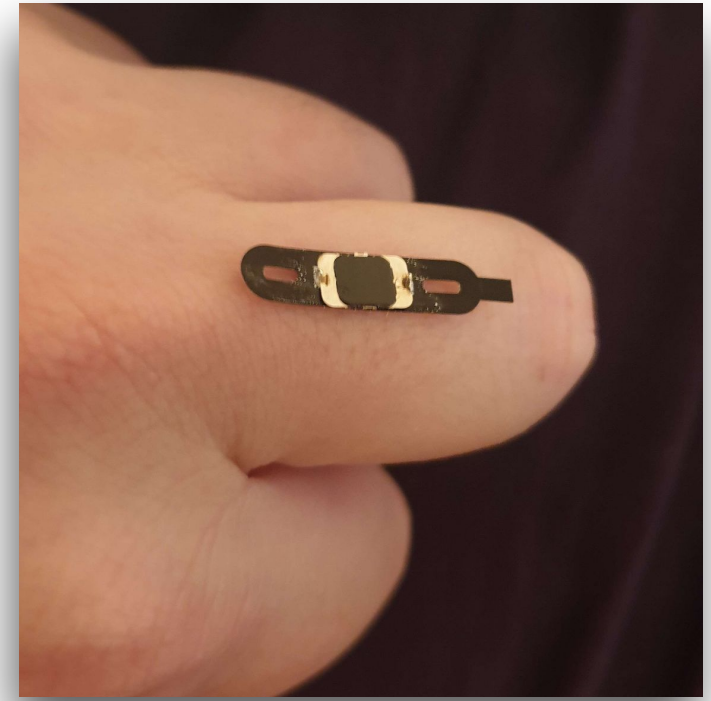


THIS CAN BE A BIT COSTLY...

ASSEMBLY



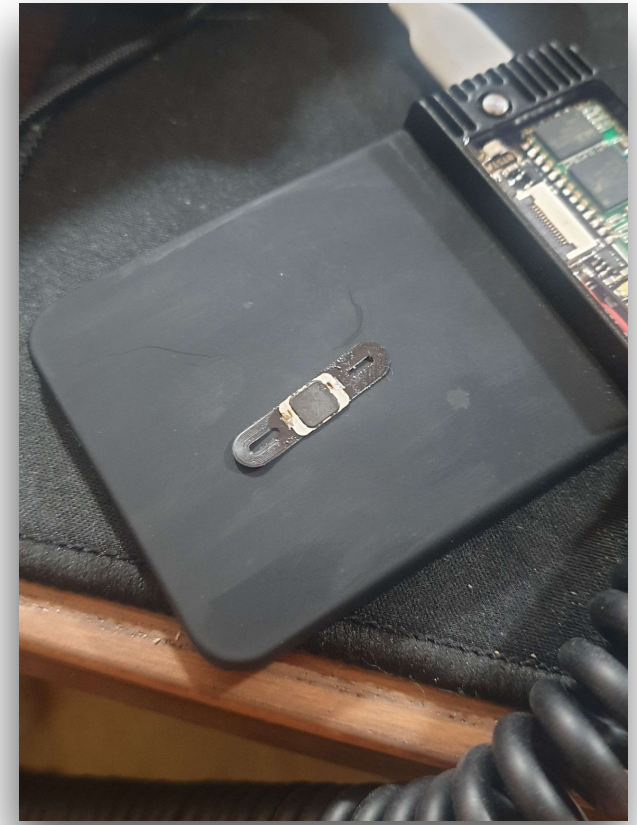
ASSEMBLY



TRIAL AND ERROR

TESTING!

DOES IT WORK? HOW WELL?



WHAT'S WRONG?

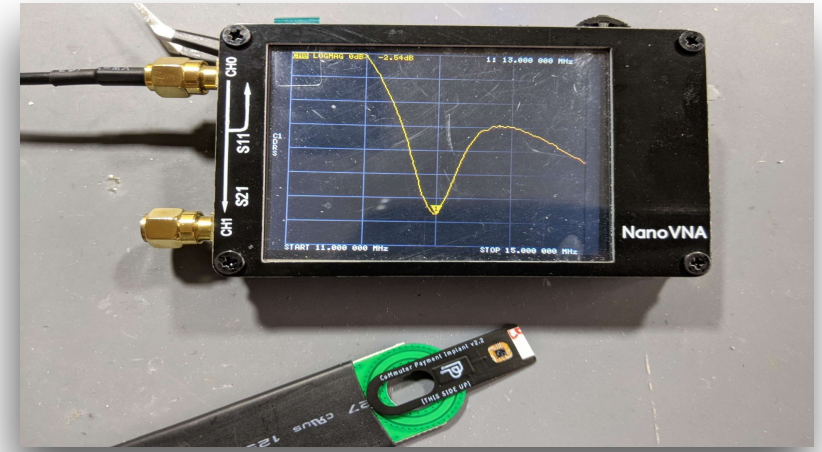


PHOTO BY CORY LORD

HOW TO FIX IT?

LC Resonant Frequency Calculator

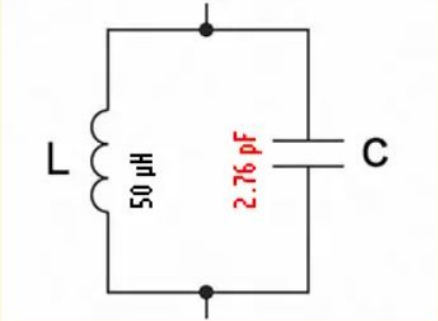
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Capacitance, **C**	?	pF
Resonant Frequency, **f**	13.56	MHz

Calculate

Reset

Results

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PROCESS IMPROVEMENTS



PHOTO BY “🐝” FROM THE DANGEROUS DISCORD

MAKING IT BIOCOMPATIBLE

THIS STEP IS ONLY NEEDED FOR IMPLANTS

BODY SAFE COATINGS

I LEAVE THIS TO THE PROFESSIONALS



AFTER COATING



INSTALLATION

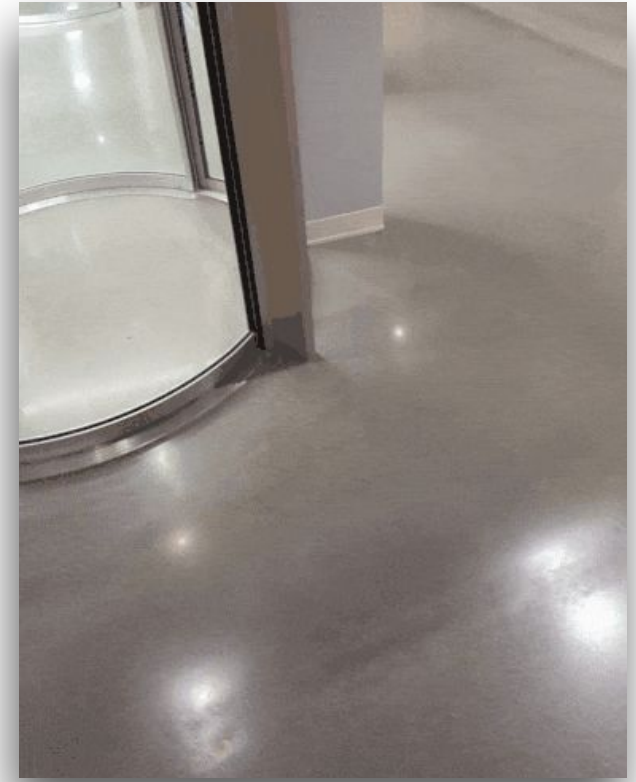
STABY STABY STAB



SO WHAT WHERE THE RESULTS?

BOOM!

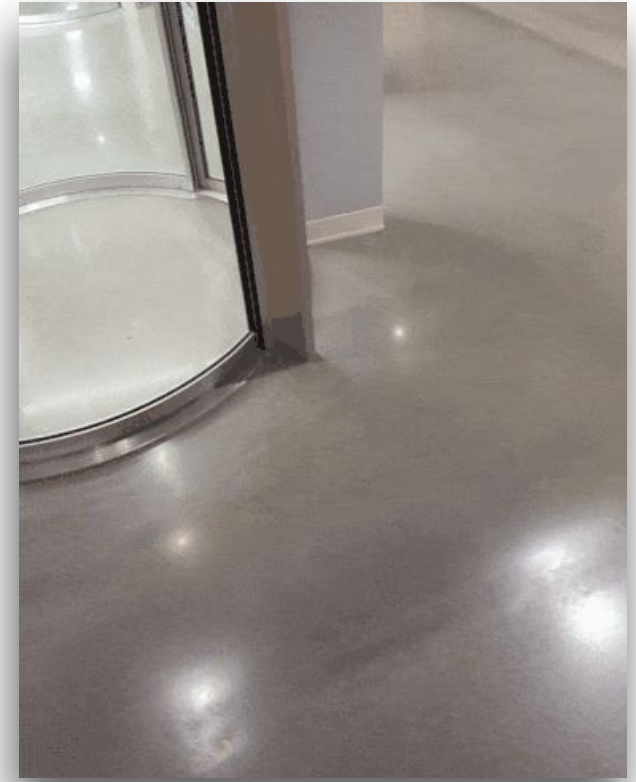
IT WORKS



doitfor.science/bird

YOU MIGHT WANT TO ASK BEFORE YOU DO THIS...

WHAT'S IT LIKE TO ACTUALLY USE IT?



doitfor.science/bird

LESSONS LEARNED

WHAT IMPROVEMENTS WOULD I MAKE?



JUST DO IT!

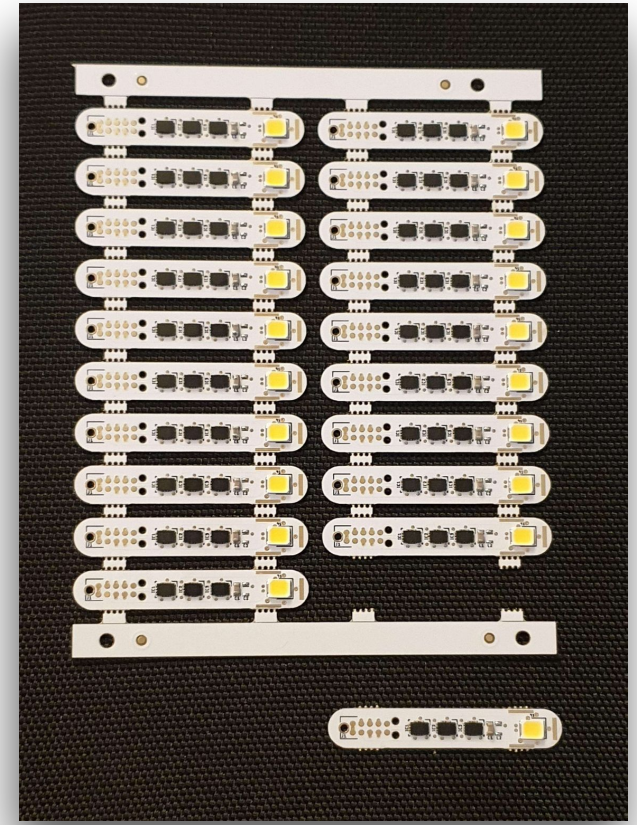
“THE FOOL DID NOT KNOW IT WAS IMPOSSIBLE SO SHE DID IT ANYWAY”

WHAT IS NEXT?

WORK IN PROGRESS PROJECTS

LITAF FLEX RGB

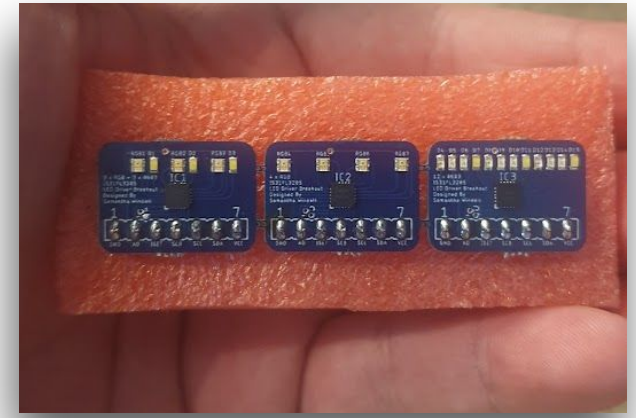
NFC POWERED ANIMATED RGB
LED IMPLANT



POWER, COMS, AND A MICRO...

LITAF FLEX RGB

NFC POWERED ANIMATED RGB
LED IMPLANT

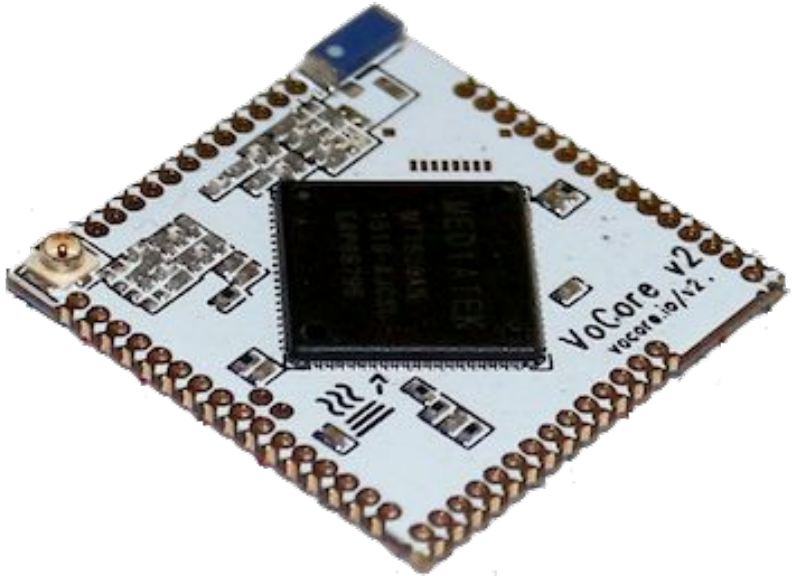


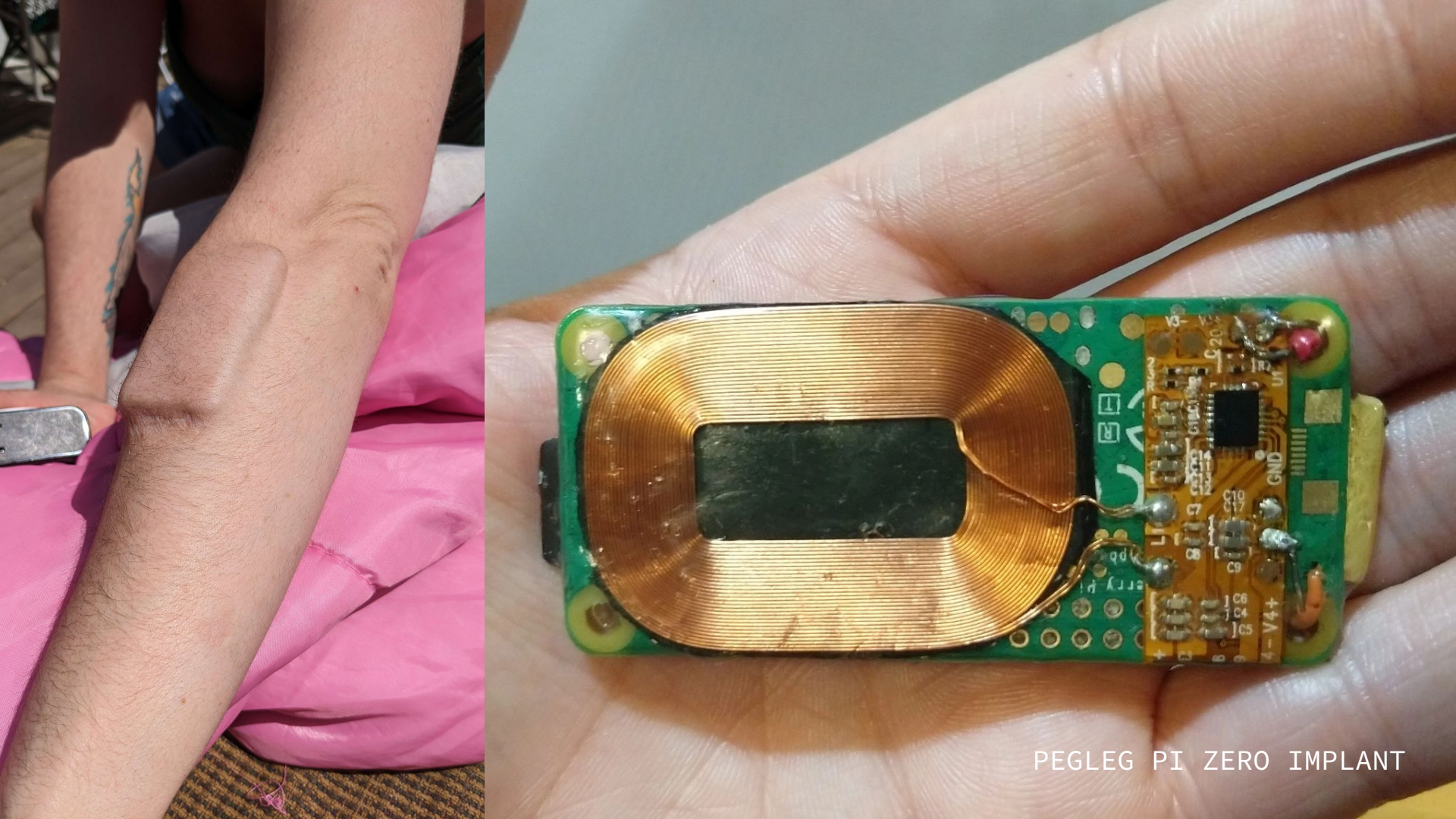
LitAF Platform V0

.--. --- .-.|.- .... --- .-. .-|... - ---

BODYBYTES

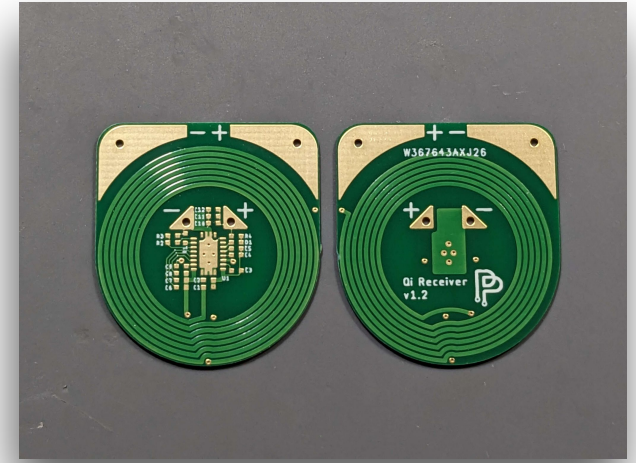
QI POWERED WIFI ENABLED
LINUX COMPUTER IMPLANT

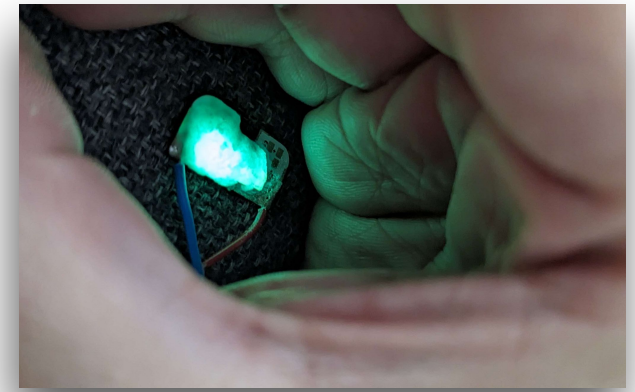



PEGLEG PI ZERO IMPLANT

LITAF QILIGHT

A QI POWERED LED IMPLANT





LITAF QILIGHT

A QI POWERED LED IMPLANT

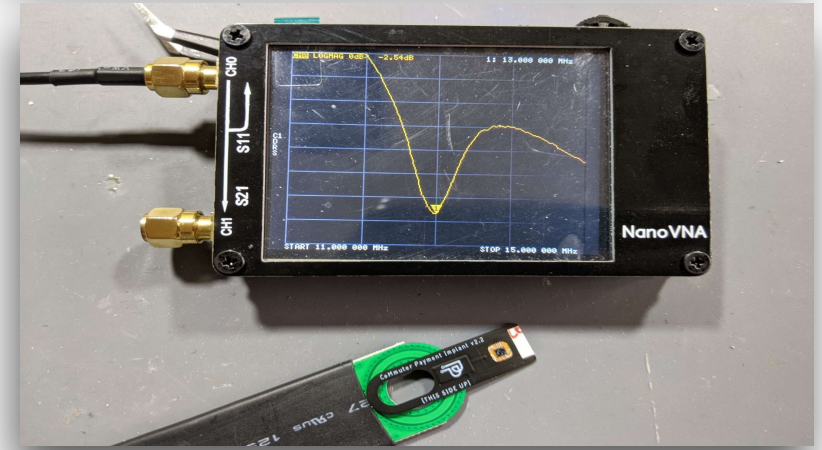


Tattoo by Maria Miller

COMMUTER

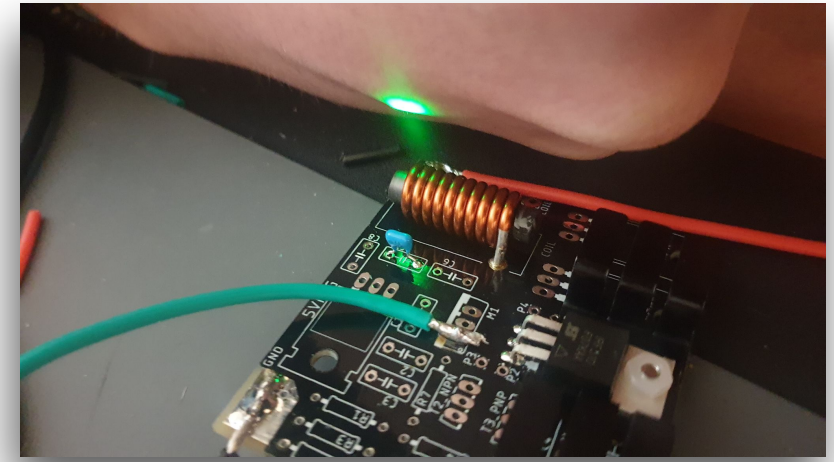
IMPLANT CONVERSION BOARD
FOR COM BASED CREDIT CARD

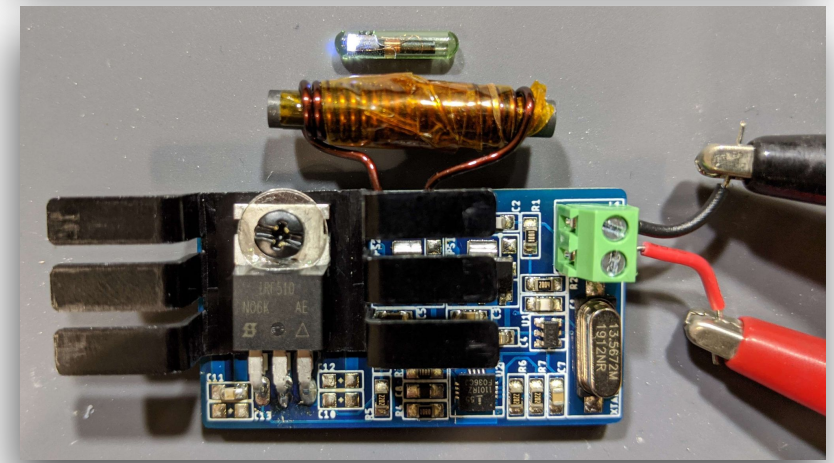




POWER ACCESSORIES

HF FIELD GENERATOR





GET INVOLVED!

IF YOU WANT TO LEARN MORE
COME JOIN US IN OUR
DISCORD COMMUNITY



doitfor.science/dd

FUTURE IMPLICATIONS OF THIS TECH?

IS IT JUST A GIMMICK?



WHERE IS IT GOING?

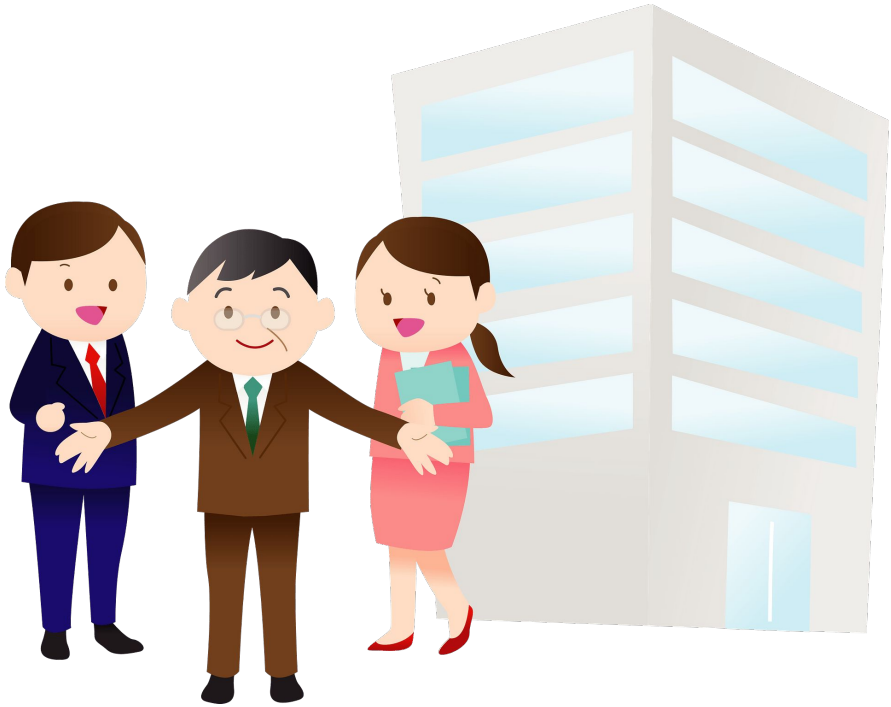
WHAT MIGHT THE FUTURE HOLD?



WHAT ARE THE BARRIERS?



WHAT ARE THE BARRIERS?



THANK YOU!

The Biohacking Community

Cory “Satur9” Lord

Daniel “DonFire” O'Neill

The RFID Hacking Community

Nick “tcprst” Draffen

Dangerous Things

Johnross Switz

The DEF CON Goons & Community

CONTACT ME

HAVE A QUESTION?
WANT TO CHAT?
GET IN TOUCH!



doitfor.science/miana

RESOURCES

LINKS TO MY THESE SLIDES AND ANY OTHER RELEVANT RESOURCES



doitfor.science/dc31/resources

QUESTIONS?

GOODBYE!

LINKS TO MY THESE SLIDES AND ANY OTHER RELEVANT RESOURCES



doitfor.science/dc31/resources