

# Closing the Perception Gap: Smartphone UV Detection as a Behavioral Intervention for Sunscreen Misapplication



## Background research

November 11, 2025

Today I officially began my science fair project. I started by identifying my research problem. I had been thinking about why I got a sunburn even though I wore a sunscreen. This question had been bothering me for a while and I decided to investigate it seriously. I began with a broad Google search on sunscreen effectiveness and skin cancer rates in Canada. I discovered that melanoma rates have been rising consistently for over 30 years in Canada despite widespread public awareness about sun safety. This seemed contradictory and I wanted to understand why. I noted this as my core research question: why does sunscreen knowledge not translate into actual protection?

**The gap between knowing and doing in sun safety is clearly real. I need to find out what is causing it.**



Today I dove deeper into skin cancer statistics. I found the Melanoma Canada website and read through their stats and facts page. I learned that one in 59 Canadian men and one in 73 Canadian women will develop melanoma in their lifetime. I also found the Government of Canada public health page on skin cancer which explained the difference between basal cell carcinoma, squamous cell carcinoma and melanoma. I noted that melanoma is only 5% of skin cancers but is the most dangerous because it spreads rapidly and strikes earlier in life. The main risk factors are recreational sun exposure and a history of sunburn, both things that sunscreen is supposed to prevent. This strengthened my conviction that the problem is not awareness but something deeper.

**If people know sun causes melanoma and use sunscreen, why are rates still rising? There must be a gap between what people think they are doing and what they are actually doing.**

Melanoma → Melanoma Stats and Facts

# MELANOMA STATS & FACTS

The leading cause of melanoma is the over exposure to ultraviolet (UV) radiation from the sun or artificial sources. Exposed human skin can tan or burn – both are signs of damage to the underlying cells. A burn, in particular, is a marker of extensive damage that normal DNA repair mechanisms may not be able to repair. Sunburn at any age is an indicator of UVR overexposure (generally intermittent exposure) and increases the risk of skin cancer, particularly of melanoma. **The rate of melanoma skin cancer is still increasing although this is a largely preventable cancer.**

“Currently, melanoma has seen one of the fastest expansions in incidence among cancers in developed countries. Exposure to ultraviolet (UV) radiation through sunlight, tanning beds, tanning booths or sun lamps is a well-established risk factor for melanoma. Past increases in sun exposure without adequate sun safety likely accounts for the continued rise in melanoma rates” – CCS Annual Cancer Stats 2024 [3]

## Melanoma Stats

- Melanoma is one of the most common cancer types found in young adults aged 15-29 and 30-49. [1].
- Melanoma is the 7th most commonly diagnosed cancers in Canada. [1].
- In 2025 an estimated 10,727 people in Canada (6,063 males, 4,664 females) would be diagnosed with melanoma [2]
- 1 in 24 new cancer cases in Canada will be melanoma
- 29-30 Canadians will be diagnosed with melanoma each day.
- In 2025, an estimated 1,242 people in Canada would die from melanoma. (794 males, and 448 females) [2].
- 3 to 4 Canadians will die each day from melanoma.
- According to [World Health Organization \(WHO\)](#) 85% of melanomas among men and women in Canada aged 30+ years are attributed to UV radiation exposure.
- Early exposure to tanning beds can increase a person's chance of developing melanoma by up to 75%.
- Artificial tanning devices emit 15x the amount of UV rays as from sun exposure

### Did you know?

The amount of people getting skin cancer has been increasing in Canada at a fairly constant rate over the past 30 years. Based on current rates, one in 73 Canadian women will develop melanoma during their lifetime while one in 59 Canadian men will develop the disease.

## Background research

December 5, 2025

Today I researched occupational sun exposure. I found a report from the Occupational Cancer Research Centre stating that approximately 1.5 million Canadians are exposed to the sun at work and that outdoor workers face 3 times greater melanoma risk than indoor workers. Around 7,000 skin cancers were attributed to occupational sun exposure in Canada in a single year. This was shocking to me because these are people who should be protected by workplace safety protocols but clearly are not being adequately protected. I began to wonder whether the problem is not just about knowing to wear sunscreen but about whether sunscreen is being applied correctly in the first place.

The occupational data suggests this is a massive population health problem, not just an individual behavior issue.

## Outdoor workers have 3 times greater risk of skin cancer

16 Oct 2018



Approximately 1.5 million Canadians are exposed to sun at work and according to the Canadian Dermatology Association, as many as 7,000 skin cancers were attributed to occupational sun exposure in 2014. Outdoor workers have a 2.5 to 3.5 times greater risk of skin cancer than indoor workers.

The Occupational Cancer Research Centre partnered with the Canadian Dermatology Association and other groups across Canada to develop Sun Safety at Work, a national sun safety program for workers across Canada. The program helps workplaces develop policies and strategies to protect workers from sun exposure.

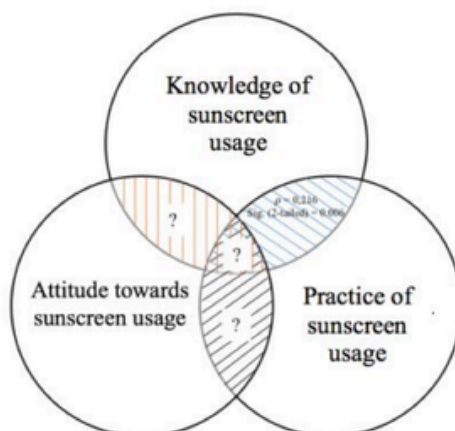
- Read more from the Canadian Occupational Safety Magazine: [Outdoor workers have 3 times greater risk of skin cancer](#)
- Visit the [Sun Safety at Work website](#)

Today I found the study that changed everything about my project direction. I came across a research paper studying sunscreen behavior among medical students in Indonesia by Isnawati, Adriani and Mahmudiono. The paper found only a 0.216 correlation between knowledge of sun safety and actual sunscreen application practice. That means knowledge explained only 5% of whether people applied correctly. These are medical students, people who understand sun damage at a molecular level and they still apply sunscreen wrong. I also found a Swedish study by Branstrom, Kristjansson and Ullen showing that 68% of people correctly attribute skin cancer to sun exposure yet 85% refuse to change their sun behavior. I stared at these numbers for a long time. If knowledge does not change behavior, what does? This is the turning point. The problem is not knowledge. Something else entirely is causing the gap between what people know and what they actually do.

**Table 8.** Analysis of the relationship between knowledge and practice of sunscreen usage

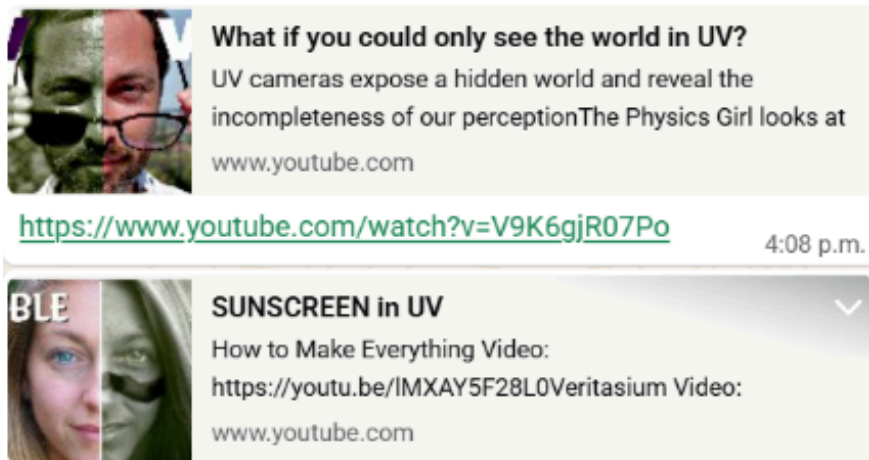
		Correlations		
			Knowledge	Practice
Spearman's rho	Knowledge	Correlation Coefficient	1.000	.216**
		Sig. (2-tailed)	.	.006
		N	159	159
	Practice	Correlation Coefficient	.216**	1.000
		Sig. (2-tailed)	.006	.
		N	159	159

*Original Article*



Today I formulated my core hypothesis. Based on yesterday's research I began to think that the problem might be sensory rather than educational. UV radiation is invisible, humans cannot see it. So when people apply sunscreen they have absolutely no way to verify whether their coverage is adequate. They rely on how the lotion feels and looks, but neither of those things tells them anything about UV protection. This led me to think about UV imaging technology. I watched the Veritasium video "What if you could only see the world in UV?" which showed how UV cameras reveal a hidden world completely invisible to human eyes including how sunscreen appears under UV light. I also watched the Physics Girl video "Sunscreen in UV" which showed sunscreen coverage patterns under UV illumination for the first time. Both videos were mind-blowing. I could see immediately that this technology could be the answer to the question I was investigating.

**If people could see their own coverage gaps the way these videos show, they would immediately understand the problem and correct it. The solution might be UV imaging.**



**What if you could only see the world in UV?**  
UV cameras expose a hidden world and reveal the incompleteness of our perception  
The Physics Girl looks at  
www.youtube.com  
<https://www.youtube.com/watch?v=V9K6gjR07Po> 4:08 p.m.

**BLE SUNSCREEN in UV**  
How to Make Everything Video:  
<https://youtu.be/IMXAY5F28L0>  
Veritasium Video:  
www.youtube.com



Today I began researching the psychology behind why people overestimate their sunscreen coverage. I identified five psychological factors that likely contribute to the perception gap. First, **sensory limitation**, we judge task completion with our senses but UV protection cannot be sensed. Second, **confirmation bias**, feeling sunscreen on skin is interpreted as proof of complete coverage. Third, **optimism bias**, people believe they are less likely than average to experience negative outcomes. Fourth, the **Dunning-Kruger Effect**, familiarity with applying sunscreen creates an illusion of expertise. Fifth, **temporal disconnect** sunburn appears hours later and skin cancer decades later, so there is no immediate feedback to learn from. I found academic sources confirming each of these biases including Nickerson (1998) on confirmation bias, Sharot (2011) on optimism bias and Weinstein (1988) on the precaution adoption process.

**The psychology section is coming together strongly. These five factors together explain comprehensively why people might be overestimating their coverage.**

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## Confirmation Bias: A Ubiquitous Phenomenon in Many Guises

Raymond S. Nickerson  
Tufts University

### JOURNAL ARTICLE

## Risk perception, optimistic bias, and readiness to change sun related behaviour FREE

Richard Bränström ✉, Sveinbjörn Kristjánsson, Henrik Ullén

*European Journal of Public Health*, Volume 16, Issue 5, October 2006, Pages 492–497, <https://doi.org/10.1093/eurpub/cki193>

Published: 29 September 2005 **Article history** ▼

describes optimistic bias as a result of cognitive error. Rare diseases, for example, lead to optimistic bias as people do not consider that the same circumstances (that the disease is unusual) are true for everyone. Finally, people tend to make conclusions about the future on earlier experiences, e.g. 'I haven't had skin cancer therefore I won't get it in the future either'. In a study by Weinstein *et al.* comparing 32 different health problems, they found a stronger optimistic bias for problems that were considered preventable, unknown, unusual, or embarrassing.<sup>11</sup> A British study examined optimistic bias for five health-related problems: skin cancer, deafness, AIDS, and sunstroke among university students.<sup>12</sup> They found an overall optimistic

If one were to attempt to identify a single problematic aspect of human reasoning that deserves attention above all others, the *confirmation bias* would have to be among the candidates for consideration. Many have written about this bias, and it appears to be sufficiently strong and pervasive that one is led to wonder whether the bias, by itself, might account for a significant fraction of the disputes, altercations, and misunderstandings that occur among individuals, groups, and nations.

*Confirmation bias* has been used in the psychological literature to refer to a variety of phenomena. Here I take the term to represent a generic concept that subsumes several more specific ideas that connote the inappropriate bolstering of hypotheses or beliefs whose truth is in question.

## Experimental Procedure

December 13, 2025

Today I began thinking seriously about building a UV camera. Professional UV cameras cost \$200–300 which is completely inaccessible for most people. If the technology is going to help people it needs to be affordable. I started researching how UV cameras work and discovered something surprising, silicon image sensors inside regular cameras are naturally sensitive to UV light. Manufacturers install filters specifically to block UV because it ruins regular photographs by causing haziness and color shifts. This means that by removing that filter and replacing it with a UV-pass filter, any regular camera could potentially become a UV camera. I found confirmation of this from Sony Semiconductor Solutions Group's research on UV imaging sensors. I also watched a DIY infrared night vision camera project by Project 326 on YouTube which showed how a standard USB camera could be modified by removing its built-in filter and replacing it with a different optical filter of IR. The infrared and UV modification processes follow the same fundamental principle. This confirmed that my approach was scientifically sound and practically achievable.

**The silicon sensor discovery is huge. It means UV detection capability already exists in every smartphone, it is just being blocked intentionally. This is the scientific foundation of my entire solution.**



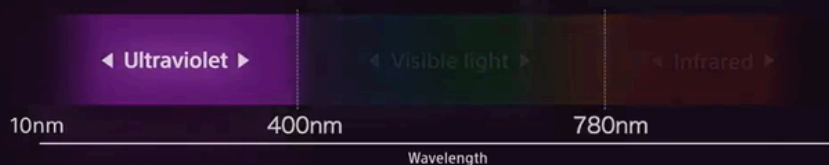
### UV PASS FILTER

becomes translucent when seen in UV camera

### Glasses

when seen in UV camera,  
absorb the UV light so it becomes  
dark and doesn't let pass the UV

The Ultraviolet (UV) wavelength is from 10nm to 400nm which is shorter than visible light (400-780nm).



This light makes it possible to capture some special images that no visible light cameras can obtain.

## Experimental Procedure

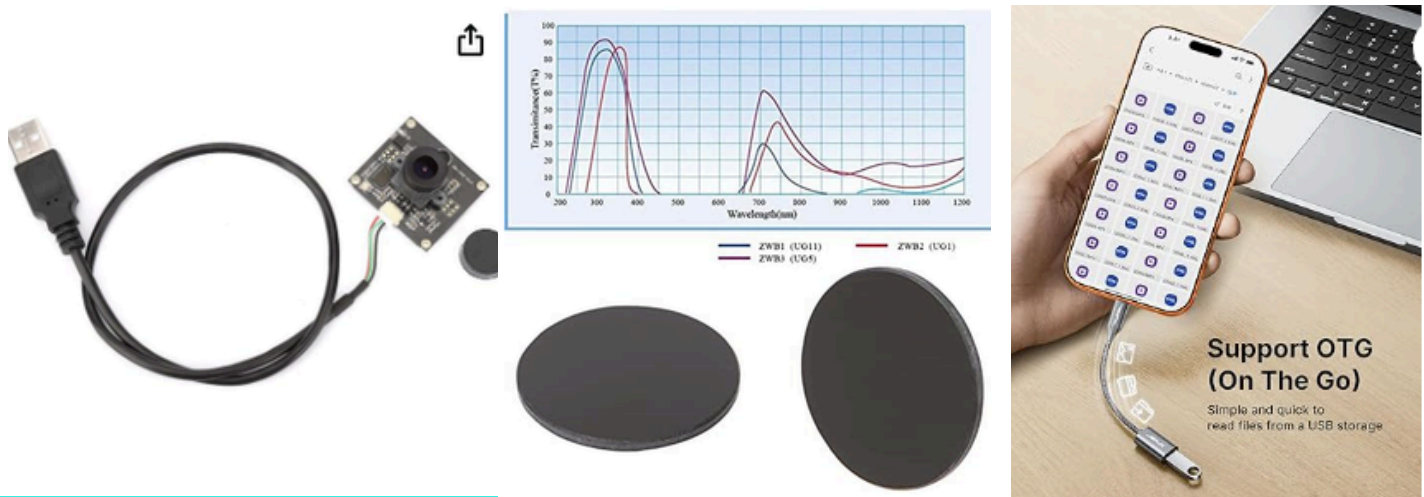
December 16,2025

Today I wrote my formal hypothesis and began planning my experiment. My hypothesis: If a smartphone-based UV imaging system is used to visualize sunscreen application in real time, then users will achieve measurably more complete UV protection coverage than those applying without visual feedback, because human eyes are biologically incapable of detecting ultraviolet wavelengths, leaving people unable to identify missed areas through any natural sensory means, which leads to chronic under protection and significantly increased risk of melanoma over time. I also planned to make a UV camera which is cheap and then I also planned my experimental procedure, I would test 15 participants aged 16 to 40, ask them to apply sunscreen to their hands naturally, have them estimate their coverage on a 1-10 confidence scale, then show them the UV camera images and record their reaction and post-UV confidence score. I will also ask if this UV technology was available in smartphone would they use it?

**Hypothesis: People apply only 20-50% of recommended sunscreen, unaware of this deficit because UV radiation is invisible. I experimentally proved this gap exists and created smartphone-based UV detection that turns sun safety into verifiable cancer prevention.**

December 17,2025

Today I ordered my materials after asking to my uncle about all the technical things. I ordered a USB camera module an OV2643 USB Camera Module Autofocus Mini Camera Board 2MP 120° Wide Angle from the Keenso Store on Amazon Canada. I also ordered a JSAUX USB-C to USB OTG adapter to connect the camera to my smartphone. I chose these specific components because they were affordable, accessible and widely used in DIY camera projects. Total materials cost was under \$60, which proved the technology could be built affordably. While waiting for the parts to arrive I continued researching the mHealth market to understand the commercial context for smartphone UV verification.



## Background research

December 18, 2025

Today I researched the mHealth market in depth. I found Fortune Business Insights data showing the North American mHealth market was valued at \$22.51 billion in 2022 and grew to \$25.23 billion in 2023, with projections showing explosive growth through 2032. I also researched how COVID-19 transformed public adoption of mobile health technology. India's Aarogya Setu app, a government-built contact tracing app reached over 150 million downloads becoming one of the fastest adopted health applications in history. Canada launched its own COVID Alert app. I found an article by Canadian law professor Michael Geist explaining why he installed the COVID Alert app, describing how the combination of clear public health benefit and strong privacy safeguards made adoption rational and obvious. This parallel to UV sunscreen verification was compelling if people adopted health apps during COVID, they will adopt UV verification once they understand the problem it solves.

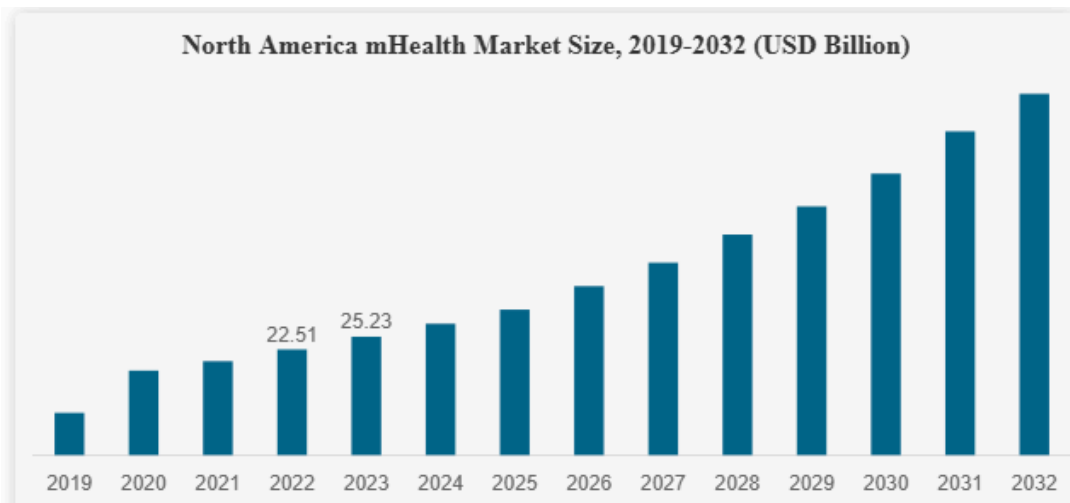
The COVID mHealth precedent is one of the strongest arguments for my solution's viability. Behavioral adoption at scale has already been proven.

### mHealth Solution Market Size

The mHealth Solution Market was valued at USD 295.4 billion in 2024 and is projected to reach USD 659.8 billion by 2034, registering a CAGR of 8.4%. Market revenue growth is driven by factors such as increasing smartphone penetration, rising healthcare costs, and growing demand for remote patient monitoring solutions. The integration of artificial intelligence and machine learning technologies into mobile health platforms has transformed how healthcare services are delivered and accessed globally. Digital health adoption accelerated significantly following the COVID-19 pandemic, with telehealth utilization increasing by 3,800% compared to pre-pandemic levels according to the Centers for Disease Control and Prevention. This shift has permanently altered consumer expectations regarding healthcare accessibility and convenience.



North America mHealth Market Size, 2019-2032 (USD Billion)



## Background research

December 21, 2025

Today I also researched an image showing different SPF values 4, 8, 15, 30, 50, 100 and 110 applied to an arm and photographed under UV light. The UV image showed that higher SPF values appeared progressively darker as more UV was blocked, while lower SPF values appeared lighter. This was visual proof that UV imaging does not just detect whether sunscreen is present but can actually distinguish between levels of UV protection. This scientific principle reinforced the entire foundation of my project.

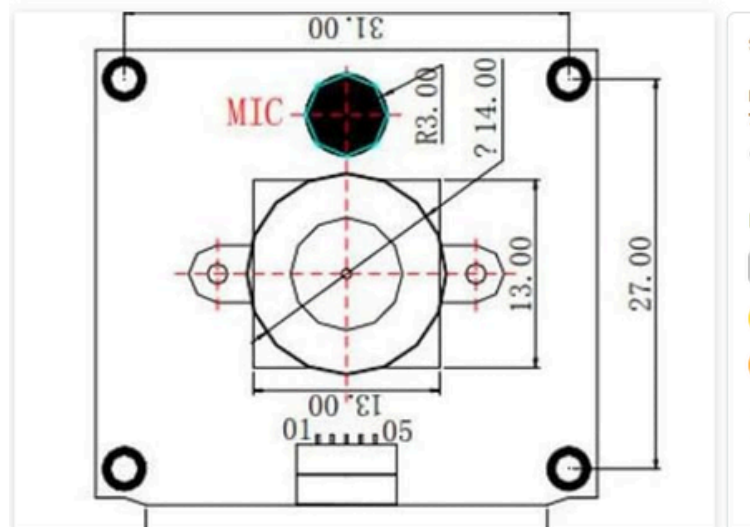
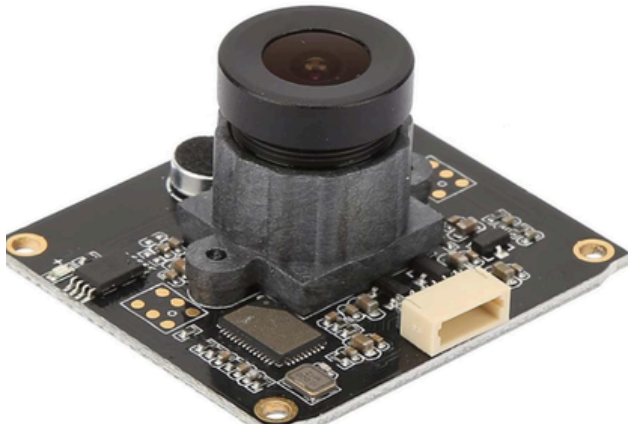
If UV imaging can distinguish between SPF 4 and SPF 110 on the same arm, it can absolutely detect covered versus uncovered skin. The science is airtight.



## Experimental Procedure

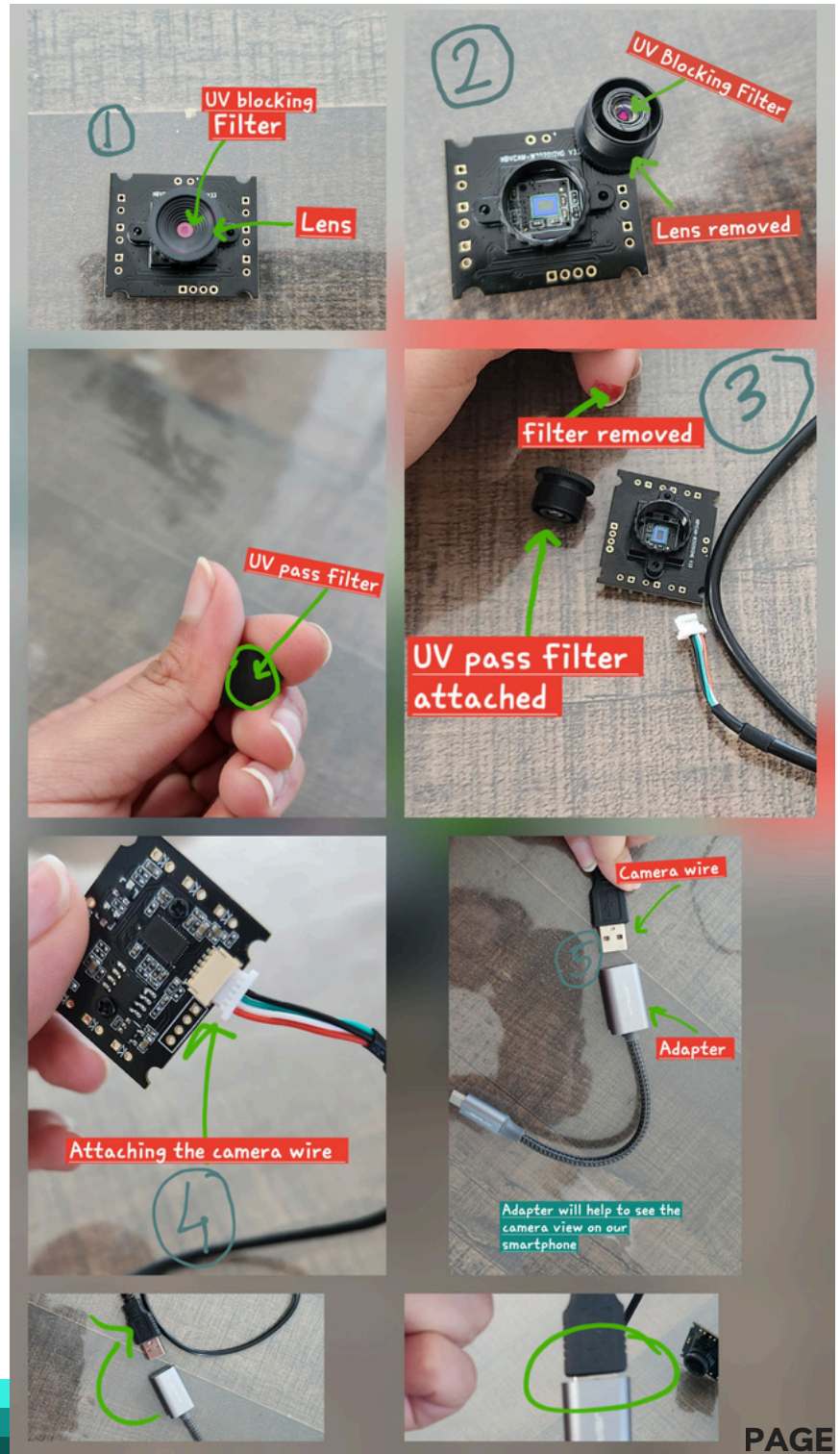
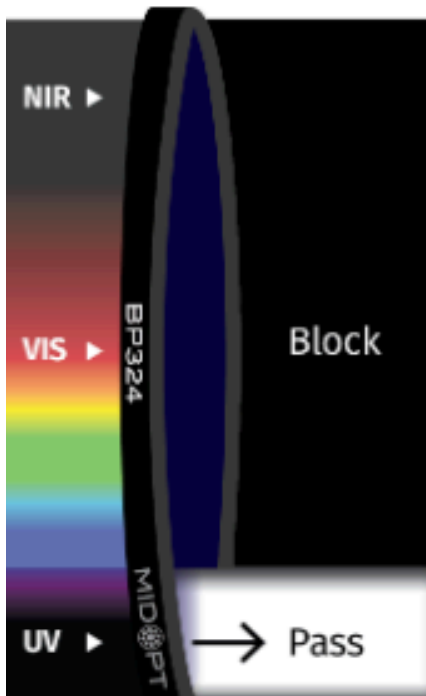
December 26, 2025

All the things I order has been arrived. I examined it carefully, a small circuit board with an image sensor and a separate lens assembly. I also ordered my ZWB2 UV pass filter, a 28mm diameter glass filter from Kamas on Amazon Canada . I researched and took a guidance from my uncle whether the filter needed to be installed inside the lens or could simply sit in front of it. I determined that placing the ZWB2 filter directly in front of the lens and securing it would be the safest and most practical approach, avoiding the risk of internal damages.

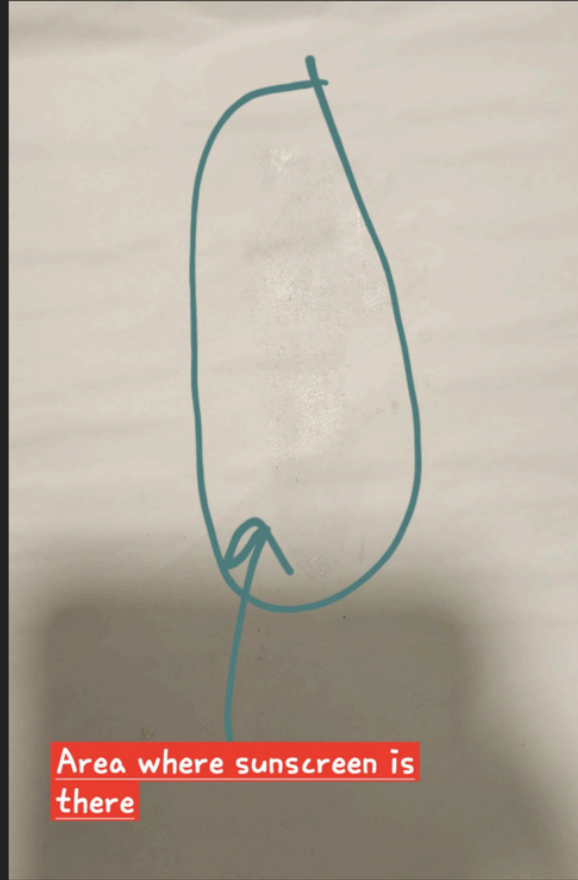


### Experimental Procedure/ Method

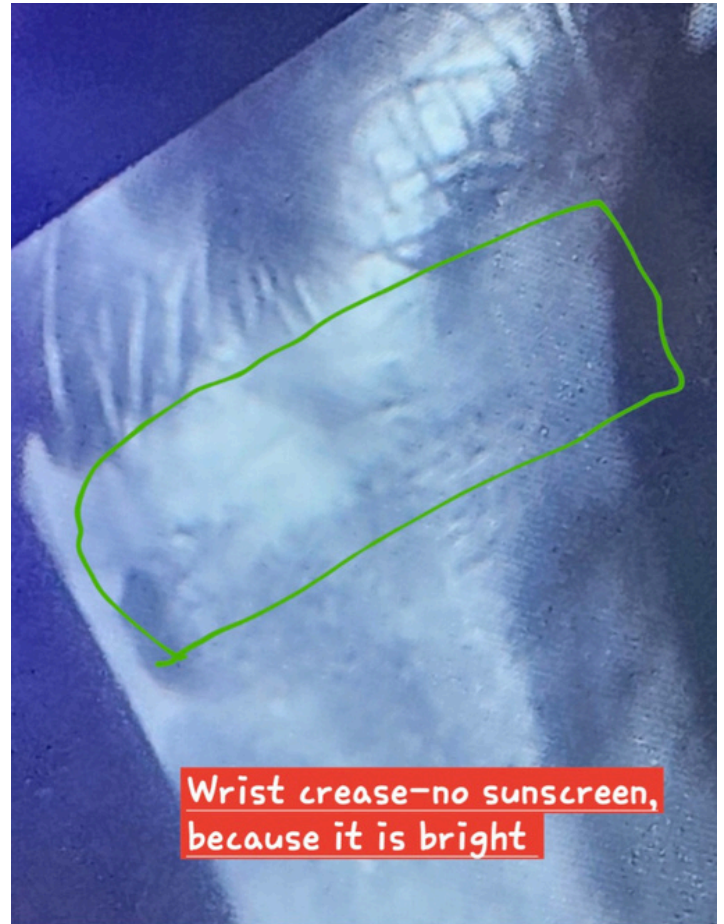
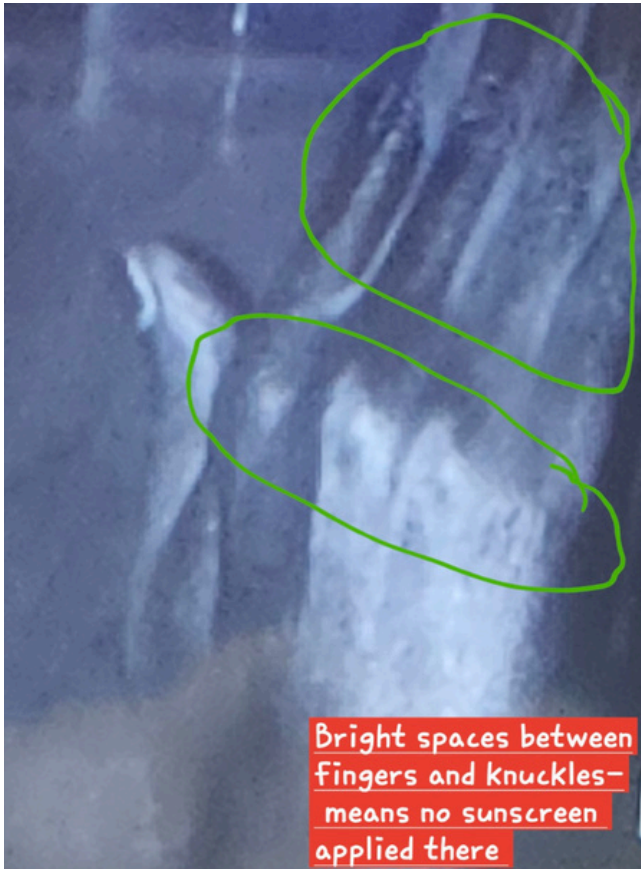
Today I set up my workspace and prepared for camera modification. I carefully disassembled the camera then working with tweezers and a magnifying glass, I removed the factory UV-blocking filter. The process was delicate the image sensor surface is incredibly sensitive and any scratch or fingerprint would permanently damage every image. The first step of removing the UV blocking filter was done. The second step is to fit the UV pass filter in the lens. After that I need to attach it with the adapter that I order so that we could see the camera view on smartphone. And now I am all done I need to test now so I applied sunscreen on paper and then I checked it with my UV camera. And it worked. Then I tried to do it on my hand to see if it works on skin or not and it worked. So, after getting the results now I was looking forward to do my planned experiment so I started asking my family and friends.



# On Paper



## On my hand



This is the image of testing UV camera on my own hand. I applied sunscreen the way I normally would, felt confident I had done a thorough job, then viewed my hand under the UV camera. Bright white patches glowed between my fingers, across my knuckles and in my wrist creases. The areas with actual coverage appeared dark. I was looking at my own perception gap in real time and it was shocking. Even I, someone who had spent weeks researching sun safety and knew exactly what I was looking for, had missed significant coverage. This moment crystallized the entire purpose of the project. If I missed this much, what did that mean for everyone else?

This was the most personally impactful moment of the project. Seeing my own hand prove my hypothesis was powerful in a way that no amount of reading could replicate.

## **Experiment**

**December 29, 2025**

Today I conducted my first five participant sessions. Each session followed the same protocol, participant applies sunscreen naturally, estimates confidence before UV viewing on a 10-point scale, views hand under UV camera, records confidence after verbal reactions documented, technology interest question asked. The results from today's sessions were immediately striking. Every single participant overestimated their coverage. The glowing white patches were visible on every hand in the same areas between fingers, knuckles, around nails, wrist creases. Participant reactions ranged from genuine shock to immediate requests to try again. One participant said "this explains why I always burn on my knuckles even when I wear sunscreen."

## **Experiment**

**December 30, 2025**

Today I conducted six more participant sessions, participants six through eleven. Results continued the pattern established yesterday. Every participant overestimated coverage. The missed areas were consistent across all participants, the same anatomical locations failing every time. One participant said "I would have gone to the beach like this thinking I was completely protected." The phrase "I can't believe I missed that much" appeared in multiple sessions. All five participants said they would use smartphone UV detection if it were available. The pattern was becoming consistent.

## **Experiment**

**December 31, 2025**

Today I completed the final four participant sessions, participants twelve through fifteen. The results were consistent with every previous session. Every single participant overestimated. The 100% overestimation rate was confirmed across all 15 participants. I calculated the average perceived coverage at 74% and average actual coverage at 40%, producing a 34 percentage point perception gap. Every participant said they would use smartphone UV detection. I documented all commonly missed areas.

15 out of 15 people who partaked in my this experiment for my research overestimation without a single exception. This is the most powerful finding of the entire project. The universality proves this is a biological constraint, not a behavioral one.

# Results



Participant no.	Confidence before (10-point scale)	Confidence after (10-point scale)	In Percentages before	In Percentages after	Gap in number	Gap in %	Result
1	9	4	90%	40%	5	50%	overestimated
2	8	3	80%	30%	5	50%	overestimated
3	9	4	90%	40%	5	50%	overestimated
4	7	5	70%	50%	2	20%	overestimated
5	8	2	80%	20%	6	60%	overestimated
6	7	4	70%	40%	3	30%	overestimated
7	8	5	80%	50%	3	30%	overestimated
8	6	3	60%	30%	3	30%	overestimated
9	9	6	90%	60%	3	30%	overestimated
10	8	4	80%	40%	4	40%	overestimated
11	5	3	50%	30%	2	20%	overestimated
12	6	2	60%	20%	4	40%	overestimated
13	6	4	60%	40%	3	30%	overestimated
14	8	7	80%	70%	1	10%	overestimated
15	7	4	70%	40%	3	30%	overestimated

Average Perception Gap % **34%**

Participant no.	Confidence Before (10-point scale)	Confidence After (10-point scale)	In percentages Before %	In percentages After %	Gap in % and number	Result
1	9/10	4/10	90%	40%	50% 5	overestimated
2	8/10	3/10	80%	30%	50% 5	overestimated
3	9/10	4/10	90%	40%	50% 5	overestimated
4	7/10	5/10	70%	50%	20% 2	overestimated
5	8/10	2/10	80%	20%	60% 6	overestimated
6	7/10	4/10	70%	40%	30% 3	overestimated
7	8/10	5/10	80%	50%	30% 3	overestimated
8	6/10	3/10	60%	30%	30% 3	overestimated
9	9/10	6/10	90%	60%	30% 3	overestimated
10	8/10	4/10	80%	40%	40% 4	overestimated
11	5/10	3/10	50%	30%	20% 2	overestimated
12	6/10	2/10	60%	20%	40% 4	overestimated
13	6/10	4/10	60%	40%	30% 3	overestimated
14	8/10	7/10	80%	70%	10% 1	overestimated
15	7/10	4/10	70%	40%	30% 3	overestimated

# PARTICIPANT DATA :-

Participant 1	Participant 2
<ul style="list-style-type: none"> <li>Confidence level Before - 9/10 (10-point scale)</li> <li>After - 4/10</li> <li>Gap - 5</li> <li>Result - overestimated</li> <li>Missed areas - Between fingers</li> <li>Reaction - I was sure I got everything!</li> <li>Will they use smartphone technology UV camera? - Yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level Before - 8/10</li> <li>After - 3/10</li> <li>Gap - 5</li> <li>Result - overestimated</li> <li>Missed areas - knuckles, wrist crease</li> <li>Reaction - Wow, I missed THAT much?</li> <li>Will they use the UV camera? - yes</li> </ul>
Participant 3	Participant 4
<ul style="list-style-type: none"> <li>Confidence level Before - 9/10 (10-point scale)</li> <li>After - 4/10</li> <li>Gap - 5</li> <li>Result - overestimated</li> <li>Missed areas - Around nails, back of hand edges</li> <li>Reaction - I do this everyday. How did I miss so much?</li> <li>Will they use the UV camera? - yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level Before - 7/10</li> <li>After - 5/10</li> <li>Gap - 2</li> <li>Result - overestimated</li> <li>Missed areas - Between fingers, wrist, knuckles, fingertips</li> <li>Reaction - I thought I was pretty thorough.</li> <li>Will they use the UV camera? - yes</li> </ul>

Participant 5	Participant 6
<ul style="list-style-type: none"> <li>Confidence level before - 9/10</li> <li>After - 2/10</li> <li>Gap - 6</li> <li>Result - overestimated</li> <li>Missed areas - knuckles, between all fingers, wrist crease, nail edges</li> <li>Reaction - This is scary. I would have gone to beach like this</li> <li>Will they use the UV camera (if integrated in smartphone)? - yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level before - 7/10</li> <li>After - 4/10</li> <li>Gap - 3</li> <li>Result - overestimated</li> <li>Missed areas - wrist, between fingers, knuckles.</li> <li>Reaction - Oh, I did it every year, so I thought I was covered</li> <li>Will they use the UV camera? - yes</li> </ul>
Participant 7	Participant 8
<ul style="list-style-type: none"> <li>Confidence level before - 8/10</li> <li>After - 5/10</li> <li>Gap - 3</li> <li>Result - overestimated</li> <li>Missed areas - fingertips, wrist crease, between fingers</li> <li>Reaction - I can't believe I missed between my fingers!</li> <li>Will they use the UV camera? - yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level before - 6/10</li> <li>After - 3/10</li> <li>Gap - 3</li> <li>Result - overestimated</li> <li>Missed areas - Between fingers and around nails.</li> <li>Reaction - Those spots seem small but add up.</li> <li>Will they use the UV camera? - yes</li> </ul>

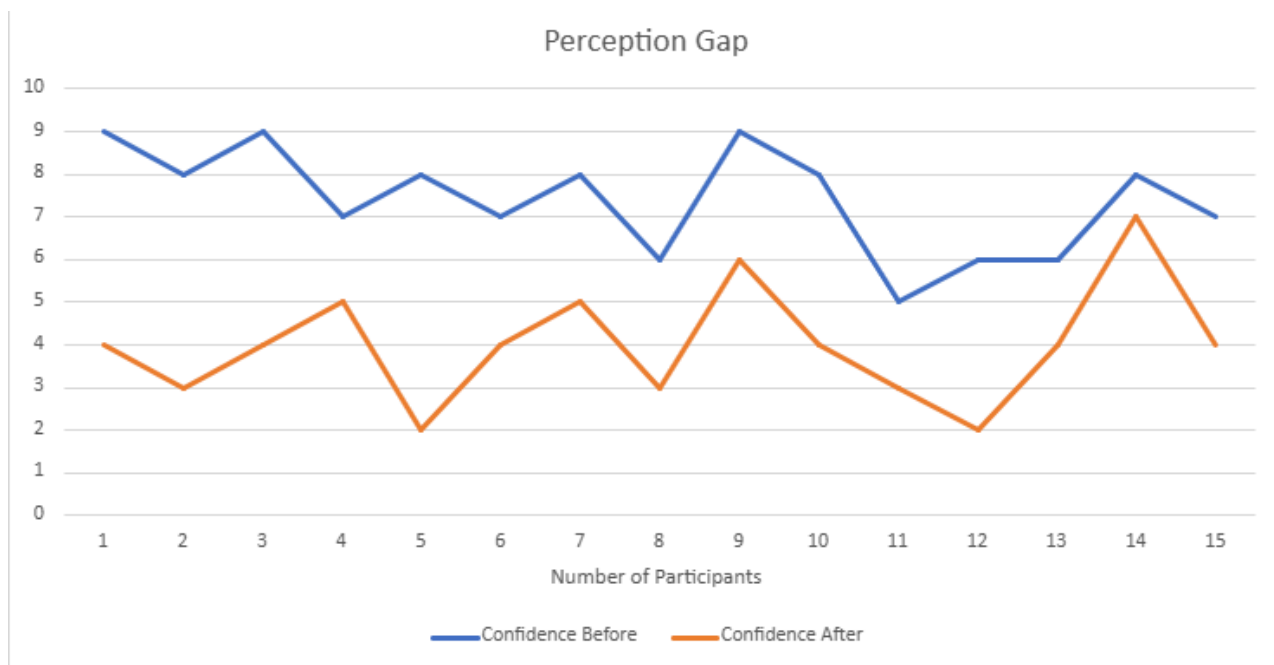
Participant 9	Participant 10
<ul style="list-style-type: none"> <li>Confidence level before - 7/10</li> <li>After - 6/10</li> <li>Gap - 3</li> <li>Result - overestimated</li> <li>Missed areas - knuckles, between fingers, wrist crease, nail edges</li> <li>Reaction - This explains why I always burn in the same spots!</li> <li>Will they use UV camera? - Yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level before - 8/10</li> <li>After - 4/10</li> <li>Gap - 4</li> <li>Result - overestimated</li> <li>Missed areas - back of hand edges between fingers</li> <li>Reaction - I have been applying sunscreen wrong my whole life.</li> <li>Will they use UV camera? - yes</li> </ul>
Participant 11	Participant 12
<ul style="list-style-type: none"> <li>Confidence level before - 5/10</li> <li>After - 3/10</li> <li>Gap - 2</li> <li>Result - overestimated</li> <li>Missed areas - wrist, between fingers</li> <li>Reaction - Seeing it glow under UV is shocking</li> <li>Will they use UV camera? - yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level before - 6/10</li> <li>After - 2/10</li> <li>Gap - 4</li> <li>Result - overestimated</li> <li>Missed areas - Small gaps between back of hand edges.</li> <li>Reaction - I actually did worse than I thought.</li> <li>Will they use UV camera? - yes</li> </ul>

Participant 13	Participant 14
<ul style="list-style-type: none"> <li>Confidence level Before - 6/10</li> <li>After - 4/10</li> <li>Gap - 2</li> <li>Result - overestimated</li> <li>Missed areas - Between fingers, fingernails</li> <li>Reaction - I never actually thought about application of sunscreen, I should be rather careful</li> <li>Will they use smartphone technology UV camera? - yes</li> </ul>	<ul style="list-style-type: none"> <li>Confidence level Before - 8/10</li> <li>After - 7/10</li> <li>Gap - 1</li> <li>Result - overestimated</li> <li>Missed area - Between fingers, fingertips</li> <li>Reaction - I was worried it did okay, but I didn't use enough.</li> <li>Will they use smartphone technology of UV camera? - yes</li> </ul>
Participant 15	
<ul style="list-style-type: none"> <li>Confidence level Before - 7/10</li> <li>After - 4/10</li> <li>Gap - 3</li> <li>Result - overestimated</li> <li>Missed areas - Between fingers, nail edges.</li> <li>Reaction - this matches what I thought. Good to confirm</li> <li>Will they use Smartphone technology of UV camera? - yes</li> </ul>	

## Analysis

January 1,2026

Today I began analyzing my data in depth and writing up my results. I calculated all statistics, created graphs showing the perception gap between before and after UV confidence scores and documented the missed area patterns. I also began writing the psychology section explaining the five cognitive and sensory reasons why 100% overestimation occurs. The data told a compelling and complete story sensory limitation combined with confirmation bias, optimism bias, the Dunning-Kruger Effect and temporal disconnect create a perfect understanding of universal, invisible and uncorrectable misapplication. It proved that perception gap exists.



## **Background research**

**January 2,2026**

Today I worked on the economic analysis section. I researched melanoma treatment costs and Canadian diagnosis rates 10,727 melanomas diagnosed annually in Canada as per the 2025 Melanoma Canada report. I calculated what UV detection adoption at various levels could mean for melanoma case prevention and treatment cost savings. At 60% smartphone adoption, epidemiological models project 25,000 to 32,000 fewer melanoma cases annually and up to \$3.18 billion in treatment cost savings every year. These numbers confirmed that smartphone UV integration would be one of the most cost-effective cancer prevention interventions ever implemented.

So, this means that the economic case is as strong as the scientific case. This project is not just interesting, it is financially compelling for manufacturers and introducing this UV feature in smartphone itself will be a great social help. The camera I built is not a build-in camera we still need to clip it in with our smartphone and to remember that every time we go outside in sun is challenging so if we built that in our smartphone it will be much more useful and also all of us have a smartphone so introducing this feature in phone itself will be very useful.

## **Conclusion**

**January 18,2026**

Today I wrote my conclusion and future directions sections. The conclusion directly addresses my hypothesis confirming it was correct and explaining why the results prove it with such absolute consistency. The future directions section outlines the pathway from my prototype to global implementation, native smartphone integration, workplace UV verification protocols, public UV mirror stations at beaches and schools, AI-powered personalized coverage coaching and follow-up research questions including multi-age group comparisons.

## Reviewing

February 5 ,2026

Today I finalized my reference list in APA format and alphabetized all 21 sources. I also reviewed my entire project for consistency making sure every claim was backed by a citation, every statistic was accurate and every section flowed logically into the next. I checked that my hypothesis was answered directly in my conclusion and that my future directions built naturally from my findings.

## Preperartion

February 13 ,2026

Today I prepared my presentation materials and practiced my speech. I also worked on my presentation video and planned all the shot sequences including the UV camera footage of glowing hands which I identified as the most powerful visual moment of the entire presentation.

## Presenation and editing

February 14 ,2026

Today I made my video and edited it.

